



St. Mary's College (Autonomous)
Reaccredited with 'A+' Grade by NAAC (Cycle IV)
Thoothukudi



Criterion: II – Teaching- Learning and Evaluation
2.2: Catering to Student Diversity
Year: 2018-2023



2.2.1 The institution assesses the learning levels of the students and organises special Programmes to cater to differential learning needs of the student

Programme for Slow Learner
Question Bank

PG

**St.Mary's College (Autonomous)-
Thoothukudi**

**Department of History
P.G Question Bank
2021-2023**

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI

QuestionBank

IM.A. History

Core1

History of India upto 1206 C.E.

Course.Code: 21PHIC11

Semester-I–November2021

(forthosewhojoinedinJuly2021andafter) Answer all

questions

SectionA

Choosethecorrect answer:

Unit-I

1. _____VedacalledasVedasofMagicalforms
a) Yajur b)Rig c)**Atherva** d)Sama
2. Rajataranginiwaswrittenby_____
a) Bihana b)Sudraka c)**Kalhana** d)Kautilya
3. The evidence of brick platform was found at _____
a) Harappa b)**Kalibangan** c)Lothal d)Mohenj-daro
4. Thebronze statueof dancing girl was found at
a) Harappa b)**Mohenjdaro** c)Dholavira d)Lothal
5. Daya Ram Sahini began excavations at Harappa in _____
a)**1921** b)1922 c)1923 d)1920
6. Rice husks are found at _____
a) **Lothal** b)Kalibangan c)Harappa d)Dholavira
7. The _____records found to trade relation with Meluha, which was ancient namesgiven to Indus region.
a) **Mesopotamian** b) Greek c)Arabs d)Chinese
8. _____knownas BookofForest
a) **Aranyakas** b) Brahmanas c)Rig d) Upanishad
9. Jataka stories gives information about previous births of _____
a) **Buddha** b)Mahavira c)Rama d)Kautilya
10. _____consistsof thelawsof Buddhist Sangha
a) Suttapitaka b)**Vinaya Pitaka**c)AbhidhammaPitakad)Mahavamsa

Unit-II

1. Whoputforth theCentral Asiantheoryof OriginalhomeoftheAryans.
a)Galil b)**Maxmuller** c)Macdonlad d)Tilak
2. The head of Vishas called _____
a) Kulapati b)**Vishapati** c)Janapati d)Vishas
3. Whoserved astheambassadorbetweenstates inEarlyVeda
a)**Duttas** b)Gramani c)Senapathi d)Kulapathi
4. Painted Grey Ware has been found in _____
a) Lothal b)**Bhagwanpura** c)Kalibanagan d)Harappa
5. _____was the main Occupation of Early Vedic people.
a)Agricultureb)**Cattle Rearing** c)Fishing d)Hunting
6. Tradeandcommercewereregulatedand managedbyagroupofpeoplecalled_____
a) Nishka b)**Pani** c)Dutas d)Purohitas
7. Whowas23rdTirtangara
a)Mahavira b)**Parsavanath** c)Rishabanath d)Buddha
8. ThefourthBuddhistcouncilwaspatronizedbyKing_____
a) Ashoka b)Kalashoka c)Maurya d)Kanishka
9. WhowrotetheBhuddhistliterature Mahavibhasya?
a) **Ashvagoshab**) Panini c)Paravanathd)Kautilya

10. Who wrote the book 'History of Buddhism'?
a) **Taranath** b) Vasubandhu c) Parsvanath d) Panini
11. The prayer halls of Buddhist monks were known as _____.
a) **Chaitya Hall** b) Rock cut caves c) Pillar Inscriptions d) Stupas
12. Which one of the following was famous for the Indo-Greek school of art?
a) **Gandhara School** b) Mathura School c) Amaravathi School d) Taxila School
13. Who established the rule of Persians in India?
a) **Darius I** b) Xerxes c) Ethiyodorus d) Cyrus I
14. The battle of Jhelum was fought between Alexander and _____.
a) **Porus** b) Ambic c) Ethiyodorus d) Xerxes
15. Who ruled the kingdom of Taxila during the Alexander's invasion in India?
a) **Ambic** b) Porus c) Ethiyodorus d) Xerxes
16. Who wrote the book 'Mudraraksasha'?
a) **Visakadatta** b) Chanakya c) Kalidas d) Bana

Unit-III

1. _____ was the founder of Mauryan Empire.
a) **Chandragupta Maurya** b) Samudra Gupta c) Asoka d) Bindusara
2. _____ was the author of Arthashastra.
a) **Kautilya** b) Megasthenes c) Bhana d) Visakhadatta
3. _____ was also called as Chanakya.
a) **Kautilya** b) Megasthenes c) Bhana d) Visakhadatta
4. Indika was written by _____.
a) **Megasthenes** b) Kautilya c) Bhana d) Visakhadatta
5. _____ was the ambassador sent by Seleukos Nikator to the court of Chandra Gupta Maurya.
a) **Megasthenes** b) Kautilya c) Bhana d) Visakhadatta
6. Mudra – Rakshasa drama was written by _____.
a) **Visakhadatta** b) Kautilya c) Bhana d) Megasthenes
7. Sandrocottus was the _____ name for Chandragupta.
a) **Greek** b) Latin c) Arabic d) Chinese
8. King _____ used the title 'Devanampriya Priyadarsi'.
a) **Asoka** b) Bindusara c) Chandragupta Maurya d) Samudra Gupta
9. _____ was the capital of Mauryas.
a) **Pataliputra** b) Kosala c) Kusinagara d) Vidarbha
10. _____ were called as 'Amitraghata' by Greek writers.
a) **Bindusara** b) Asoka c) Chandragupta Maurya d) Samudra Gupta
11. _____ earned the title 'Chandasoka'.
a) **Asoka** b) Bindusara c) Chandragupta Maurya d) Kanishka
12. Asoka was converted into Buddhism after the war of _____ by the monk Upagupta.
a) **Kalinga** b) Magadha c) Taxila d) Pataliputra
13. The state under _____ was a 'Welfare State' and not a 'Police State'.
a) **Asoka** b) Bindusara c) Chandragupta Maurya d) Kanishka
14. Asoka introduced a new change in the administration of the appointment of new class of officers known as _____.
a) **Dharma Mahamatras** b) Yutas c) Rajukas d) Pradesikas
15. _____ inscriptions mention the personal name of Asoka.
a) **Maski** b) Bharkut c) Saranath d) Girnar
16. Asoka convened a Buddhist Council at _____.
a) **Pataliputra** b) Kosali c) Vadabhi d) Vidarbha

17. For the convenience of administration, the Mauryan empire was divided into _____.
- a) **Provinces** b) Rajyas c) Rajukas d) Ur
18. The lowest unit of administration of the village during the Mauryan period was _____.
- a) **Grama** b) Aharas c) Rajyas d) Ur
19. _____ was the last king of Maurya dynasty.
- a) **Brihadratha** b) Danananda c) Dasharatha d) Devadharma
20. _____ was the founder of Sunga dynasty.
- a) **Pushyamitra Sunga** b) Brihadratha c) Agnimitra d) Asoka
21. _____ was the founder of the independent Greek kingdom of Bactria.
- a) **Diodotus I** b) Antiochos I c) Euthydemos d) Eukratides
22. Parthian Empire was founded by _____.
- a) **Arsaces I** b) Antiochos I c) Euthydemos d) Eukratides
23. _____ was the founder of the Kushan dynasty.
- a) **Kadphises I** b) Kanishka c) Asoka d) Chandragupta Maurya
24. Kushans were belonged to the great nomadic _____ tribe.
- a) Yu-chi b) Huns c) Mangolians d) Parthians
25. Kanishka started a new era named _____.
- a) **Saka Era** b) Kaliyuga c) Kollam Era d) Ancient Era
26. _____ poet who flourished in the court of Kanishka.
- a) **Asvaghosha** b) Kautilya c) Kanishka d) Megasthenes
27. _____ was the author of Buddha Charita.
- a) **Asvaghosha** b) Kautilya c) Kanishka d) Megasthenes
28. Kanishka convened the fourth Buddhist council at _____.
- a) **Jullundur** b) Allahabad c) Kanauj d) Purushapura
29. _____ presided over the fourth Buddhist council.
- a) **Vasumitra** b) Nagarjuna c) Asvaghosha d) Charaka
30. Mahavibhasha Sastra was written by _____.
- a) **Vasumitra** b) Nagarjuna c) Asvaghosha d) Charaka
31. Namethat which developed during the period of Kanishka.
- a) **Gandhara** b) Madhura c) Amaravathi d) Dravidian
32. Which one of the following title earned by Kanishka for the spread of Buddhism?
- a) **Asoka II** b) Samudra Gupta c) Harsha d) Vasudeva
33. _____ School was famous for the Indo-Greek Art.
- a) **Gandhara** b) Madhura c) Amaravathi d) Taxila
34. _____ was the founder of Satavahan dynasty.
- a) **Pushyamitra Sunga** b) Asoka c) Vasudeva d) Kadphises I

Unit-IV

1. Gupta dynasty was founded by _____.
- a) **Sri Gupta** b) Skanda Gupta c) Kumara Gupta d) Samudra Gupta
2. _____ earned the title 'Kaviraja'.
- a) **Samudra Gupta** b) Skanda Gupta c) Kumara Gupta d) Sri Gupta
3. _____ was called as 'Indian Napoleon'.
- a) **Samudra Gupta** b) Skanda Gupta c) Kumara Gupta d) Sri Gupta
4. _____ was called as 'Mahendraditya'.
- a) **Kumara Gupta** b) Sri Gupta c) Samudra Gupta d) Skanda Gupta
5. _____ was the founder of Nalanda University.
- a) **Kumara Gupta** b) Sri Gupta c) Samudra Gupta d) Skanda Gupta
6. _____ was one of the famous astronomers in the court of Samudra Gupta.

- a) **Aryabhata** b) Sarakar c) Susrutha d) Vakpatar
7. Allahabad Pillar Inscription was composed by _____.
- a) **Harisena** b) Chandra Gupta c) Simuka d) Vasudeva
8. _____ Chinese pilgrim visited India during the reign of Chandra Gupta II.
- a) **Fa-hien** b) It-sing c) Hiuen-Tsang d) Yu-chi
9. 'Si – Yu – Ki' book was written by _____.
- a) **Fa-hien** b) It-sing c) Hiuen-Tsang d) Yu-chi
10. Navaratnas adorned the court of _____.
- a) **Chandra Gupta II** b) Sri Gupta c) Kumara Gupta d) Skanda Gupta
11. _____ period was considered as the Golden Age and Augustan Age in Indian history.
- a) **Guptas** b) Mauryas c) Sungas d) Satavahanas
12. _____ wrote two great epics 'Raghuvamsa' and 'Kumarasambhavam'.
- a) **Kalidasa** b) Sudraka c) Harisena d) Kanishka
13. The famous Chinese pilgrim who visited India during the time of Harsha _____.
- a) **Hiuen – Tsang** b) It-sing c) Fa-hien d) Nicolo Conti
14. Prince of Pilgrims was the name attributed to _____.
- a) **Hiuen – Tsang** b) It-sing c) Fa-hien d) Megasthenes
15. Harshacharita was written by _____.
- a) Bana b) Kalhana c) Kalidasa d) Dandin
16. Kanauj assembly was convened by _____.
- a) **Harsha** b) Asoka c) Kanishka d) Bindusara
17. Kanauj assembly was presided over by _____.
- a) **Hiuen – Tsang** b) It-sing c) Fa-hien d) Megasthenes
18. Harsha convened the great Prayag and Kanauj Assembly in the year _____.
- a) **643 AD** b) 543 AD c) 343 AD d) 443 AD
19. Harsha was attracted towards Mahayanism by _____.
- a) **Hiuen – Tsang** b) It-sing c) Fa-hien d) Megasthenes

Unit-V

1. Arabs conquered Sindh in _____ A.D
- a) 812 b) 612 c) **712** d) 912
2. Who was the first king of Pala dynasty
- a) Dharmapala b) **Gopala** c) Devapala d) Narayan pala
3. Who founded the famous Buddhist University at Vikramashila
- a) **Dharmapala** b) Gopala c) Devapala d) Narayan pala
4. _____ founder of Pratihara Dynasty
- a) Nagabhata I b) **Harichandra** c) Vatsaraja d) Nagabhata II
5. Which Pratihara King rebuilt the Somanath Temple
- a) Nagabhata I b) Vatsaraja c) **Nagabhata II** d) Mihir Bhoja
6. Who was the founder of Rashtrakuta Dynasty
- a) Krishna I b) Govinda III c) **Dantidurga** d) Vatsaraja
7. The Ramacharita was written by _____
- a) **Sandhyakara Nandi** b) Dhananjaya c) Bhoja d) Rajashekara
8. Who was head of the first Arab Conquest of Sind
- a) Muhammad of Ghazni b) **Muhammad Bin Qasim** c) Al-Hajaj d) Muhammad of Ghori
9. In which year Ghazni invaded Kalinjar and Gwalior
- a) **1022** b) 1020 c) 1021 d) 1001
10. Which was the last expedition of Muhammad of Ghazni
- a) **Jats** b) Somnath c) Kannauj d) Punjab

Section B

Answer in about 50 words each: Unit –

I

1. Discuss a note on Paleolithic Age.
2. Explain the Four Vedas.
3. Summarize the religious condition of Indus Valley Civilization.
4. Distinguish the two epics of Ancient India.
5. Illustrate a note on Arthashastra.
6. Discuss a short note on Indika.
7. Explain Mudra– Rakshasa of Visakhadatta.
8. Explain the importance of Rajatarangini.
9. Write a note on Great Bath.
10. Explain the structure of Great Granaries found at Harappa.
11. Differentiate age of Mesolithic and Neolithic.
12. Write a note on Indus Script.

Unit–II

1. Discuss a note on Three Ratnas.
2. Explain the work of Two popular Assemblies.
3. Summarize the Fourth Buddhist Council and its impact.
4. Distinguish the Early Life of Buddha.
5. Write a note on Economic Condition of Rig Vedic Age.
6. Sketch a short note on Early Vedic Gods.
7. Explain different types of Marriages in Later Vedic Age.
8. Summarize the Philosophy of Mahavira.
9. Write a note on Nanda Dynasty.
10. Summarize the Republic states in 6th century.
11. Explain the result of Invasion of Greeks.

Unit–III

1. Write a short note on Arthashastra.
2. Sketch a note on Indika.
3. Explain Mudra– Rakshasa of Visakhadatta.
4. Describe the Indian Buddhist literature.
5. Illustrate a note on Ceylonese Chronicles of Mauryas.
6. Define Kalinga War and its importance.
7. Assess the Panchayat Boards of Mauryan Empire.
8. List out the names of the Asoka Edicts.
9. Illustrate a note on Kadphises I.
10. Write a short note on Saka Era.
11. Sketch a note on Buddha Charita.
12. Summarize an account of Mahayanism.

Unit–IV

1. Write a short note on work of Devichandragupta.
2. Sketch a note on Allahabad Pillar Inscription.
3. Explain the Asvamedha type coins during Gupta period.
4. Illustrate the Navaratnas during Gupta period.
5. Explain a short note on Nalanda University.
6. List out the names of Ministers during Gupta period.
7. Summarize the works of Kalidasa.

8. Estimate the works of Sudraka.
9. Assess the work of Visakadatta.
10. Narrate the work of Bharavi.
11. Interpret the assembly of Prayag during Harsha period.

Unit-V

1. Write a short note on the ruler Pulakesin I.
2. Sketch an account of the Chinese pilgrim Hiuen-Tsang during the visit of Pulakesin II.
3. Explain the Chalukyan style of architecture.
4. Define the term 'Rashtrakutas'.
5. Summarize the work of Amoghavarsha.
6. Write a note on Invasion of Muhammad Bin Qasim.
7. Sketch a note on University of Vikramashila.
8. Summarize the societal condition of Post-Gupta Period.
9. Explain the Architecture in Post Gupta period.
10. Write a note on First Battle of Tarain.

Section C

Answer in about 200 words each: Unit –

I

1. Summarize the Arts and Crafts of Indus Valley Civilization.
2. Discuss the Archaeological Sources for Ancient India.
3. Summarize the Vedic Literature to write about the Vedic Age.
4. Interpret the Paleolithic and Mesolithic age and tools.
5. Examine the excavation of Adichanallur.
6. Assess the importance of archaeological excavations of Sivagalai.
7. Examine the Town Planning system of Indus Valley Civilization.
8. Narrate the Socio, Economic condition of Indus Valley Civilization.
9. Analyse the trade system of Indus Valley Civilization.
10. Examine the Foreign Accounts of Ancient Indian History.

Unit-II

1. Summarize the Four Buddhist Councils and its impact.
2. Discuss the Causes for the Rise of New Religious Movements.
3. List out the meritorious features of Jainism.
4. Examine the impact of Persian Invasion.
5. "The Greek invasion was a turning point in the History of India"-Explain.
6. Narrate the socio, economic condition of Early Vedic Age.
7. Examine the Art and Architecture of Buddhism.
8. Assess causes for Rise of New Religious Movements.
9. Summarize the Religious Condition and Gods of Early Vedic Age.
10. Analyse the Political structure of sixteen Mahajanapadas.

Unit-III

1. Appraise the literary sources of the Mauryan period.
2. Assess the Archaeological Sources of Ancient India.
3. Interpret the religious sources of Mauryan Empire.
4. Describe the empire of Bindusara.
5. Analyse the conquest and Asoka's extent of his Empire.

6. Explain the historical importance of Asoka's Inscriptions.
7. Estimate Asoka's contribution of Dharma Mahamatras to Buddhism.
8. Narrate the effect of Indo-Greek rule in India.
9. Describe the development of Parthian rule in India.
10. Examine the conquest of Kanishka.

Unit-IV

1. Explain the expedition of Chandra Gupta I.
2. Distinguish the differences between North Indian and South Indian Expedition of Samudra Gupta.
3. Summarize the seven types of coins struck by Samudra Gupta.
4. Assess the Mantri Parishad during Gupta period.
5. Analyze the political condition of Guptas.
6. Narrate the provincial, district and village administration during Gupta period.
7. Describe the rise of Huns Invasion over India.
8. Interpret the assembly of Kanauj during Harsha period.

Unit-V

1. Estimate the Western Chalukyas of Badami.
2. Analyze the conquest of Pulakesin II.
3. Analyze the significant contributions of Pala to art and literature.
4. Examine the reasons for the Arab invasion of Sindh.
5. Assess the political, social, economic and religious impact on the conquest of Arab invasion in India.
6. Describe the expeditions of Muhammad Ghazni.
7. Assess the various expeditions of Muhammad Ghori.
8. Describe the Art and Architecture in Post Gupta period.
9. Examine the religion and philosophy in Post Gupta Period.
10. Narrate the political History of Pala Dynasty.

Section D

Answer in about 400 words each:

Unit-I

1. Distinguish Literary Sources of Ancient India.
2. Examine the significant features of Indus Valley Civilization.
3. Describe the various sources to write the history of Ancient India.
4. Examine the Archaeological sources for Ancient Indian History.
5. Analyze the trade system of Indus Valley Civilization.
6. Examine the Foreign Accounts of Ancient Indian History.
7. Analyze the Pre-historic and Historic Period.
8. Examine the Archaeological Excavations of Adichanallur and Kondagai.
9. Analyze the Archaeological Excavations of Mayiladumpara and Sivagalai.

Unit II

1. Evaluate the political, social, economic and religious conditions of Early Vedic Age.
2. Elaborate the Birth and Teachings of Buddha and its Councils.
3. Examine the Early life and Teachings of Buddha.
4. Analyze the impact of Buddhism and point out the causes for its decline.
5. Alexander's invasion of India is an important event"- Explain.
6. Analyze the Political history of Sixteen Mahajanapadas.
7. Elaborate the Teachings and Sangha of Mahavira.
8. Examine the Causes for the Rise of Religious Movements.
9. Elaborate the Spread of Jainism and Buddhism.

10. Analyze the causes for the decline of Buddhism.

Unit III

1. Examine the sources of the Mauryan Empire.
2. Analyze the conquest of the Mauryan ruler Chandra Gupta Maurya.
3. Evaluate the reforms of Asoka as an administrator.
4. Estimate the provincial, military and revenue administration of Mauryas.
5. Narrate the place of Kanishka in the History of India as Second Asoka.
6. Analyze the political history of Satavahanas.
7. Describe the development of Art and Architecture during the period of Satavahanas.
8. Analyze the contributions of Chandra Gupta Maurya as the builder of the Mauryan Empire.
9. Assess the contributions of Asoka to the services of Buddhism.
10. Examine the administration of Mauryas.
11. Estimate the economic condition of Mauryan Empire.
12. Narrate the growth of Art and Architecture of Mauryan Empire.
13. Describe Kanishka as the patron of art and letters.

Unit-IV

1. Examine the sources of the Gupta period.
2. "Samudra Gupta was considered as Indian Napoleon" – Estimate.
3. Evaluate the marriage alliances and conquests of Chandra Gupta II.
4. Analyze the administration of Guptas.
5. Describe the growth of literature during Gupta period.
6. Assess the growth of Education during Gupta period.
7. Examine the effects of the Huns Invasion over India.
8. Analyze the charity and patron of art and letters of Harsha.
9. Assess the Hiuen – Tsang account of India.
10. "Gupta period was considered as the 'Golden Age' in History" – Evaluate.
11. Assess the growth and development of science during Gupta period.
12. Examine the causes for the failure of Huns Invasion over India.
13. Analyze the administration of Harsha.

Unit- V

1. Evaluate the Eastern Chalukyas of Vengi.
2. Describe the growth of architecture during Chalukyas.
3. Analyze the significant contributions of Rashtrakutas to art and literature.
4. Narrate the polity and administration of Rashtrakutas.
5. Examine the effects of the Arab conquest of Sindh.
6. Estimate the invasion of Muhammad Ghori and its impact.
7. Assess the difference between the invasion of Muhammad Ghazni and Ghori.
8. Assess the cultural contributions of Chalukyas.
9. Distinguish the branches between Chalukyas.
10. Assess the significant contributions of Rashtrakutas to cultural development.
11. Analyze the significant contributions of Prathikaras to art and literature.
12. Examine the causes of the Arab conquest of Sindh.
13. Estimate the invasion of Muhammad Ghazni and its impact.

ST. MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001

Question Bank

I M.A. History

Core 2 Ancient World Civilisations (Excluding India) Sub. Code:21PHIC12

Semester – I November 2021

(for those who joined in July 2021 and after)

Answer all questions

Section – A

Choose the correct answer:

Unit I

- _____ indicates an advanced stage of human social and cultural development.
a) **Civilization** b) Culture c) Paleolithic Age d) Beliefs
- The beliefs, customs, and way of life shared by a group of people is called _____.
a) Civilization b) **Culture** c) Paleolithic Age d) Beliefs
- The word Civilization is derived from _____ language
a) **Latin** b) Roman c) Greek d) Persian
- Paleolithic Age is also known as _____.
a) Bronze Age b) Chalcolithic Age c) **Old Stone Age** d) New Stone Age
- _____ is also known as New Stone Age.
a) Paleolithic Age b) **Neolithic Age** c) Bronze Age d) Chalcolithic Age
- Egyptian civilization flourished on the banks of river _____.
a) Indus b) Huang Tse c) **Nile** d) Amazon
- _____ civilization flourished on the banks of river Euphrates and Tigris
a) **Mesopotian** b) Egyptian c) Greek d) Persian
- Chinese civilization flourished on the banks of river _____.
a) Indus b) **Huang Tse** c) Nile d) Amazon

Unit – II

- Rivers Tigris and Euphrates are associated with _____.
(a) **Mesopotamian Civilization** (b) Egyptian Civilization (c) Harappa Civilization
(d) Chinese Civilization
- The Greek word Mesopotamia means _____.
(a) Between mountains (b) **Between rivers** (c) Between seas (d) Between lands
- _____ was the script of Mesopotomians.
(a) **Cuneiform** (b) Hieroglyphics (c) Brahmi (d) Archaic
- Nebuchadnezzar built the famous _____.
(a) **Hanging Gardens** (b) Pyramid of Ghiza (c) Sphinx (d) Statue of Sargon I
- _____ is considered as the world's first law giver.
(a) Alexander (b) Nebuchadnezzar (c) **Hammurabi** (d) Nannar
- Marduk was the chief God of _____ civilization.
(a) **Mesopotamian Civilization** (b) Egyptian Civilization (c) Harappa Civilization
(d) Chinese Civilization

7. Gilgamesh was the ruler of _____
 (a) Kish (b) Ur (c) **Uruk** (d) Lagesh
8. The Patron deity of Ur was _____.
 (a) **Nanna** (b) Zeus (c) Sphinx (d) Ra
9. The religious ceremonies of Sumerians took place in _____.
 (a) pyramids (b) houses (c) churches (d) **ziggurat**
10. _____ called Egypt, the gift of Nile.
 a) **Herodotus** b) Homer c) Thucydides d) Hammurabi
11. Egyptian Civilisation developed along the river _____.
 a) Indus b) Yellow c) Tigris (d) **Nile**
12. The term Pharaoh referred to _____.
 a) Temple b) King's Palace (c) **King** d) Pyramid
13. _____ is the meaning of the word "pharaoh".
 a) Great Leader b) Emperor (c) **Great House** d) God
14. King Menas founded the capital of Ancient Egypt at _____.
 a) Cairo b) Athens (c) **White walls** d) Sparta
15. Who discovered the Rosetta stone?
 a) **Francois Champollion** b) Christopher Columbus c) Mortimer Wheeler d) Gordon Childe
16. The Kushites were driven out of Egypt in 670 by _____.
 a) Romans b) Greeks c) Persians (d) **Assyrians**
17. Emperor _____ is known as the Napoleon of Egypt.
 a) Thutmose I (b) **Thutmose III** c) Menes d) Khufu
18. _____ was the script of Mesopotomians.
 a) Cuneiform (b) **Hieroglyphics** c) Brahmi d) Archaic
19. The word Hieroglyph means _____.
 a) Script (b) Mountains (c) **Sacred carvings** d) Nile river

Unit III

1. _____ was the center of Assyrian empire
 a) **Mesopotomia** b) Egypt (c) China (d) India
2. Cyrus the Great of Persia conquered the Medes in _____.
 a) 245 BC (b) **550 BC** c) 590 BC d) 675 BC
3. Which among the following is a Median King?
 a) Nebuchadnezzar (b) **Cyaxes** c) Alexander d) Julius Ceaser
4. _____ put an end to the glory of Persian state.
 a) Nebuchadnezzar b) Cyaxes (c) **Alexander** d) Julius Ceaser
5. Alexander the great put an end to the Persian state in _____.
 a) 245 BC (b) **331 BC** c) 430 BC d) 675 BC
6. Zarathustra founded _____.
 a) **Zoroastrianism** b) Confucianism c) Taoism d) Jainism
7. Ahura Mazda is considered as the all powerful God by _____.
 a) Egyptians b) Greeks (c) **Persians** d) Romans
8. _____ is considered as the Bible of Persians.
 a) Zenta b) Ramayana c) Quran (d) **Avesta**

Unit – IV

1. _____ is also called the Yellow River.
a) Nile **b) Hwang-Ho** c) Tigris d) Indus
2. _____ is also called the sorrow of China.
a) Nile **b) Hwang-Hoc** c) Tigris d) Indus
3. _____ built the Great Wall of China
a) Fu Xi b) Wu Wang c) Lao Tze **d) Shi Huang Ti**
4. The first historical dynasty of China is _____.
a. Xia dynasty b. Zhou dynasty **c. Shang dynasty** d. Ming dynasty
5. The supreme god of Shang dynasty is _____.
a. Shangdi b. Tian c. Zhou d. Wei
6. Who founded Taoism?
a. Confucius **b. Lao-Zic.** T'ao Hung-ching d. Xin –zi

Unit – V

1. The first Greek civilization to develop was _____.
a) The Minoan **b) The Mycenaean** c) The Ionian d) The Spartan
2. The Greek word for city-state is _____?
a) Hoplite **b) Polis** c) Agora d) Parthenon
3. Which city-state created the first democratic form of government?
a) Sparta b) Corinth c) Argos **d) Athens**
4. Who took Athenian democracy to its highest form through the promotion of arts & sciences?
a) Pericles b) Pythagoras c) Phidias d) Plato
5. _____ built the first Greek Empire.
a) Alexander b) Pythagoras c) Phidias d) Philip
6. Iliad and Odyssey were written by _____.
a) Homer b) Pythagoras c) Plato d) Philip
7. The Republic was written by _____.
a) Homer b) Pythagoras **c) Plato** d) Philip
8. _____ is known as the father of History.
a) Homer **b) Herodotus** c) Plato d) Philip
9. _____ is considered as the father of western medicine.
a) Homer **b) Hippocratus** c) Plato d) Philip
10. Parthenon, the temple of Athena is situated in _____.
a) Athens b) Sparta c) Thebes d) Corinth
11. The city of Rome was founded in _____.
a) BC 753 b) BC 500 c) BC 780 d) BC 900
12. The city of Rome was founded by _____.
a) Romulus and Remes b) Romulus and Alexander c) Romens and Julius Caesar
d) Romulus and Augustus Caesar
13. _____ river flows through the center of Italy.
a) Tiber b) Nile c) Indus d) Yellow River
14. _____ was the leader of Roman Republic who was assassinated on the Ides of March.
a) Octavian Caesar b) Alexandere) **Julius Caesar** d) Augustus Caesar
15. Julius Ceaser was murdered in _____.
a) BC 53 b) BC 50 c) BC 78 **d) BC 44**

16. History of Rome was written by _____

a) **Livy** b) Tacitus c) Herodotus d) Homer

17. The emperor who made Christianity the official religion in the Roman Empire was

_____.

(a) Alexander (b) Augustus (c) **Constantine** (d) Nero

18. _____ were the two main classes of people in Ancient Rome.

a) **Patricians and Plebians** b) Plebians and slaves c) Slaves and patricians d) Hellans and romans

19. _____ was the brave Carthagian General.

(a) Alexander (b) Augustus (c) **Hannibal** (d) Nero

20. The period of _____ is considered as the Golden Age of Roma

(a) Alexander (b) **Augustus** (c) Constantine (d) Nero

Section – B

Answer in about 50 words each:

Unit – I

1. Define Civilization
2. Write a note on Culture
3. Explain about Paleolithic Culture
4. Give an account on Neolithic Culture
5. Write about the significance of rivers for the Cradle of Civilisation

Unit II

6. Explain about Cuniform Script.
7. Give an account on Code of Laws
8. Write about Fertile Crescent
9. List out the importance of Code of Hammurabi
10. State the significance of Ziggurat
11. Sketch the importance of Epic of Gilgamesh
12. Summarise the history of Hieroglyphics
13. Write a note on Pyramids
14. Explain the characteristics of Sphinx
15. Illustrate the prominence of Pharoah
16. Exemplify the importance of Pyramid of Giza

Unit III

17. Give an account on social life of the Mesopotamian Civilisation.
18. Explain about the origin of Chaldean Civilisation.
19. Write about the culture of Hittites
20. Give an account on Zorastrianism

Unit – IV

21. Give an account on Athens
22. Define Roman Democracy

23. Write about City states
24. Explain about the historicity of Sparta
25. Give an account on Herodotus and his works
26. Explain the Homer and two epics.
27. Summaries the philosophical ideas of Plato
28. List out the importance of Senate
29. Outline the significance of Roman Republic
30. Discuss the Code of Hammurabi
31. Describe the Justinian Laws
32. Illustrate the history of Laws of Twelve Tables
33. Explain about Punic Wars
34. Discuss the road facilities of Roman Civilisation

Unit – V

35. Give an account on Great Wall
36. Assess the contributions of Chinese philosophers
37. Write a note on Lao Tze
38. Explain the influence of Confucius and his philosophical ideas
39. List out the characteristic features of Inca Civilisation

Section – C

Answer in about 200 words each choosing either (a) or (b):

Unit – I

1. Point out the differences between culture and civilization.
2. Explain the origin and growth of civilisation.
3. Give an account on Neolithic Culture.
4. Write about the rivers as the resource for the growth of civilization.

Unit – II

1. Briefly assess the religion of Mesopotamian Civilization.
2. Write a short note on the contributions of Mesopotomian civilization in the realm of science and astronomy.
3. Write a short note on the contributions of Egyptian Civilisation to Architecture and Sculpture.
4. Give an account of the political condition of Egypt.
5. Give an account of socio-economic condition of Egyptian Civilisation.
6. Briefly explain the religious condition of Egypt.
7. Sketch the importance of script and literature in Egyptian civilization.

Unit – III

1. Critically assess the importance of Assyrian civilization.
2. Give an account on social life of the Mesopotamian Civilisation.
3. Examine the political life of Babylonians.
4. Examine the achievements of Nebuchadnezzar II.

Unit – IV

1. Comment on the religion and philosophy of ancient China.
2. Examine the Contribution of Mayan Civilisation to Science.
3. Give an account of the trade and commerce of China.
4. Write about the contribution of Incas to medicine.

Unit – V

1. Give an account of Greek democracy.
2. Write a short note on Spartan hegemony.
3. Give an account of Hellenistic culture
4. Assess the Golden Age of Pericles.
5. Write a short note on Greek philosophy.
6. Assess the significance of Greek architecture.
7. Analyse the socio-economic condition of Rome.
8. What are the contribution of Roman Civilisation to Art and Architecture.
9. Explain the significance of Roman Laws.
10. Briefly assess the significance of religion in Roman society.
11. Assess the period of Augustus Caesar as the Golden Age of Rome.

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit – I

1. Evaluate the differences between the culture and civilisation.
2. Analyse the growth of Paleolithic Culture.
3. Explain the origin and growth of civilisation.
4. Explain the importance of Pre-historic Period.
5. Outline the special features of culture.

Unit – II

1. Examine the Contribution of Sumerian Civilisation to the World.
2. Write an essay on the contributions of Mesopotomian civilization.
3. Assess the polity, economy and society of Egyptian Civilization.
4. Enumerate the contribution of Egyptian civilization.
5. Write an essay on Egyptian Civilization.

Unit – III

1. Assess the significance of Assyrian civilization.
2. Discuss the achievements of Ashurbanipal.
3. Examine the causes for the decline of Assyrian Civilisation.
4. Analyse the condition of Babylonians after Hamurabi.
5. Explain the importance of Hittites architectural style

Unit – IV

1. Assess the socio-economic conditions of Ancient China.
2. Give an account of the contributions of Chinese Civilization.
3. Analyse the contributions of Chinese Philosophers and Thinkers.
4. Evaluate the administrative system of Aztec Civilisation.
5. Explain about the achievements of Tokugawa Shogun.

Unit – V

6. Comment on the Golden Age of Pericles.
7. Elucidate the legacy of Greek civilization.
8. Assess the contributions of Greek civilization.
9. Assess the contributions of Roman civilization to the world.
10. Critically evaluate the significance and the legacy of Rome.
11. Assess the causes for the decline of Roman Empire.
12. Comment of the Classical Age of Roman Civilization.

St. Mary's College (Autonomous) – Thoothukudi
Question Bank
I M.A. History

Core 3 History of Tamil Nadu upto 1336 C.E Sub. Code: 21PHIC13
Semester I – November 2021
(for those who joined in June 2021 and after)

Answer all questions
Section – A

Choose the correct answer:

Unit – I

1. The Eastern Ghats and Western Ghats meet at _____.
a) **Nilgris** b) Elagiri c) Sivagiri d) Gudalur
2. The height of the Doddabetta peak is _____.
a) 8841 b) **8760** c) 8800 d) 8770
3. _____ is the largest river in South India.
a) **Kaveri** b) Tamiraparani c) Vaigai d) Palar
4. _____ has come to be called as 'the rice bowl of Tamilaham'.
a) Srirangam b) Madurai c) **Tanjore** d) Tirunelveli
5. The Sangam works were _____ in character.
a) Unique b) **Secular** c) Socialist d) Religious
6. _____ was called as the 'Father of History'.
a) **Herodotus** b) Ptolemy c) Megasthenese d) Periplus
7. _____ was called as the 'Prince of the Travelers in the middle age'.
a) Iben-Bettuta b) **Marco Polo** c) Fa-hien d) Hiuen-Tsang
8. _____ is the study of Inscriptions.
a) Numismatics b) Archaeology c) **Epigraphy** d) Literary Sources
9. Allahabad Pillar Inscription described the achievements of the ruler _____.
a) **Samudra Gupta** b) Sri Gupta c) Chandra Gupta Maurya d) Asoka
10. Coins are otherwise known as _____.
a) **Numismatics** b) Inscriptions c) Archaeology d) Literature
11. _____ was a pioneer in the field of South Indian Archaeology.
a) Mortimer Wheeler b) **Bruce Forte** c) Alexander Cunningham d) Jagor
12. Adichanallur is in _____ district.
a) Tirunelveli b) Virudhunagar c) **Thoothukudi** d) Ramanathapuram
13. The Director, Mortimer Wheeler of Archaeological Department conducted excavation works at _____.
a) Adichanallur b) Korkai c) Uraiur d) **Arikkamedu**
14. Tolkappiam was written by _____.
a) Valmiki b) **Tolkappiar** c) Thiruvalluvar d) Illango Adigal
15. _____ built a temple for Kannaki at Vanchi.
a) Udayan Cheral b) Imayavarampan
c) **Cheran Senguttuvan** d) Perum Cheral Irumporai
16. _____ visited Tamil Nadu during the rule of Cheran Senguttuvan.
a) **Gajabahu I** b) Cosmos c) Perum Cheral Irumporai d) Imayavarampan
17. Manimekalai was composed by _____.
a) Ilango Adigal b) Appar c) Perialwar d) **Sattanar**
18. _____ was the capital of the Cheras.

- a) **Vanji-Karur** b) Kanchipuram c) Uraiyur d) Puhar
19. _____ was the greatest of the Chola Kings of the Sangam Age.
a) Vijayalaya b) Raja Raja I c) **Karikalan** d) Rajendra I
20. _____ means 'Killer of Elephant'.
a) Raja Raja I b) Rajendra I c) Kulottunga I d) **Karikalan**
21. _____ deserves the title 'Karikal Peru Valathan'.
a) **Karikalan** b) Raja Raja I c) Vijayalaya d) Rajendra I
22. The famous achievement of Karikalan was _____.
a) **Kallanai** b) Pamban bridge c) Mamallapuram d) Sittannavasal
23. _____ was the founder of the third sangam.
a) Ukkiraperuvaludi b) **Mudathirumarana** c) Kayasinavaludi d) Kadungan
24. _____ was responsible for spreading Jainism in South India.
a) **Bhadrabahu** b) Sittalaisattana c) Illango Adigal d) Bhakhas
25. The leading poet of the Sangam Age was _____.
a) Thiruvalluvar b) **Tolkappiar** c) Naladiar d) Nachinarkiniyar
26. The God of Mullai land was _____.
a) Murugan b) Varuna c) **Indira** d) Thirumal
27. The followers of Lord Siva were called _____.
a) Bhakhas b) Vaishnavaites c) **Nayanmars** d) Alwars
28. The Term 'Varna' is used for _____.
a) **Caste** b) Colour c) race d) religion
29. The period of Kalabhras is called as _____ in the history of Tamil Nadu.
a) **Dark Age** b) Augustan Age c) Golden Age d) Elizabethan Age

Unit – II

30. The Pallavas ruled _____ as their capital.
a) Tanjore b) **Kanchipuram** c) Uraiyur d) Korkai
31. _____ is an important centre of painting during the Pallava period.
a) Mamallapuram b) Kudumiyamalai c) **Sittannavasal** d) Kanchipuram
32. Vaikundaperumal temple is located at _____.
a) **Kanchipuram** b) Mamallapuram c) Thanjavur d) Madurai
33. _____ earned the title 'Vichitrachitta'.
a) Simhavishnu b) Narasimhavarman c) **Mahendravarman I** d) Narasimhavarman II
34. The author of "Matha Vilasa Prahasana" was _____.
a) **Mahendravarman I** b) Narasimhavarman I c) Simha Vishnu d) Appar
35. _____ assumed the title 'Vatapikonda'.
a) **Narasimhavarman I** b) Nandivarman II c) Dandivarman d) Mahendravarman I
36. Hiuen-Tsang visited Kanchi during the period of _____.
a) Mahendravarman I b) Simha Vishnu c) **Narasimhavarman I** d) Dandivarman
37. Hiuen-Tsang, the famous Chinese pilgrim visited Kanchi in _____.
a) 650 A.D. b) 648 A.D. c) 640 A.D. d) **642 A.D.**
38. The reign of _____ was considered as golden age in the history of Pallavas.
a) Simhavishnu b) Nandivarman II c) **Narasimhavarman I** d) Mahendra Varman I
39. The battle of Thirupurampiam was fought in the year _____.
a) **880 A.D.** b) 642 A.D. c) 630 A.D. d) 891 A.D.
40. _____ was the principal sea-port of the Pallavas.
a) Kanchipuram b) **Mamallapuram** c) Korkai d) Uraiyur

41. The land tax collected from the people was called _____.
 a) **Visakkanam** b) Lattukkayam c) Tattukanam d) Paraikkanam
42. The tax collected from the goldsmith was called _____.
 a) Tattukanam b) Paraikkanam c) **Lattukkayam** d) Visakkanam
43. The Seven Pagodas are seen at _____.
 a) **Mahabalipuram** b) Mamandur c) Kanchi d) Mahendravadi
44. The _____ inscription of Pudukkottai threw much light on science and music.
 a) Anaimalai b) Tirukovalur c) Tirumayyam d) **Kudumiyanmalai**
45. The Tirumayam inscription was a _____ inscription.
 a) **Musical** b) Painting c) Dancing d) Art
46. _____ was one of the prominent weaving centres under the Pallavas.
 a) Madurai b) **Kanchi** c) Tiruppur d) Mamallapuram
47. In _____, a separate Tamil Sangam was organized to promote Tamil language and to spread Jainism.
 a) 400 A.D. b) 576 A.D. c) **476 A.D.** d) 555 A.D.

Unit – III

48. _____ was the founder of the I Pandyan Empire.
 a) **Kadungon** b) Sendan c) Arikesari Maravarman d) Varaguna I
49. _____ took the title of Vanavan.
 a) Varaguna I b) **Sendan** c) Arikesari Maravarman d) Jatila Parantaka Nedunjadayan
50. _____ period was described as an age of Saivite religious renaissance in the Pandyan country.
 a) Kadungon b) Jatila Parantaka Nedunjadayan c) **Arikesari Maravarman** d) Sendan
51. ‘Emmandalamum Kondan and Kovil Ponveynta Perumal’ titles were assumed by _____.
 a) Maravarman Sundara Pandya I b) **Jatavarman Sundara Pandya I**
 c) Maravarman Kulasekhara I d) Jatavarman Kulasekhara I
52. _____ assumed the title like ‘Kollamkonda’ after conquering Quilon from Cheras.
 a) Arikesari Maravarman b) Sendan c) Kadungond) **Maravarman Kulasekhara I**
53. Pandyas conducted pearl fishing at _____.
 a) **Thoothukudi** b) Kayalpattinam c) Tiruchendur d) Rameswaram
54. The village established in the name of Maravarman Sundara Pandyan was _____.
 a) Paravai b) **Sadurvedi Mangalam** c) Kochadai d) Talaialunganam
55. The foreign traveler who visited Pandya Country was _____.
 a) Fa-hien b) Hiuen-Tsang c) **Marco-Polo** d) Al Beruni
56. Archana bhogam lands were assigned to _____.
 a) **Brahmins** b) Feudal Lord c) Artisans d) Soldiers
57. _____ was the famous centre for horse and pearl trade.
 a) **Kayal** b) Madurai c) Tanjore d) Tenkasi

Unit – IV

58. _____ founded the Imperial Chola dynasty.
 a) Aditya I b) **Vijayalaya** c) Rajaraja I d) Rajendra I
59. _____ assumed the titles like ‘Maduraikonda’ and ‘Maduraium Ilamumkonda’.
 a) **Parantaka I** b) Rajaraja I c) Rajendra I d) Uttama Chola
60. The title ‘Mummudi Chola’ was assumed by _____.

- a) Rajendra I b) **Rajaraja I** c) Aditya I d) Parantaka II
61. 'Jeyamkonda Chola', 'Gangaikondan', 'Kadaramkonda Chola' titles was assumed by _____.
- a) Parantaka II b) Vijayalaya c) **Rajendra I** d) Rajaraja I
62. _____ was the first ruler of the Chalukya Chola period.
- a) Vikrama Chola b) **Kulottunga I** c) Kulottunga II d) Kulottunga III
63. The title 'Sungam Thavirtha Cholan' was assumed by _____.
- a) Rajendra I b) Rajaraja I c) **Kulothunga I** d) Samudra Gupta
64. Kudavolai system of election was held during _____ period.
- a) **Cholas** b) Pallvas c) Pandyas d) Cheras
65. 'Jivitam, Archana Bhogam' lands were given to _____.
- a) Kshatriyas b) **Brahmins** c) Sudras d) Vaisyas
66. Brihadeswara Temple at Tanjore was built by _____.
- a) **Rajaraja I** b) Rajendra I c) Kulottunga I d) Kulottunga III
67. Gangaikonda Cholapuram Temple was built by _____.
- a) Rajaraja I b) **Rajendra I** c) Kulottunga II d) Kulottunga III
68. Local self government was flourished under the _____.
- a) Pallavas b) Cheras c) **Cholas** d) Pandyas
69. The lands assigned to the government servants for the services were called as _____.
- a) **Jivitham lands** b) Bhogam lands c) Vritti lands d) Vaichya Bhogam
70. _____ were assigned to the Brahmins for conducting pujas in the temples.
- a) Vritti lands b) Vaichya Bhogam c) **Archana Bhogam lands** d) Jivitham lands
71. The lands donated to the physicians were known as _____.
- a) Nrita Bhogam b) **Vaichya Bhogam** c) Bhogam lands d) Vritti lands
72. The Chola kings used _____ as building material.
- a) Marble b) **granite** c) tiles d) stone
73. Devadasis danced in front of the _____.
- a) People b) **idols** c) palace d) ruler
74. Vethanda Saram and Vethantha Deepam religious works was written by _____.
- a) **Ramanuja** b) Nadamuni c) Yamunachariyar d) Sundarar
75. The founder of the Vadakalai sect was _____.
- a) Appar b) **Vedantadesika** c) Manavala Mahamuni d) Meykandar
76. _____ was the headquarters of the Vadakalai sect.
- a) **Kanchipuram** b) Srirangam c) Trichy d) Madurai
77. The leader of the Tenkalai sect was _____.
- a) **Manavala Mahamuni** b) Meykandar c) Vedantadesika d) Arulnandi
78. _____ was the headquarters of the Tenkalai sect.
- a) **Srirangam** b) Kanchipuram c) Tanjore d) Madurai
79. Saiva Siddantham was connected with the _____.
- a) Kalabras b) Sultans c) **Bhakthi Cult** d) Pallavas
80. Ottakuthar belonged to the age of _____.
- a) Pallavas b) Pandyas c) **Cholas** d) Cheras
81. Sivagnanabodham work was written by _____.
- a) Arulnandi b) **Meykandar** c) Umapati d) Manavasagam
82. _____ was the author of Unmaivilakkam.
- a) Umapati b) Manavasagam c) Vedantadesika d) **Arulnandi**

83. Sivaka – Sindamoni work was composed by _____.
 a) **Tiruttakka Devar** b) Nathakuttanar c) Sekkilar d) Jeyamkondar
84. _____ work was composed by Nathakuttanar.
 a) Sivaka – Sindamoni b) Kalingattuparani c) **Kundalakesi** d) Periyapuramam
85. Jeyamkondar composed _____.
 a) Periyapuramam b) **Kalingattuparani** c) Kundalakesi d) Sivaka – Sindamoni
86. Periyapuramam was composed by _____.
 a) **Sekkilar** b) Jeyamkondar c) Nathakuttanar d) Tiruttakka Devar
87. Ulas was composed by _____.
 a) Jeyamkondar b) Nathakuttanar c) Tiruttakka Devar d) **Ottakkuttar**
88. _____ wrote Nalavenba.
 a) **Pugalendi** b) Sekkilar c) Nambi Andar Nambi d) Buddhamitra
89. Nalayiradivya Prabhandam was compiled by _____.
 a) Sekkilar b) **Nambi Andar Nambi** c) Buddhamitra d) Ottakkuttar
90. _____ was considered as the eleventh Thirumurai of Saivism.
 a) Nalavenba b) Ulas c) Virasoliyam d) **Nalayiradivya Prabhandam**
91. Thiruvilaiyadal Puranam was written by _____.
 a) Nambi Andar Nambi b) Pugalendi
 c) **Perumbarrap – puliyur Nambi** d) Jeyamkondar
92. Buddhamitra wrote _____.
 a) **Virasoliyam** b) Nalavenba c) Ulas d) Periyapuramam
93. Who is considered to be the earliest among Nayanmars?
 a) **Appar** b) Thirumular c) Manickavasagar d) Thirugnana Sambandar
94. Who renounced the throne and devoted himself to the propagation of Vaishnavism?
 a) Tirumangai Alwar b) **Nammalwar** c) Kulasekhara Alwar d) Perialwar
95. Devaram songs were sung by _____.
 a) Perialwar b) Nammalwar c) Poigai Alwar d) **Appar**
96. The hymns of Alwars have been compiled into _____.
 a) **Nalayiradivya Prabandam** b) Thiruppavai c) Thiruvanthathi d) Thirumozhi

Unit – V

97. Malik Kafur invaded Madurai in _____.
 a) 1310 A.D. b) **1311 A.D.** c) 1309 A.D. d) 1308 A.D.
98. Muslim conquest paved the way for the downfall of the _____ Empire.
 a) First Pandyan b) **Second Pandyan** c) Cholas d) Pallavas
99. _____ was the capital of Vira Pandya.
 a) **Madurai** b) Tanjore c) Birdhul d) Coimbatore
100. Ala-ud-din Khilji died in _____.
 a) 1311 b) **1316** c) 1318 d) 1319
101. Khusurukhan established a Muslim rule at _____.
 a) **Madurai** b) Tanjore c) Coimbatore d) Trichy
102. Ulughkhan invaded the Pandya country and ransacked the _____ Temple.
 a) Tanjore b) **Madurai** c) Srirangam d) Kangaikonda Chalapuram
103. Madurai Sultanate was established in the year _____.
 a) **1335 A.D.** b) 1336 A.D. c) 1327 A.D. d) 1325 A.D.
104. The founder of the Madurai Sultanate was _____.

- a) Ala-ud-din Khilji b) **Jalal-ud-din Hasam Shah**
 c) Qutb-ud-din Mubarakshah d) Muhammad-bin-Tughlaq
105. A typical form of Muslims _____ architecture was developed in Tamil Nadu.
 a) Mamalla style b) Raja – Simha style c) **Sarasonic** d) Aparajita style
106. Sanskrit works were translated into _____ language to understand Hindu culture.
 a) Urdu b) **Persian** c) Telugu d) Tamil
107. _____ was evolved as a common medium of expression between the Muslims and Hindus.
 a) **Urdu** b) Persian c) Telugu d) Sanskrit

Section – B

Answer in about 50 words each:

Unit – I

1. Geographical Division.
2. Greek Accounts.
3. Roman Accounts.
4. Ceylonese Accounts.
5. Marco Polo Account.
6. Account of Iben-Bettuta.
7. Brahmi Script.
8. Asoka Edicts.
9. Hathigumpha Inscription.
10. Tirukkovalur Inscription.
11. Hero-stones.
12. Allahabad Pillar Inscription.
13. Adichanallur.
14. Arikamedu.
15. Tolkappiyam.
16. Ettutogai.
17. Pattuppattu.
18. Eighteen Minor Works.
19. Silappadikaram.
20. Manimekalai.
21. Chera Senguttuvan.
22. Karikalan.
23. Nedunchelivan.
24. Pari.
25. Kari.
26. Ori.
27. Adigaiman.
28. Aimperumkulu.
29. Enperayam.
30. Totemic Symbol Worship.
31. Symbol worship.
32. Worship in Ambalam.
33. Regional Worship.

Unit – II

34. Prakrit Pallavas.
35. Sanskrit Pallavas.
36. Simhavishnu.
37. Mahendravarman I.
38. Vatapikonda.
39. Hiuen – Tsang.
40. Naga Origin.
41. Tamil Origin.
42. Mahendra Style.
43. Mamalla Style.
44. Raja – Simha Style.
45. Aparajita Style.
46. Kudumiyamalai Inscription.
47. Tirumayyam Inscription.
48. Ghatikas.
49. Bahur Sanskrit College.
50. Mathas.

Unit – III

51. Kadungon.
52. Sendan.
53. Arikesari Maravarman.
54. Jatila Parantaka Nedunjadayan.
55. Rajasimha II.
56. Maravarman Sundara Pandya I.
57. Jatavarman Sundara Pandya I.
58. Maravarman Kulasekhara I.
59. Nagarathar.
60. Marco – Polo Accounts.
61. Pearl fishing.
62. Horse-trading.

Unit – IV

63. Vijayalaya.
64. Aditya I.
65. Parantaka I.
66. Rajaraja I.
67. Rajendra I.
68. Kulottunga I.
69. Kudavolai system.
70. Tanjore Temple.
71. Gangaikonda Cholapuram Temple.
72. Nadamuni.
73. Yamunachariyar.
74. Ramanuja.
75. Vadakalai Sect.
76. Thenkalai Sect.

77. Saiva Siddhanta Philosophy.
78. Vira Saivism.
79. Sivaka - Sindamoni.
80. Valayabathi.
81. Kundalakesi.
82. Kalingattuparani.
83. Periyapuranam.
84. Ulas.
85. Nalavenba.
86. Nalayiradivya Prabhandam.
87. Virasoliam.
88. Nayanmars.
89. Appar.
90. Sambandar.
91. Sundarar.
92. Manikkavasagar.

Unit – V

93. Malik Kafur.
94. Ghiyas-ud-din Tughlaq.
95. Muhammad-bin- Tughlaq.
96. Jalal-ud-din Hasan Shah.
97. Sarasonic Architecture.

Section – C

Answer in about 200 words choosing either (a) or (b):

Unit – I

1. Sketch the location of TamilNadu.
2. Narrate the Western Ghats and Eastern Ghats.
3. Evaluate the rainfall and climatic conditions of Tamil Nadu.
4. Discuss the rivers in Tamil Nadu.
5. Briefly discuss the effects of geography on history of Tamil Nadu.
6. Mention the literary sources of the Sangam age.
7. Trace the Numismatic sources of the Sangam Age.
8. Explain the achievements of Chera Senguttuvan.
9. Narrate the achievements of Karikalan.
10. Discuss the chieftains of the sangam Age.
11. Critically analyse the five – fold divisions of land during the Sangam age.
12. Assess the economic condition of Sangam Age.
13. Examine the religious condition of Sangam age.
14. Give a short note on the conquest and legacy of the Kalabhras.
15. Briefly discuss the Anti-Brahmanical attitude of the Kalabhras.

Unit – II

16. Give an account of the Early Pallavas.
17. Explain the conquests of Narasimhavarman I.
18. Explain the historic visit of Hieun – Tsang to Kanchi.

19. Briefly discuss the battle of Thirupurampiam.
20. Describe the Origin of Pallavas.
21. Point out the development of music, dance and painting under the Pallavas.
22. Narrate the economic condition of the Pallavas.
23. Sketch the Buddhist and Jainism centres of learning during the Pallava period.

Unit – III

24. Give a short account of Arikesari Maravarman.
25. Give a brief account about Jatila Parantaka Nedunjadayan.
26. Sketch the achievements of Maravarman Sundara Pandya I.
27. Narrate the achievements of Jatavarman Sundara Pandya I.
28. Explain briefly about Maravarman Kulasekhara I.

Unit – IV

29. Describe the Chola-Rashtrakuta conflict of Parantaka I.
30. Examine the northern expeditions of Rajaraja I.
31. Explain the successors of Kulottunga I.
32. Narrate the provincial administration under the Cholas.
33. Assess the economic condition under the Cholas.
34. Briefly discuss about Thanjai Brahadeeswarar Temple.
35. Write a short note on Gangai Konda Cholapuram Temple.
36. Explain the Temple Economy of the Cholas.
37. Discuss the Valankai and Idankai division under the Cholas.
38. Describe Devadasi system.
39. Explain the impact of the Bhakti Movement.

Unit – V

40. Give a brief account about the Tughlaq invasion.
41. Narrate the art and architecture under the Muslim rule in Tamil Nadu.
42. “Muslim period witnessed the fusion of Hindu-Muslim development of literature and Education” – Explain.

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit – I

1. Mention the foreign literary evidences of the Sangam age.
2. Trace the epigraphical sources to study about the Sangam age.
3. Explain the archaeological sources to study about the Sangam age.
4. “Sangam Age is considered to be the classical age of the Tamil” – Discuss.
5. Describe the Sangam Polity.
6. Assess the administration of the Sangam Age.
7. Examine the Sangam Society.
8. Explain the development of education during the Sangam Age.
9. Analyse the growth of art and architecture under the Sangam Age.
10. Why Kalabhra period was called as the “Dark Age” in the history of Tamil Nadu?

Unit – II

11. Explain the conquests of Mahendravarman I and his contribution to art.
12. Assess the administration of the Pallavas.
13. Estimate the development of art and architecture under the Pallavas.

14. Narrate the social condition of the Pallavas.
15. Explain the religious condition under the period of Pallavas.
16. Give a detailed account of the development of education during the Pallavas.

Unit – III

17. Describe the first Pandyan Empire.
18. Explain the second Pandyan Empire.
19. Assess the administrative system under the period of Pandyas.
20. Evaluate the economic condition under the Pandyas.
21. Narrate the social condition of the Pandyas.
22. Discuss the accounts of Marco – Polo.
23. Estimate the contribution of the Pandyas to art and architecture.

Unit – IV

24. Examine the southern conquests of Rajaraja I.
25. Explain the expeditions of Rajendra I.
26. Trace the achievements of Kulottunga I.
27. Describe the central administration under the Cholas.
28. Assess the inland and foreign trade during the period of Cholas.
29. Narrate the development of art under the Cholas.
30. Evaluate the religious condition under the Cholas period.
31. Explain the Temple Society during the Cholas.
32. Discuss the Cholas contribution to literature.
33. Trace the growth of Bhakti Movement in Tamil Nadu.

Unit – V

34. Elaborate the Muslim invasion of South India.
35. Describe Malik Kafur's expedition of Tamil country.
36. Evaluate the rise of Madurai Sultanate in Tamil Nadu.
37. Estimate the impact of the Muslim rule.

St. Mary's College (Autonomous) –Thoothukudi
Question Bank
I M.A. HISTORY

Core 4 **Principles and Methods of Archaeology Sub.Code:21PHIC14**
Semester I - November 2021
(for those who joined in July 2021 and after)

SECTION - A

Choose the correct answer:

Unit - I

1. _____ studies the story of man's past through his material remains.
a) **Archaeology** b) Epigraphy c) Artefacts d) Paleography
2. The word Archaeology comes from the word _____.
(a) **Greek** (b) English (c) Latin (d) German
3. Archaeological excavations done in _____ provided new evidence about less known dynasty flourished in the beginning of Christian era.
a) **Nagarjunakonda** b) Rajasthan c) Tamil Nadu d) Bihar
4. A collection of artefacts of one category at a site is called an _____.
(a) **Industry**(b) Artefact(c)Pottery (d) Materials
5. _____ focus his attention on material aspects of culture.
a) **Archaeologists** b) Historian c) Epigraphist d) Philanthropist
6. Archaeology forms the sole source for_____
a)**Pre- history** (b) Proto- history (c) History (d) Modern history
7. The study of Pre – History depends on the sources_____
a)**Epigraphy** (b) Numismatics (c) Archaeology (d) Literary Sources
8. What is artefact?
a)**Pottery and Burials** (b) Industry (c) Documents (d) None of these
9. Archaeologists called the smallest cultural unit as _____.
(a) **Artifact** (b) Bones (c)Pottery (d) Materials
10. Environmental study of archaeology is often called as _____.
(a) **Palaeo-ecology** (b) New Archaeology (c) Proto- history (d)Numismatics
11. Who has to survey, explore and discover Archaeology Sites_____
(a) **Archaeologist** (b) Epigraphist (c) Historian (d) Scientist
12. “Environment and Archaeology” book was written by _____.
(a) **Karl W. Butzer** (b) Glyn Daniel (c)Gordon Childe(d) John Marshall
13. “Analytical Archaeology” book was written by _____.
(a) **David L. Clark** (b) Gordon Childe (c) Bruce Foot (d) John Marshall
14. _____ study of Eskimos is one of the best known studies in Ethno Archaeology.
a) **Leuis Binford** b) John Marshall c) Glyn Daniel d) Gordon Childe
15. Kaveripumpattinam was a flourishing port-city of the ancient _____.
(a) **Cholas** (b) Pandyas (c) Pallavas (d) Cheras
16. Who rejected the traditional view that Iliad and Odyssey was works of fiction?
(a) **Heinrich Schliemann**(b) Glyn Daniel (c) Bruce Foot (d) John Marshall
17. The ‘Excavations is Cranborne Chase’ was written by _____.

- a) **Augustus Pitt Rivers** b) John Marshall c) Glyn Daniel d) Gordon Childe
18. The Wessex Gallery of Archaeology was opened in _____.
- a) **2014** b) 2010 c) 2015 d) 2012
19. Who is widely regarded as the first scientific archaeologist to work in Britain.
- a) **Augustus Pitt Rivers** b) John Marshall c) Glyn Daniel d) Bruce Foot
20. _____ studied and excavated 'The Great Pyramid of Giza'.
- a) **Flinders Petrie** b) John Marshall c) Glyn Daniel d) Sir Arthur Evan's
21. The classic book 'Methods and Aims in Archaeology' was written by _____.
- (a) **Flinders Petrie** (b) Gordon Childe (c) Bruce Foot (d) John Marshall
22. _____ became one of the first scholars to describe the transition from hunting and gathering to agriculture.
- a) **Gordon Childe** b) John Marshall c) Glyn Daniel d) Alexander Cunningham
23. Name the first archaeologist in the West to use Marxist theory in his work.
- a) **Gordon Childe** b) John Marshall c) Alexander Cunningham d) Bruce Foot
24. 'Biblical Researches in Palestine' book was written by _____.
- (a) **Edward Robinson** (b) Sir Arthur Evan's (c) Pitt Rivers (d) Sir Flinder Petrie
25. _____ is supplementing our knowledge and adding new vistas.
- (a) **Excavation** (b) Exploration (c) Artefacts (d) Archaeology

Unit - II

26. Asiatic Society of India was founded by _____.
- (a) **Sir William Jones** (b) Pitt Rivers (c) Sir Flinder Petrie (d) Thomson
27. William Jones wrote the poem 'Caissa' in _____ language.
- a) **Latin** b) Greek c) Arabic d) Chinese
28. Who was called as "the father of Indian Archaeology"?
- (a) **Alexander Cunningham** (b) P.J. Watson (c) Robert J. Braidwood (d) Pitt Rivers
29. In 1861, _____ Viceroy of India appointed Alexander Cunningham as Archaeological Surveyor to Government of India.
- a) **Lord Canning** b) Lord Dalhousie c) Lord William Bentinck d) Lord Wavell
30. In which year Canning established the Archaeological Survey of India _____?
- (a) **1861** (b) 1860 (c) 1957 (d) 1961
31. _____ is often considered as the 'Father of Indian Prehistory'.
- a) **Robert Bruce Foote** b) Mortimer Wheeler c) Alexander Cunningham d) John Marshall
32. In which year Robert Eric Mortimer Wheeler was the Director General of Archaeology in India _____?
- (a) **1944** (b) 1890 (c) 1976 (d) 1954
33. _____ was the founder of the Institute of Archaeology in London University.
- (a) **Mortimer Wheeler** (b) Gordon Childe (c) H.D. Sankalia (d) Pitt Rivers
34. Who established the Three Age System?
- (a) **Michael Mercati** (b) Glyn Daniel (c) H.D. Sankalia (d) Gordon Childe
35. In which year the 'Britanica' book was published?
- (a) **1586** (b) 1587 (c) 1589 (d) 1588
36. Who deciphered the Brahmin Script of Asokhan period?
- (a) **James Prinsep** (b) Galetop (c) Thompson (d) Lavoisier
37. Which method is used for ship wrecks of ancient boats?

- (a) **Marine Archaeology** (b) Aerial Archaeology (c) Geographical Archaeology
(d) Sewage Archaeology
38. Buddhist Archaeology deals with _____
(a) **Buddhist Sites** (b) Temples Sites (c) Mosques Sites (d) None of these
39. In which year the Ancient Monuments Preservation Act was enacted?
(a) **1904** (b) 1985 (c) 1984 (d) 1905
40. The archaeologist William Smith was called as _____.
(a) **Strata Smith** (b) Typological Smith (c) Trial Trench Smith (d) Quardent Smith
41. Geological factors of exploration determine the settlements of _____.
a) **Pre historic period** b) Historic period c) Proto historic period d) Contemporary period
42. The Indus Valley Civilization was excavated by _____.
(a) **Sir John Marshall** (b) L.Curzon (c) R.J.C.Atkinson (d) Bruce Foote
43. Lord Curzon appointed whom as Director General of Archaeology?
(a) **John Marshall** (b) Wheeler (c) William Jones (d) L.Curzon

Unit - III

44. The Aerial photography was very useful to _____.
(a) **Trial Trench** (b) Typological (c) Stratiographical (d) Horizontal
45. What do you mean by Anthropology?
(a) **Study of Man** (b) Study of Soil (c) Study of Climate (d) Study of Nature
46. _____ is the alphabets of archaeology.
(a) **Pottery** (b) Beads (c) Bones (d) Pollen Grains
47. The study of soil is known as _____.
(a) **Palynology** (b) Pedology (c) Anthropology (d) Palaeopathology
48. _____ is very convenient to excavate a vast area.
(a) **Open Stripping** (b) Grid system (c) Quadrant method (d) Vertical method
49. The process of locating, recording the surface features in USA is known as _____.
a) **Site Survey** b) Field Archaeology c) Field Visit d) Intensive Survey
50. Which is the cheapest way of Archaeological Survey?
a) **Surface Survey** b) Intrusive Survey c) Aerial Survey d) Remote Reconnaissance
51. Which method was used for unearthing the Indus valley civilization?
(a) **Stratigraphy** (b) Vertical (c) Horizontal (d) Open Striping

Unit - IV

52. _____ plays a key role in the documentation.
a) **Photography** b) Contour Maps c) Survey Plans d) Layout
53. Name the archaeological tool used to locate the site?
a) **Survey** b) Exploration c) Excavation d) Artefacts
54. Which type of survey will be required to fix soil marks and crop marks?
a) **Aerial Reconnaissance** b) Remote Reconnaissance c) Quarrying d) Surface Survey
55. Which survey is often described as rescue survey?
a) **Intrusive** b) Intensive Survey c) Extensive Survey d) Non-Intrusive Survey
56. The electric resistance will be high under in electrical resistivity survey _____.
a) **Stone walls** b) Water reservoir c) Garbage d) Pits
57. The day to day work done in the excavation is documented in _____.
a) **Note book** b) Antiquity Envelope c) Antiquity Register d) Site Map

58. Absolute Dating gives the correct sequence of events in _____.
 a) Historic period b) Pre-historic period c) Ice Age d) Proto-historic period
59. The important last effort made by the archaeologists is called as _____.
 (a) **Cataloguing** (b) Drawing (c) Photography (d) Label

Unit - V

60. The method of dating the glacial areas was introduced by _____.
 (a) **Gerard De Geer** (b) James (c) Marshall (d) Henry
61. The method of Radio Carbon dating was introduced by _____.
 (a) **Willard F.Libby** (b) Alfred F.Libby (c) Albert F.Libby (d) Alson F.Libby
62. C14 dating was used in the year _____.
 (a) **1940** (b) 1985 (c) 1947 (d) 1958
63. The moving neutrons collide with atmospheric nitrogen atoms and create _____.
 (a) **C₁₄** (b) C₁₅ (c) C₁₆ (d) C₁₂
64. The method of Dendrochronology dating is developed by _____.
 (a) **A.E.Doughlas** (b) A.E.George (c) A.E. James (d) A.E.Wheeler
65. Thermo Remnant Magnetic Survey is used to detect the buried _____.
 (a) **Burnt Clay artifacts** (b) Iron and Kiln Sites (c) Solis and Race (d) Iron Metal
66. Proton- Magnetometer is used to detect the buried _____.
 (a) **Burnt Clay artifacts** (b) Iron and Kiln Sites (c) Solis and Race (d) Iron Metal
67. Which method of dating is used for measuring the Potassium content of the earth crust?
 (a) **Potassium – Argon** (b) Silicon (c) Silver (d) Iron
68. The Uranium content is measured by the method known as _____.
 (a) **Radio metric** (b) Collagen (c) Phosphate (d) Nitrogen Analysis
69. Pollen Analysis is otherwise known as _____.
 (a) **Palynology** (b) Archaeology (c) Geology (d) Chronology

SECTION - B

Answers in about 50 words each:

Unit – I

1. Define Archaeology.
2. State the differences between Archaeology and Culture.
3. Explain Palaeo-ecology.
4. Define New Archaeology.
5. Write a short note on Pre and Proto-Historical Archaeology.
6. Explain Ethno – Archaeology.
7. Sketch a short note on Under – Water Archaeology.
8. Explain Aerial Archaeology.
9. Give an account of Salvage Archaeology.
10. Write a note on Arikamedu.
11. Explain the capital city of Cholas Kaveripumpattinam.
12. Describe the poem Iliad and Odyssey.
13. Explain Treasure of Priam.
14. Write a short note on Mycenaean Civilization.
15. Point out the Ancient Monuments Preservation Act, 1904.

Unit – II

16. Explain Histoire de Nader Shah of William Jones.
17. Write a short note on Latin Chess Poem.
18. Give a short note on Biblical Archaeology.
19. State the outstanding contribution of Indus Valley Civilization.
20. Write an account of the First Director of Indian Archaeological Survey.
21. Who is called as the Father of Indian Archaeology?
22. Explain a short note on Father of Indian Pre-History.
23. Point out the archaeological services of Sir John Marshall.
24. Write a note on Magnetic Survey.
25. Give a short note on Thermo-Remnant Magnetic Survey.
26. Define Probe Survey.
27. Explain Augur Survey.
28. State a short note on Drills.
29. Explain Aerial Survey and Photography.
30. Point out the Shadow Marks.
31. List out the features of Photogrammetry.

Unit – III

32. Explain the importance of Field Archaeology.
33. Write a short note on Intensive Survey.
34. Give an account of Non – Intrusive Survey.
35. Explain Reconnaissance Survey.
36. Point out the importance of Map Reading.
37. Discuss the importance of Grid Excavation.
38. Write a short account on Exploration.
39. Discuss Seriation.
40. Explain Trial-Trench method.
41. Examine the importance of Aerial Photography.

Unit - IV

42. Discuss Pottery Yard.
43. Explain the methods of Relative Dating.
44. Define Field Note Book.
45. Write a short note on Section Drawing.
46. Give an account of Antiquity Register.
47. Point out the features of Antiquity Envelope.
48. Explain Robber Trench.
49. Write a note on Pottery classification.

Unit - V

50. Examine the importance of Pollen Analysis.
51. Write a short note on Dendro chronology.
52. Explain Glacial Varve Chronology.
53. Point out the importance of Thermoluminescence.
54. Give a short note on Proton Magnetometer.
55. Define C – 14 dating.
56. Discuss Poly Vinyl Acetate.
57. Define Tree-ring Dating Method.

SECTION - C

Answer in about 200 words each:

Unit - I

1. Explain the scope of Archaeology.
2. Describe the significance of Environmental Archaeology.
3. Discuss the relations between the Archaeology and Natural Science.
4. Explain the relations between the Archaeology and History.
5. Sketch an account on the Pre-Historic Archaeology.
6. Mention the functions of an Archaeologist.
7. Explain the methods of 'New Archaeology'.
8. Trace the history of archaeology in the 18th century.
9. Describe the contribution of Sir Flinders Petrie to Archaeology.
10. Assess the contribution of Pitt Rivers to the fields of Technique of Excavation and Recording.

Unit - II

11. Why Alexander Cunningham was called as 'The Father of Indian Archaeology'?
12. Discuss the services of Sir John Marshall to Indian Archaeology.
13. Assess the contribution of William Jones to Archaeology in India.
14. Describe the significant contributions of Robert Bruce Foote to Indian Geology.
15. Explain the nature methods of Exploration.
16. Sketch an account of Historical Literature.
17. Give a short note on Local Traditions.
18. Define Exploration Kit.
19. What is the importance of Aerial photography in field archaeology?

Unit - III

20. Define Site Survey and its different methods.
21. List out the importance of Excavation Equipments.
22. Elucidate the importance of rivers in Site Survey.
23. Trace out the historical facts from Adichanallur excavation.
24. Enumerate the features of Open Stripping Method.
25. Explain the significance of Quadrant method.

Unit - IV

26. Explain the role of stratigraphy in an Archaeological excavation.
27. 'Exploration precedes excavation' – Discuss.
28. Describe Typological Method.
29. Analyse the Section Drawing of Pottery and its symbols.
30. Assess the significance of Three Dimensional Recording.
31. Explain about the Stratigraphical Method of Dating.

Unit - V

32. Explain Radio Carbon dating.
33. Bring out importance of Thermoluminescence Dating.
34. Examine the importance of Potassium-Argon Method.
35. Assess the Pollen Analysis Dating.
36. Define Nitrogen Dating Method.
37. Mention the method of glacial varve chronology.

38. Explain the Relative Dating method.
39. Describe the method of Dendrochronology.

SECTION - D

Answer in about 400 words each:

Unit - I

1. Define the term 'Archaeology.' Give its scope and value.
2. Assess the value of Archaeology for the reconstruction of History.
3. Examine the origin and development of Archaeology in India.
4. Explain the kinds of Archaeology.
5. Sketch History's relationship with Archaeology.
6. Explain Proto-historic Archaeology.
7. Assess the Historical Archaeology.
8. Trace the history of archaeology in the 19th and 20th century developments.
9. Describe the contribution of Heinrich Schliemann to Archaeology.
10. Narrate the contribution of Gordon Childe to Archaeology.

Unit - II

11. Write an essay on Archaeology in India.
12. Trace out the contribution of Sir Mortimer Wheeler to Indian Archaeology.
13. Mention the objectives of Exploration.
14. List out the significant physical features that an archaeologist has to take notes?
15. Describe the important methods of Site Survey.
16. Define the Recording of Exploration Data.
17. Describe the various Scientific Aids used in prospecting and survey of archaeological sites.

Unit - III

18. Define Site Survey and its various methods of Site Survey.
19. Explain the vertical excavation method.
20. Describe the Geophysical Survey in the archaeological excavation.
21. Explain the significance of the terms 'horizontal' excavations and discuss their relative merits and demerits.

Unit - IV

22. What is Stratigraphy? Point out its role in Archaeological Excavation.
23. Assess the chronological sequence of Pottery classification with Drawing.
24. Explain Photo Documentation in archaeological recording.
25. Enumerate the importance of Field Note Book in documentation.

Unit - V

26. Discuss the scientific dating methods.
27. Discuss the method of Radio Carbon Dating.
28. Explain Archaeo-magnetism.
29. Discuss the importance of the Carbon-14 dating method.
30. Trace out the important features of DendroChronology.

St. Mary's College (Autonomous) – Thoothukudi

Question Bank

I M.A. History

Core 5

Intellectual History of India

Sub. Code: 21PHIC15

Semester I – November 2021

(for those who joined July 2021 and after)

Section – A

I. Choose the correct answer

Unit I

1. The History which deals with the rise and evolution of ideas
(a) **Intellectual** (b) Cultural (c) Social (d) Political
2. Who quoted this statement 'All History is the History of thoughts'
(a) Arthur Lovejoy (b) **R.G.Collingwood** (c) Voltaire (d) Jacob Burckhardt
3. The term Intellectual had its origin from the -- language
(a) **Latin** (b) Spanish (c) French (d) English
4. Who wrote The Great Chain of Being?
(a) Voltaire (b) **Arthur Lovejoy** (c) Jacob Burckhardt (d) R.G.Collingwood
5. The term 'Intellectual Revolution' refers to the -----speculation about the nature
(a) **Greek** (b) Rome (c) Spain (d) Portugal

Unit II

6. Tuhfat –ul-Muwalidin was written by
(a) **Rajaram Mohan Roy** (b) Annie Besant (c) Karve (d) Vidyasagar
7. Name the religious society established by Rajaram Mohan Roy.
(a) **Brahmo samaj** (b) Prarthna Samaj (c) Arya Samaj (d) Theosophical Society
8. When did Brahmo Samaj establish?
(a) 1825 (b) 1826 (c) 1827 (d) **1828**
9. Who was the founder of Atmiya sabha?
(a) Atmarav Pandurang (b) Annie Besant (c) **Rajaram Mohan Roy** (d) Vallalar
10. When was Atmiya sabha founded?
(a) **1815** (b) 1825 (c) 1835 (d) 1845
11. Rajaram Mohan Roy started a press campaign in Sambadkaumudi against
(a) **Sati** (b) Child marriage (c) widow remarriage (d) female infanticide
12. Who was called as the father of Indian renaissance?
(a) Dayanand Saraswathi (b) **Rajaram Mohan Roy** (c) Swami Vivekananda (d) Karve
13. Who was called as the prophet of Indian nationalism?
(a) Jyotirao Phule (b) Dayanand Saraswathi (c) **Rajaram Mohan Roy** (d) Swami Vivekananda
14. Who among the following popularly known as father of modern India?
(a) Karve (b) **Rajaram Mohan Roy** (c) R.G Bhandarker (d) Iswar Chandra Vidyasagar
15. The person who fought against sati was
(a) Savitribai Phule (b) Jyotirao Phule (c) **Rajaram Mohan Roy** (d) R.G.Bhandarker
16. Vidyasagar means ocean of
(a) faith (b) **knowledge** (c) trust (d) thinking
17. Name the journal in which Iswar Chandra Vidyasagar against widowhood
(a) **Tattwabodhinipatrika** (b) Sambadkaumudi (c) Somprakash (d) Sambadkaumud
18. Narisiksha Bhandar fund organized by

- (a) R.G.Bhadarker (b) Pandit Ramabai (c) Karve (d) **Iswar Chandra Vidyasagar**
19. Who started the BirsinghaBhagabatividyalaya in 1890?
- (a) Pandit Ramabai (b) **Iswar Chandra Vidyasagar**(c) Savitribai Phule (d) Veerasalingam
20. In which year the hindu widow Remarriage Act was passed?
(a) **1856** (b) 1866 (c) 1876 (d) 1886
21. Widow's Remarriage Act was passed due to efforts of
(a) Raja Ram Mohanroy (b) Annie Besant (c) Swami Vivekananda (d) **Ishwara Chandra Vidhyasagar**
22. When did Ishwara Chandra Vidhyasagar become the Honorary Member of the Royal Asiatic Society?
(a) 1862 (b) 1860 (c) **1864** (d) 1865
23. Who was the founder of Satya Shodak Samaj?
(a) D.K.Karve (b) Savtribai Phule (c) **Jyotirao Phule** (d) Veerasalingam
24. Jyotirao Phule opened the first school for girls in
(a) **1848** (b) 1850 (c) 1855 (d) 1860
25. When was the Mahila Seva Mandal started?
(a) **1852** (b) 1853 (c) 1854 (d) 1855
26. Which of the following was established by Savitribai Phule?
(a) **Balhatya Pratibandhak Griha** (b) Arya Samaj (c) Satya Shodak Samaj
(d) Prarthnana Samaj
27. The Prarthana Samaj was established in the year
(a) 1864 (b) 1865 (c) 1866 (d) **1867**
28. When was the Mahila Vidyalaya started by Karve?
(a) 1905 (b) **1907** (c) 1909 (d) 1910
29. The first university for women in India was established by
(a) Savtribai Phule (b) Jyotirao Phule (c) Vidyasagar (d) **D.K.Karve**
30. When did Karve start the first women university?
(a) 1915 (b) **1916** (c) 1917 (d) 1918
31. Name the association founded by Karve for the promotion of Human Equality
(a) Kanya Shala (b) **Samata Sangh** (c) Manavisamata (d) Jana Sangh
32. Who wrote the work "The High caste Hindu woman"?
(a) **Pandit Rama Bai** (b) Dr. Muthu Lakshmi Reddy (c) Ambujammal (d) Durgabhai
33. Pandita title was conferred by University of Calcutta to Ramabai for her knowledge on Sanskrit works in
(a) **1876** (b) 1878 (c) 1890 (d) 1879
34. Pandita Rama Bai established a school at - - - in karnataka
(a) **Gulbarga** (b) Bijapur (c) Golkonda (d) Mysore
35. Who among the following establishes the Mukti mission in Pune?
(a) **Pandit Ramabai** (b) Veeraalingam (c) R.G.Bhandarker (d) Karve
36. Ranajit Guha emphasized the importance of _ perspective in writing History
(a) **Subaltern** (b) Intellectual (c) Marxism (d) Structuralism
37. The term Subaltern refers to _ in the vocabulary of Indians
(a) Junior Physician (b) **Junior army officer** (c) Junior Historian (d) Junior Revenue officer
38. Provincializing Europe is the masterpiece of
(a) Partha chaterjee (b) Foucault (c) Gramsci (d) **Ranajit Guha**

39. Which work of Guha was a mixer of subaltern studies and post colonial theory?
 (a) **Provincializing Europe** (b) The crises of civilization (c) The calling of History
 (d) Re-thinking working - Class History
40. Kluge Prize for Lifetime Achievement in the Study of Humanity in 2008 is given to
 (a) **Romila Thapar** (b) .Pandita Rama Bai (c) Durgabhai (d) Gramsci
41. Romila Thapar presents History of India by – interpretation
 (a) **Marxist** (b) Structuralism (c) Intellectual (d) Subaltern
42. Who wrote ‘Voices of Dissent’?
 (a) Pandita Rama Bai (b) Durgabhai (c) **Romila Thapar** (d) Gramsci

Unit III

43. When the shantiniketan was found?
 (a) **1863** (b) 1864 (c) 1865 (d) 1866
44. Who was the founder of shantiniketan?
 (a) **Debendranath Tagore** (b) Rabindranath Tagore (c) Dayananda Saraswathi
 (d) Swami Vivekananda
45. Who was the founder of Tattvabodhini sabha?
 (a) Rabindranath Tagore (b) Veerasalingam (c) Ramalinga Adigal (d) **Debendranath Tagore**
46. When was Tattvabodhini Sabha founded?
 (a) 1809 (b) 1819 (c) 1829 (d) **1839**
47. Who is known as Martin Luther of India?
 (a) **DayandaSaraswatti** (b) Ramalinga Adigal (c) Debendranath Tagore (d) Swami Vivekananada
48. The slogan of ‘Go back to the Vedas’ was raised by
 (a) Debendranath Tagore (b) Swami Vivekananda (c) Ramalinga Adigal (d) **Dayanda Saraswatti**
49. The Arya samaj was founded by
 (a) **Dayanda saraswatti** (b) Annie Besant (c) Vivekananda (c) Karve
50. The Aryasamaj was founded in
 (a) 1874 (b) **1875** (c) 1876 (d) 1877
51. Who was the first man to advocate the concept of ‘swaraj’?
 (a) **DayanandSaraswatti** (b) Annie Besant (c) Ramakrishna Paramhansa (d) Debendranath Tagore
52. Who is the founder of Ramakrishna mission?
 (a) Vidyasagar (b) Savitribai Phule (c) **Swami Vivekananda** (d) Pandit Ramabai
53. ‘Arise, awake and stop not, until the goal is achieved’- who said?
 (a) **Swami Vivekananda** (b) Ramakrishna Paramhansa (c) Dayanda saraswatti (d) Pandit Ramabai
54. “Be an atheist if you went but do not believe in anything unquestioningly”- who said?
 (a) S.N.Banerjee (b) Ramakrishna Paramhansa (c) Dayanda Saraswatti (d) **Swami Vivekananda**
55. The world Parliament of religions organized in Chicago was attended by
 (a) **Swami Vivekananda** (b) Ramakrishna Paramhansa (c) Dayanda Saraswatti (d) S.N.Banerjee
56. When did Swami Vivekananda attend the world Parliament of Religions at Chicago?
 (a) **September 1893** (b) September 1793 (c) September 1693 (d) September 1593
57. Who was called by his followers as ‘Vallalar’?
 (a) **RamalingaAdigal** (b) Ramakrishna Pramahamsar (c) Debenranath Tagore
 (d) VaikundaSwamigal

58. The book 'Ozhuvil Odukkam' was published in _____
 (a) 1850 (b) **1851** (c) 1852 (d) 1853
59. The book 'Thondamandal Satham' was published in _____
 (a) 1850 (b) 1851 (c) **1855** (d) 1853
60. The book 'Sinmaya theepikai' was published in _____
 (a) 1850 (b) 1851 (c) 1852 (d) **1857**
61. The book 'Thiruvarutppa' was written by _____
 (a) Debendranath Tagore (b) Ramakrishna Paramhansa (c) Swami Vivekananda (d) **Ramalinga Adigal**
62. The book 'Jeevakaarunya Ozhukkam' was written by
 (a) Debendranath Tagore (b) Ramakrishna Paramhansa (c) **Ramalinga Adigal** (d) Swami Vivekananda

Unit IV

63. Who was the first Indian elected to the British Parliament?
 (a) **Dadabhai Nauroji** (b) Surendranath Banerjee (c) G.K.Gokhale (d) M.G.Ranade
64. Who was known as The Promise of India?
 (a) **Dadabhai Nauroji** (b) M.G.Ranade (c) G.K.Gokhale (d) Surendranath Banerjee
65. The Poverty and Un-British Rule in India was written by _____
 (a) Vallalar (b) M.G.Ranade (c) S.N.Banerjee (d) **Dadabhai Nauroji**
66. The Rise of the Maratha Power was published by _____
 (a) Gokhale (b) **M.G.Ranade** (c) S.N.Banerjee (d) DadabhaiNauroji
67. The Poona Sarvajjanik Sabha was established by _____
 (a) Gokhale (b) **M.G.Ranade** (c) S.N.Banerjee (d) DadabhaiNauroji
68. Who was the founder of the Servants of India Society?
 (a) Vallalar (b) **Gokhale** (c) S.N.Banerjee (d) Dadabhai Nauroji

Unit V

69. Bankim Chandra's epochmaking newspaper, *Bangadarśan* commenced publication in
 (a) 1878 (b) **1872** (c) 1887 (d) 1890
70. A volume of poems entitled *Lalita O Manas* was published by
 (a) **Bankim Chandra Chatterjee** (b) Rabindranath Tagore (c) Surendranath Banerjee (d) Amartya Sen
71. Who was regarded as the father of modern novel in India?
 (a) Amartya Sen (b) Rabindranath Tagore (c) **Bankim Chandra Chatterjee** (d) P.C.Ray
72. Who was known as the father of Indian Chemistry?
 (a) Amartya Sen (b) Rabindranath Tagore (c) Bankim Chandra Chatterjee (d) **P.C.Ray**
73. Who founded Bengal Chemicals and Pharmaceutical works?
 (a) Amartya Sen (b) Rabindranath Tagore (c) Bankim Chandra Chatterjee (d) **P.C.Ray**
74. P.C Ray discovered the stable compound mercurous nitrite in
 (a) 1878 (b) **1896** (c) 1887 (d) 1890
75. Life and Experiences of a Bengali Chemist was the autobiography of
 (a) Amartya Sen (b) Rabindranath Tagore (c) **P.C.Ray** (d) Ramanujam
76. Navdanya was launched in

- (a) 1978 (b) **1991** (c) 1987 (d)1990
 77. Amartya Sen, Indian Economist was awarded Nobel Prize in
 (a) **1998** (b)1996 (c)1997 (d) 1992
 78. Economics which seeks welfare of the community
 (a)**Welfare Economics** (b) Population Economics (c) Macro Economics (d) Micro Economics
 79. Who was the first Indian elected as a fellow of Trinity College Cambridge?
 (a) **Srinivasa Ramanujam** (b)Amartya Sen (c)Vandana Shiva (d) P.C.Ray

SECTION B

Answer any seven in about 50 words each:

Unit -I

1. Intellectual History
2. Etymology of Intellectual
 3. Ancient School of Philosophy
 4. Arthur Lovejoy
 5. Great Chain of Being
 6. Intellectual Revolution
 7. Role of Individuals

Unit -II

8. Rajaram Mohan Roy
9. Atmiya Samaj
10. Brahmo Samaj
11. Jyotirao Phule
12. Satya Shodhak Samaj
13. Savitribai Phule
14. Mahila Seva Mandal
15. Balhatya Pratibandhak Griha
16. Nishkam Karma Math
17. R.G.Bhandarker
18. Subaltern studies
19. The calling of History
20. Arya Mahila Samaj
21. Mukti Mission
22. The High caste Hindu woman

Unit -III

23. Debendranath Tagore
24. Shantiniketan
25. Dayananda Saraswathi
26. Arya Samaj
27. Principles of Arya Samaj
28. Suddhi Movement
29. Sanghatan
30. Vallalar
31. Satya Sanmarga Sangam

Unit -IV

32. Poona Sarvajanik Sabha
33. Servants of India Society
34. Dadabhai Naoroji
35. The Poverty and Un-British Rule in India
36. Indian Association

Unit -V

37. *Anandmath*
38. *Baᅅgadar'san*
39. Amartya Sen
40. Amartya Sen's Works
41. Amartya Sen Fellowship Fund
42. *Bengal Chemicals and Pharmaceutical works*
43. *Father of Indian Chemistry*
44. *Father of Radio Science*
45. *Crescograph*
46. *Navdanya*
47. *Golden Rice*
48. *Seed Bank*

SECTION C

(5x6=30)

Answer in about 200 words each choosing either (a) or (b):

Unit –I

1. Examine the significance of Intellectual History.
2. Describe the scope and purpose of Intellectual History
3. Enumerate the categories of Intellectual History

Unit –II

4. Give a brief account of the social ideas of Raja Ram Mohan Roy
5. Discuss briefly about the religious ideas of Raja Ram Mohan Roy
6. Enumerate the contributions of Iswar Chandra Vidyasagar for women education.
7. Discuss briefly about the efforts taken by Iswar Chandra Vidyasagar for widow remarriage.
8. Narrate the contributions of Jyotirao Phule for Women education.
9. Sketch a note on Savitribai Phule.
10. List out the contributions of Karve to women education.
11. Describe the social reforms of Veerasalingam.
12. Enumerate the significance of the work of Ranajit Guha's Provincializing Europe .
13. Explain the influence of subaltern perspectives in the works of Ranajit Guha.
14. Elucidate Pandita Rama Bai's works in the light of social reforms.

Unit - III

15. Narrate the religious reforms of Dayananda Saraswati.
16. Mention the social Reforms of Dayananda Saraswai.
17. Point out the importance of Sri Ramakrishna Paramhansa's teachings.
18. Discuss briefly about Swami Vivekananda and World Parliament of religions.
19. Give an account of Ramakrishna Mission.
20. Discuss briefly about the preachings of Ramalinga Adigal.
21. Sketch a note on Thiruvartppa.

Unit - IV

22. Explain the drain theory of Dadabhai Nauroji in the context of India
23. Describe the role of S.N.Banerjee in the national awakening of India.
24. Give an account of the Economic History of India by R.C.Dutt.
25. Explain the economic liberal policy of Gokhale.
26. Discuss briefly about the political liberalism of Gokhale.
27. Explain M.G.Ranade's political ideas of liberalism.

Unit - V

26. Enumerate the literary contribution of Bankim Chandra Chatterjee
27. Enumerate the Seed Freedom campaign of Vandana shiva.
28. Elucidate the importance of Ramanujam's notebooks
29. Explain Hardy – Ramanujam number 1729
30. Describe the legacy of J.C.Bose towards modern Science.

SECTION D

(3x12=36)

Answer any THREE in about 400 words each:

Unit I

1. Elucidate the significance of Intellectual History.
2. Explain intellectual History with special reference to Arthur Lovejoy
3. Explain the nature of Intellectual History
4. Explain the differences between Indian and western Intellectual History.
5. Enumerate the role of Individuals in Intellectual History

Unit II

6. Evaluate the role and contribution of Rajaram Mohan Roy for social awakening.
7. Assess the role and contribution of Jyotirao Phule for women empowerment.
8. Elucidate the contribution of Savtribai Phule for the emancipation of women.
9. Examine the role of D.K.Karve in promoting women education.
10. Estimate the social reforms of Veerasalingam Panatalu.
11. Comment on "Ranjit Guha was the first historian I met in flesh and blood who had a real enthusiasm for Ideas"-Dipesh Chakrabarty
12. Enumerate the significance of Pandita Rama Bai's contribution to societal changes.

Unit III

13. Elucidate the works and teachings of Debendranath Tagore.
14. Evaluate the role and contribution of Arya Samaj towards social and religious reforms in India.
15. Assess the religious reforms of Swami Vivekananda.
16. Estimate the teachings of Swami Vivekananda and point out their impact on the Indian society.
17. Analyse the impact of Ramakrishna Mission on Indian society and religion.
18. Assess the religious contribution of Ramalinga Adigal

Unit IV

19. Evaluate the political ideas of Dadabhai Nauroji.
20. Elucidate Gokhale's contribution to liberal political ideas in the context of India.

21. Critically examine political and economic ideas of Gokhale.
22. Estimate the political ideas of M.G.Ranade.
23. Explain the ideas of S.N.Banerjee on nationalism.

Unit V

24. Assess the significance of the novel Anandmath
25. Trace out the amalgamation of spirituality and science in J.C. Bose's contribution.
26. Enumerate the activist works of Vandana Shiva who is often referred as Gandhi of grain.
27. P.C. Ray was a revolutionary in garb - Justify the statement
28. Enumerate Welfare Economics of Amartya Sen as known for his conscience of profession

St. Mary's College (Autonomous), Thoothukudi – 628 001

Question Bank

I M.A. History

Core 1 History of India 1206 – 1707 C.E Sub.Code: 21PHIC21

Semester II April 2022

(for those who joined in July 2021 and after)

Time: 3 hours

Max:100 marks

SECTION A

Choose the correct answer:

Unit – I

1. The travel account 'Tarikh-i-Firozshahi' was written by _____.
a) **Ziya- ud-din Barani** b) Nicolo Conti c) Alberuni d) Muhammad Khan
2. The book 'TughluqNama' was written by _____.
a) **Amir Khusrau** b) Alam Khan c) Ala-ud-din d) Azad Khan
3. The travelogue 'Rehla' was written by _____.
a) **IbnBatuta** b) Inayat Khan c) AbulFazl d) Humayun
4. In which year the Delhi Sultanate was founded _____.
a) **1206** b) 1207 c) 1208 d) 1209
5. The slave dynasty was founded by _____.
a) Nusratkhilji b) Qutb-ud-din Aibak c) Jala-ud-din khilji d) Ala-ud-din khilji
6. Who was the founder of the khilji dynasty?
a) Nusratkhilji b) Ulugh khilji c) **Jala-ud-din khilji** d) Ala-ud-din khilji
7. The administrative system of Delhi Sultanate was based on the model of _____.
a) **Turko-Persian** b) Turko-Indian c) Turko-Iranian d) Turko-Islamis
8. The Diwani-I Ariz was the in-charge of the _____.
a) **Army** b) Civil c) Royal Household d) Irrigation
9. The system of branding the horses was introduced by _____.
a) **Ala-ud-din-Khilji** b) Jalal-ud-din Khilji c) FiruzshahKhilji d) Alamshah Khilji
10. The converted Mongols were called as _____.
a) **New Muslims** b) New Shia c) New Sunnis d) New Hindus
11. The tax collected from the Muslims for the religious purposes _____.
a) **Zakat** b) Jizya c) Khams d) Kharaj
12. The tax payed by the non-Muslims is known as _____.
a) Zakat b) **Jizya** c) Khams d) Kharaj
13. The Alai Darwaza was built by _____.
a) **Ala-ud-din-Khilji** b) Jalal-ud-din c) Firuzshah d) Ghazni
14. The city of Siri was founded by _____.
a) **Ala-ud-din Khilji** b) Muhammad Ali c) Iltutmish d) Bahlul Lodi
15. The first battle of Panipat was fought in _____.
a) 1556 (b) **1526** (c) 1562 (d) 1256
16. Ala-ud-din-Khilji undertook an expedition of Madura under the general _____.
(a) **Malik Kafur** (b) Muhammad (c) Jalal-ud-din (d) Taj-ud-din Yildiz
17. The system of branding the horses was introduced by _____.
(a) **Ala-ud-din-Khilji** (b) Jalal-ud-din Khilji (c) Firuzshah Khilji (d) Alamshah Khilji
18. In which year Timur – 'the lame' invaded in India?

- (a) **1398** (b) 1399 (c) 1397 (d) 1396

Unit II

19. Tughluq dynasty was founded by _____.

- a) **Ghiyaz-ud-din Tughluq** b) Alam Tughluq c) Jalal Tughluq d) Firuz Tughluq

20. Ibn Battuta was a traveller belongs to _____ country.

- a) **Morocco** b) Taxila c) Persia d) Russia

21. _____ among the following sultan transfers his capital from Delhi to Daulatabad.

- a) **Mohammad Bin Tughlaq** b) Feroz Shah Tughlaq

c) Ibrahim Lodhi d) Feroz Shah Tughlaq

22. Mohammad Bin Tughlaq created a Department of Agriculture named as _____.

- a) Diwan-i-Kohi b) Diwan-i-Khairat c) Diwan-i-Risalat d) Diwan-i-Insha

23. _____ among the following Sultan was also called as **Man of Ideas**.

- a) **Mohammad Bin Tughlaq** b) Feroz Shah Tughlaq c) Ibrahim Lodhi d) Sikandar Lodhi

24. _____ among the following Sultan had removed Ashokan Pillar from its original place.

- a) **Feroz Shah Tughlaq** b) Mohammad Bin Tughlaq c) Ibrahim Lodhi d) Jallaludin Khliji

25. _____ had repaired the Qutub Minar in an earthquake and many of the tombs of Delhi.

- a) **Feroz Shah Tughlaq** b) Mohammad Bin Tughlaq c) Ibrahim Lodhi d) Jallaludin Khliji

26. _____ was the irrigation tax introduced by Feroz Shah Tughlaq.

- a) **Haq-e-Sharb** b) Ushr c) Khams d) Zakat

27. _____ of the following Sultan founded the cities, Fatehabad and Jaunpur.

- a) **Feroz Shah Tughlaq** b) Mohammad Bin Tughlaq c) Ibrahim Lodhi d) Jallaludin Khliji

28. _____ of the following Fort was attacked five times by Sikander Lodhi but failed to capture.

- a) **Gwalior Fort** b) Golconda Fort c) Agra Fort d) Chittor Fort

29. _____ was Delhi Sultanate's last ruler.

- a) **Ibrahim Lodhi** b) Sikandar Lodhi c) Bahlol Lodhi d) Khiz Khan

30. Ibn Battuta, a famous Muslim explorer, came to India during the period of _____ Sultan's reign.

- a) **Mohammad Bin Tughlaq** b) Feroz Shah Tughlaq c) Ibrahim Lodhi d) Sikandar Lodhi

31. Vijaynagar Empire was founded during the reign of _____ Delhi Sultan.

- a) **Mohammad Bin Tughlaq** b) Feroz Shah Tughlaq c) Ibrahim Lodhi d) Sikandar Lodhi

32. _____ were called Barids during the period of Delhi Sultanate.

- a) **Spies** b) Accountant c) Commander in Chief d) Record Keeper

33. _____ among the following Sultan established a city in Delhi named as Ferozshah Kotla.

- a) **Feroz Shah Tughlaq** b) Mohammad Bin Tughlaq c) Ibrahim Lodhi d) Jallaludin Khliji

34. Ghazi Malik (Giyasuddin Tughlaq) was the founder of the _____ dynasty.

- a) **Tughlaq** b) Khaliji c) Sayyid d) Lodhi

35. _____ was the founder of Sayyid dynasty.

- a) Hamid Khan b) Muhammad Shah c) Mubarak Shah d) **Khizr Khan**

36. _____ was the last ruler of Lodi dynasty.

- a) **Ibrahim Lodi** b) Muhammad Lodi c) Jalal Lodi d) Mubarak Lodi

Unit III

37. Vijayanagar Empire was founded in _____

- a) 1335 b) **1336** c) 1337 d) 1526

38. _____ built the Udayagiri fort

- a) **Harihara I** b) Bukka I c) Harihara II d) Bukka II

39. Vijayanagar Empire was founded on the banks of river

- a) Krishna b) Caveri c) **Tungabatra** d) Narmada
40. _____ was considered as the real architect of the Vijayanagar Empire.
a) Harihara I b) **Bukka I** c) Krishnadeva Raya d) Devaraya I
41. Krishnadeva Raya built temples at _____
a) **Tirupati** b) Trichy c) Tiruchendur d) Srirengapnam
42. _____ built Hazara Temple
a) Devaraya I b) Harihara I c) **Krishnadeva Raya** d) Bukka I
43. _____ earned the title of Andhra Boja
a) Vira Narasimha b) Bukka II c) Vijaya Raya II d) **Krishnadeva Raya**
44. Battle of Talikotta was took place in _____
a) **1565** b) 1656 c) 1555 d) 1556
45. *When was Vijayanagar visited by Abdur Razak*
a) 1423 b) 1427 c) 1433 d) 1443
46. *Which among the following was the single biggest item of import to the Vijayanagar Empire?*
a) *Precious stone* b) **Horses** c) *Luxury goods* d) *Raw Silk*
47. _____ wrote the book *Rehla*
a) *Nicolo Conti* b) **Ibn Batuta** c) *Barbosa* d) *Nuniz*
48. _____ visited Vijayanagar Empire during the time of Deva Raya I
a) *Ibn Batuta* b) **Nicolo Conti** c) *Nuniz* d) *Barbosa*
49. *Which Portuguese traveller visited the Vijayanagar empire at the Battle of Talaikotta*
a) *Ibn Batuta* b) *Nuniz* c) *Barbosa* d) **Caesar Fredrick**
50. _____ was the name of gold coin assisted by Vijayanagar Empire
a) *Nishka* b) *Rysya* c) **Pagodas** d) *Jital*
51. *Srirangam copper plates gave information about _____ achievements*
a) *Krishnadeva Raya* b) **Deva Raya I** c) *Deva Raya II* d) *Hari Hara I*
52. *The Ashtathigajas of the Krishnadeva Raya were*
a) *Great Ministers*
b) **Great Scholars of Telugu Literature**
c) *Great Musicians*
d) *Gurdian of the Palace*
53. The most famous state festival of the empire of Vijayanagar as:
a. **Mahanavami** b) Brahmotsavam c) Ramanavarni d) Spring (Vasant) Festival
54. A. Saint scholar whose name is associated with the foundation of the empire of Vijayanagar is _____.
a. Sayana b) Sivagaya c) **Madhava Vidyaranya** d) Vyasaraya
55. Which one of the following was not one of the foreign travelers to visit India during the period of Krishnadevaraya?
a. Fernao Nuniz b) **Nicolo Conti** c) Domingo Paes d) None of these
56. Which of the following Vijayanagar kings allowed Portuguese to establish Churches at Vellore _____
a. Venkata II b) **Krishnadevaraya** c) Devaraya II d) None of these
57. Which of the following musical instruments had acquired a prominent place in the Vijayanagar Empire?
a. Cymbals b) Nadasawram c) **Veena** d) Mridangam
58. Who were Kaikkolas?

- a. Temple priests
- b. An anti-religious group which entertained the people by caricaturing various godheads
- c. An influential community of weavers living around temple precincts**
- d. A community of acrobats

59. The Vijayanagar King who after defeating the Srilankan troops forced Sri Lanka to pay tribute to the Vijayanagar empire

- a) Harihara b) Krishnadevaraya c) Devaraya I **d) Devaraya II**

60. The Bahmani Kingdom was established in _____

- a) 1345 b) **1347** c) 1336 d) 1335

61. Which of the following was not a Province of the Bahmini Kingdom?

- a) Daulatabad b) Berar c) **Gulbarga** d) Golconda

62. The Bahminis were traditional enemies of the rulers of Vijayanagar. What was the main bone of contention between two?

- a) Raichur Doab** b) Berar c) Golconda d) Ahmadnagar

63. Who annexed the Sharqi Kingdom of Jaunpur to the Sultnate?

- a) Sikander Lodi b) **Bahlol Lodi** c) Daulat Khan Lodi d) Ibrahim Lodi

64. Who founded the state of Mewar?

- a) Rana Kumbha b) Kshetra Simla c) Hushang Shah d) **Hamir**

65. The Kingdom of Gujarat reached its extreme limit during the reign of _____.

- a) Abdul Fatah Khan** b) Qutubudin Ahmad c) Muhammad Shah d) Ahmas Shah

66. The Bahmani Kingdom was founded by _____

- a) Hasan Bahman Shah** b) Ahmas Shah c) Muhammad Shah d) Qutubudin Ahmad

67. _____ was the first capital of Bahmani Kingdom

- a) Gulbarga** b) Golconda c) Bidar d) Berar

68. _____ transferred the capital from Gulbarga to Bidar

- a) Qutubudin Ahmad b) **Ahmad Shah Wali** c) Abdul Fatah Khan d) Ahmas Shah

69. _____ was the founder of the city of Ahmednagar

- a) Hasan Bahman Shah b) Ahmas Shah c) **Nizam Shahis** d) Hamir

70. Gol Gumbaz was built by _____

- a) Ahmas Shah b) Nizam Shahis c) **Muhammad Adil Shah** d) Hasan Bahman Shah

71. Charminar was built by _____

- a) Quli Qutub Shah** b) Muhammad Adil Shah c) Hasan Bahman Shah d) Amir Barid

72. _____ was the last ruler of Bahmani Kingdom

- a) **Amir Barid** b) Muhammad Adil Shah c) Quli Qutub Shah d) Nizam Shahis

Unit IV

73. Jama Masjid at Sambhal was built by _____.

- a) Akbar b) **Babur** c) Shah Jahan d) Jahangir

74. The first battle of Panipat was fought between Babur and _____.

- a) Ibrahim Lodi** b) Jayapala c) Jayachandra d) Lakshmanasena

75. The tomb of Babur is located at _____.

- a) Lahore b) **Kabul** c) Istanbul d) Bagdad

76. Purana Quila at Delhi was built by _____.

- a) Humayun b) Akbar c) **Sher Shah** d) Shahjahan
77. Humayun built a city at Delhi called as _____.
- a) Din Illahi b) Fatepur Sikri c) Jahanpanah d) **Din Panah**
78. The Jami Masjid at Fatepur Sikri is a tomb of _____.
- a) **Shaik Slaim Shisti** b) Akbar c) Humayun d) Babur
79. Buland Darwaza was built by _____.
- a) Fort b) City c) **Akbar** d) Palace
80. The tomb of Akbar was situated at _____.
- a) Agra b) Delhi c) Fatepur Sikri d) **Sikandara**
81. Jahangir had more interest in _____.
- a) Architecture b) **Painting** c) Literature d) Hunting
82. _____ was the chief Architect of Tajmahal.
- a) Ala-ud-din b) **Ustd Ahmed lahari** c) Jasidhu d) Hamir
83. _____ visited the Mughal court in the time of Jahangir.
- a) Willaim Finch b) **Sir Thomas Roe** c) Francisco Palsaert d) Fazal
84. _____ was best singer in the reign of Akbar.
- a) Birbal b) Jahangir c) Todar mal d) **Mian Tansen**
85. _____ was called as the “ Prince of Autobiographers”.
- a) Shahjahan b) Akbar c) Humayun d) **Babur**
86. _____ wrote the book kitab – ul- Hind.
- a) Badauni b) **Al- Baruni** c) Fazal d) Faizi
87. AbulFazal wrote _____.
- a) Akbar nama b) Ain –i- Akbari c) only a d) **both a&b**
88. The most famous court poet of Akbar was _____.
- a) Sur das b) Tulsidasc) **Abdur Rahim – Khan –i- Khanand** d) Rashkan
89. In whose reign Tulasi Das composed Ramacharitmanas?
- a) Humayun b) Jahangir c) **Akbar** d) Aurangzeb
90. The Mughal school of miniature painting was developed during _____ reign.
- a) Akbar b) Babur c) **Jahangir** d) Shah Jahan
91. _____ translated Ramayana into Persian language.
- a) AbulFazal b) Faizi c) **Badauni** d) Ghaizali
92. The pilgrim tax was abolished in _____.
- a) 1564 b) 1560 c) **1563** d) 1562
93. ShahJahanNamah was written by _____.
- a) **Inayat Khan** b) Shah Jahan c) NurJahan d) Mumtaj
94. BibiKaMakbara is the tomb of _____.
- a) MumtazMahal b) **Aurangzeb’s** wife c) Nurjahan d) Humayun’s sister
95. Fatwa-i-Alamgiri was compiled under the patronage of _____.
- a) Shah Jahan b) **Aurangzeb** c) Akbar d) Babur
96. Sadulla Khan was the wazir of _____.
- a) Shah Jahan b) Aurangzeb c) Jahangir d) **Both a &b**
97. Which European traveller visit Shah Jahan’s Court _____.
- a) Willaim Hawkins b) **Bernier** c) Thomas Roe d) Edward Terry
98. Which Mughal Emperor was a great Musician and was popularly known as ‘Rangila’.
- a) Adil Shah b) BagadurShahI c) Bagadur Shah II d) **Muhammad Shah**
99. _____ was the official language of the Mughal Empire.

- a) Urdu b) **Persian** c) Persian and local languages d) Turki
100. _____ was the original name of Shah Jahan.
 a) Salim b) Kushru c) **Kurram** d) Zahir-ud-din Muhammad
101. Taj Mahal Took _____ years to complete.
 a) **22** b) 23 c) 20 d) 21
102. _____ was the chief vocalist at the court of Shah Jahan.
 a) **Ram Das** b) Tansen c) Tulasi das d) Todar Mal

Unit V

103. The First Carnatic war took place in _____.
 (a) 1725 (b) 1775 (c) **1746** (d) 1730
104. The First Carnatic war came to an end with the treaty of _____.
 (a) Madras (b) Mangalore (c) **Aix-la-Chapelle** (d) Srirangapatnam
105. The Treaty of Aix-la-Chapelle was signed in _____.
 (a) 1725 (b) 1775 (c) **1748** (d) 1730
106. The Second Carnatic war took place in _____.
 (a) 1725 (b) 1775 (c) **1749** (d) 1730
107. The Second Carnatic war came to an end with the treaty of _____.
 (a) Madras (b) Mangalore (c) **Pondicherry** (d) Srirangapatnam
108. The Third Carnatic war took place in _____.
 (a) 1725 (b) 1775 (c) **1758** (d) 1730
109. Third Carnatic war came to an end with the treaty of _____.
 (a) Madras (b) Mangalore (c) **Paris** (d) Srirangapatnam
110. The Battle of Plassey took place in _____.
 (a) 1725 (b) 1775 (c) **1757** (d) 1730
111. The Battle of Buxar took place in _____.
 (a) 1725 (b) 1775 (c) **1764** (d) 1730
112. The Treaty of Allahabad was signed in _____.
 (a) 1725 (b) 1775 (c) **1765** (d) 1730
113. Dual Government was introduced in _____.
 (a) 1725 (b) 1775 (c) **1765** (d) 1730
114. The Dual Government of Bengal was introduced by _____.
 (a) **Robert Clive** (b) Warren Hasting (c) Lord Hasting (d) Wellesley

SECTION B

Answer in about 50 words each:

Unit – I

1. Give an account on Qutub – Minar
2. Write a note on Chihalgani
3. Explain Iqta system
4. Give an account on Sultana Raziya
5. Explain Malik kafur invasion on Madurai
6. Give an account on Qutb-ud-din- Aibek
7. Write a short note on Jalaluddin Khilji
8. Write a note on Amir Khusrau

9. Somnath Temple
10. The first battle of Tarain

Unit II

11. Write a note on Ibrahim Lodi
12. Give an account on Devagiri
13. Write a short note on Jittal
14. Give an account on Firozabad
15. Give an account on Jizya
16. Write a short note on Chief Qazi
17. Write a note on Tanka
18. Give an account on City of Tughluqabad
19. Write a note on Sikkander Lodi
20. Timur – ‘the lame’
21. Khizr khan
22. Ibrahim Lodi
23. Taj-ul-Masacir

Unit III

24. Write a note on Ibn Batuta
22. Give an account of Abdur Razak
23. Write a short note on Kingdoms of Vijayanagar
24. Who were Ashtadiggajas
25. Write about Tenali Rama Krishna
26. Write a note on Deva Raya II
27. Gove an account of Hampi
28. Write a short note on Hazara Temple
29. What is Pagodas
30. Allaudin Hassan Bahman Shah
31. Mahmud Gawan
32. Given an account of Gol Gumbaz
33. Write a short note on Charminar
34. Write a note on visit of Nicolo Conti
35. Athanasius Nikitin
36. Yusuf Adil Shah

Unit IV

37. Write a note on Ibadat Khana
38. Explain the concept Din - I- Ilahi
39. Write a note on Battle of Kanauj
40. Give an account on Nur Jahan
41. Write a short on Gulbadan Begum
42. Explain the biography Humayun Namah
43. Explain the importance of Taj Mahal
44. Write a note on AbulFazal
45. Give an account on Red Fort
46. Give an account on Nadir shah invasion
47. Write a short note on Third battle of Panipat

48. Give an account on Guerilla Warfare
49. Write a short note on Todar Mal
50. Give an account on Raigarh
51. Give an account on Treaty of Purandhar
52. Write a note on Jai Singh
53. Write a note on Ain-i-Akbari
54. Write a short note on Jizya
55. Give an account on Sir Thomas Roe
56. Write a note on Guru Arjun Dev
57. Give an account on Khalsa
58. Write a note on GuruTeghBahadur

Unit V

59. Treaty of Aix-la-Chapell
60. Treaty of Pondicherry
61. Battle of Wandiwash
62. Treaty of Paris
63. Robert Clive
64. Treaty of Allahabad
65. Dual Government

SECTION C

Answer in about 200 words each:

Unit – I

1. Analyse the challenges of Iltumish.
2. Examine the first women ruler's reign of Sultana Raziya.
3. Examine the conquests of Qutb-ud-din- Aibek.
4. Examine the market reforms of Alauddin Khilji
5. Analyse the importance of Mongol invasions.
6. Assess the Malik Kafur invasions on Madurai
7. Examine the importance of the reign of Ghiyasuddin Tughlaq

Unit II

8. Examine the art and architecture during the time of the Slave dynasty.
9. Analyse the agrarian reforms of Muhammad Bin Tughlaq.
10. Examine the services of Firoz Shah Tughlaq in the field of Public works .
11. Analyse the significance of First Battle of Panipat.
12. Examine the Provincial administration under Delhi Sultanate.
13. Assess the reign of Sayyid dynasty.

Unit III

14. Explain the causes led to the birth of Vijayanagar Empire.
15. Describe the Social condition of the Vijayanagar Empire.
16. Explain the Revenue system of Vijayanagar Empire.
17. Write a short note on Battle of Talikotta.
18. Narrate the cultural contributions of Vijayanagar Kingdom.

19. Estimate the achievements of Muhammad Gawan.
20. What were the causes of the conflict between Bhamini and Vijayanagar Kingdoms?
21. Narrate the architectural contributions of Bhamini Kingdom.
22. Enumerate the emergence of five independent Bahmani Kingdom.
23. Write a short note on the condition of Golkonda under the Bahmani rulers.

Unit IV

24. Assess the conquests of Babur on India
25. Examine the causes for the success of Babur in India
26. Analyze the early challenges faced by Humayun.
27. Examine the conquests of Sher Shah Sur.
28. Analyze the features of Jagirdar system
29. Examine the North West Frontier policy of Mughals
30. Assess the importance of an iconic monument Taj mahal
31. Examine the role of Nur Jahan Junta.
32. Examine the political conquests of Akbar
33. Examine the significance of Mughl and Rajputs relations.
34. Examine the Suh – i- Kul policy of Akbar.
35. Examine the significance of art and architecture during Akbar’s reign..
36. Narrate the religious condition under Akbar.
37. Critically examine the Rajput policy of Akbar.
38. Assess the importance of the revolt of Jats in North India.

Unit V

39. Analyse the causes and results of the First Carnatic War.
40. Examine the causes of the second Carnatic War.
41. Briefly discuss the third Carnatic war.
42. Sketch the causes and results the battle of Plassey.
43. Narrate the significance the Battle of Buxar.
44. Give an account of Robert Clive.
45. Briefly discuss the dual government of Bengal.

SECTION D

Answer in about 400 words each:

Unit – I

1. Assess the achievements of Qutb-ud-din- Aibak .
2. Estimate the reign of Iltumish in the history of medieval India.
3. Evaluate the reforms of Alauddin Khilji
4. Evaluate the conquests Alauddin Khilji.
5. Examine the achievements of Ghiyaz – ud – din Balban.
6. Narrate the North Indian expedition of Ala-ud-din khilji.

Unit - II

7. Analyse the agrarian reforms of Muhammad Bin Tughlaq.
8. Examine the services of Firoz Shah Tughlaq in the field of Public works.
9. Analyse the significance of First Battle of Panipat.
10. Examine the Provincial administration under Delhi Sultanate.
11. Assess the reign of Sayyid dynasty. Enumerate the downfall of Muhammad –bin – Tughluq through his administrative reforms.
12. Write a note on the causes for the downfall of Delhi Sultanate.
13. Explain the role of Ibrahim Lodi for the decline of Delhi sultanate.

Unit – III

14. Narrate the administration of Vijayanagar Empire.
15. Write an essay about the Social and Economic condition of the Vijayanagar Empire.
16. Estimate the development of Art and Architecture under the Vijayanagar Empire.
17. Briefly explain the battle of Talikotta.
18. Narrate the military expeditions of Krisnna deva Raya.
19. Evaluate the development of Art and Architecture under the Bahmini Kingdom.
20. Sketch out the character and the role of Muhammad Gawan.
21. Explain the prominence of Bijapur Kingdom.

Unit - IV

22. Evaluate the career and achievements of Babur
23. Estimate the achievements of Humayun.
24. Assess the legacy of Sher Shah Sur.
25. Estimate the features of Mansabdari system.
26. Evaluate the contribution of art and architecture during Shah Jahan reign.
27. Estimate the North West frontier policy of Mughals.
28. Estimate the religious policy of Akbar.
29. Assess the Mughals relations with Rajputs
30. Estimate the features of Mughal Administration.
31. Evaluate the religious condition under Mughal period.
32. Estimate the causes for the decline of Mughals.
33. Appraise the religious policy of Aurangzeb and its impact
34. Examine the downfall of Mughal Empire.

Unit V

35. Write an essay about the Advent of Europeans.
36. Explain the Anglo French Rivalry.
37. Analyse the causes and results of the First Carnatic War.
38. Examine the causes of the second Carnatic War.
39. Briefly discuss the third Carnatic war.
40. Sketch the causes and results the battle of Plassey.
41. Narrate the significance the Battle of Buxar.
42. Give an account of Robert Clive.
43. Briefly discuss the dual government of Bengal.

ST. MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001

Question Bank

I M.A. History

Core – 2 History of Tamil Nadu from 1336 to 1806 C.E Sub. Code: 21PHIC22

Semester – II April 2022

(for those who joined in July 2021 and after)

Answer all questions

Section – A

Choose the correct answer:

Unit – I

1. The Vijayanagar Empire was founded in the year _____.
a) **1336** b) 1346 c) 1356 d) 1366
2. Vijayanagar Empire was founded by _____.
a) **Harihara and Bukka** b) Krishnadevaraya c) Devaraya d) Ramaraya
3. Vijayanagar Empire was established on the banks of the river _____.
a) **Tungabhadra** b) Ganga c) Yamuna d) Godavari
4. _____ Period was considered as the Augustan Age of Telugu literature.
a) **Vijayanagar** b) Nayak c) Marathas d) Guptas
5. Madura Vijayam was written by _____.
a) Andal b) **Gangadevi** c) Periyalwar d) Krishnadevaraya
6. Krishnadevaraya wrote the Telugu poem _____.
a) **Amuktamalyada** b) Ushaparinayam c) Jambavathi Kalyanam d) Gita Govinda
7. The court of Krishnadevaraya was adorned by _____.
a) Poets b) **Ashtadigajjas** c) Navaratnas d) Patriots
8. In which year the Madras record office was renamed as Tamil Nadu Archives?
a) **1967** b) 1968 c) 1969 d) 1970
9. _____ was the first great ruler of the Sangama dynasty.
a) **Harihara** b) Krishnadevaraya c) Kumarakampana d) Saluva Narasimha
10. Saluva dynasty was founded by _____.
a) **Saluva Narasimha** b) Harihara c) Krishnadevaraya d) Kumarakampana
11. Saraswathi Mahal Library is situated at _____.
a) **Tanjore** b) Madurai c) Trichy d) Madras
12. _____ was called as “Irattai Pulavar”.
a) **Elam Suriyan and Muthu Suriyan** b) Paranjothi
c) Tholkappiya Devar d) Villuputhurayar
13. The battle of Talikotta took place in the year _____.
a) **1565** b) 1566 c) 1568 d) 1616
14. The battle of Toppur took place in the year _____.
a) 1610 b) 1612 c) 1614 d) **1616**
15. Who composed the traditional poem “Thiruvanaikaula”?
a) **Kalamekapulavar** b) Athi Veerapandyar c) Paranjothi d) Tholkappiya Devar

Unit - II

16. _____ was the founder of the Madurai Nayaks.
a) **Viswanatha Nayak** b) Thirumalai Nayak
c) Rani Mangammal d) Chokkanatha Nayak

17. _____ was the capital of the Nayaks.
 a) **Madurai** b) Tanjore c) Kanchipuram d) Mamallapuram
18. Thirumalainayakar Mahal was constructed by _____.
 a) **Thirumalai Nayak** b) Chokkanatha Nayak
 c) Krishnappa Nayak d) Viswanatha Nayak
19. _____ was considered as “one among a million women”.
 a) **Rani Mangammal** b) Minakshi c) Jhansi Rani d) Rani Lakshmi Bai
20. _____ was the last ruler of the Nayaks of Madurai.
 a) **Minakshi** b) Rani Mangammal c) Jhansi Rani d) Rani Lakshmi Bai
21. _____ was the founder of the Nayaks of Tanjore.
 a) **Sevappa Nayak** b) Viswanatha Nayak
 c) Virappa Nayak d) Chokkanatha Nayak
22. _____ was the most important ruler of the Tanjore Nayaks.
 a) **Raghunatha Nayak** b) Vijayaraghava Nayak
 c) Sevappa Nayak d) Achyutappa Nayak
23. Who composed the poem “Kantharkalivenba”?
 a) **Kumara Kurubarar** b) Pillai Perumal Iyengar
 c) Thayumanavar d) Robert De. Nobili
24. _____ was the leader of the Jesuit mission in Madurai.
 a) **Robert De. Nobili** b) G.U. Pope c) Thayumanavar d) Veeramamunivar
25. _____ was the original name of Veeramamunivar.
 a) **Fr. Constant Joseph Beschi** b) G.U. Pope c) Thayumanavar d) Robert De. Nobili
26. _____ was the important feature of the poligar administration.
 a) **Kaval system** b) Nayankara system c) Ayyangar system d) Palayam Administration
27. Kattabomman was a Poligar of _____.
 a) **Panchalamkurichi** b) Sivagangai c) Ramnad d) Dindugal
28. Kattabomman was executed at _____.
 a) **Kayathar** b) Sivagangai c) Ramnad d) Dindugal
29. Kattabomman was executed in the year _____.
 a) 1790 b) 1794 c) 1796 d) **1799**
30. Maruthu Pandiyan was a Poligar of _____.
 a) Ramnad b) **Sivagangai** c) Panchalamkurichi d) Dindugal
31. Maruthu Pandiyan was affectionately called as _____.
 a) **Chinna Maruthu** b) Periya Maruthu c) Vella Maruthu d) Maruthu
32. Maruthu Pandiyan was praised as _____ of Sivagangai.
 a) Tiger b) **Lion** c) Eagle d) Elephant
33. _____ shifted his headquarter from Pugalur to Ramnad.
 a) **Kilavan Sethupathi** b) Thirumalai Sethupathi
 c) Kuttan Sethupathi d) Sadaikka Devar
34. _____ rule was marked as the Golden Age of Maravas.
 a) Kuttan Sethupathi b) Thirumalai Sethupathi
 c) **Kilavan Sethupathi** d) Sadaikka Devar
35. The Marathas ruled Tanjore from _____.
 a) **1676** b) 1756 c) 1806 d) 1856
36. The Maratha rule of Tanjore was ruled by _____.
 a) **Ekoji** b) Venkoji c) Shahji d) Serfoji I

37. _____ was the last son of Venkoji.
 a) Shahji b) Venkoji c) **Tukoji** d) Serfoji I
38. _____ acted as the centre of Carnatic Music and Bharatha Natiyam.
 a) Madurai b) Mamallapuram c) Kanchipuram d) **Tanjore**
39. _____ was popularly known as modern Pathanjali.
 a) **Ramachandra Diksitar** b) Baskara Diksitar
 c) Swaminatha Diksitar d) Seerkali Arunachala Kavirayar

Unit – III

40. _____ shifted his headquarter from Pugalur to Ramnad.
 b) **Kilavan Sethupathi** b) Thirumalai Sethupathi
 c) Kuttan Sethupathi d) Sadaikka Devar
41. _____ rule was marked as the Golden Age of Maravas.
 b) Kuttan Sethupathi b) Thirumalai Sethupathi
 c) **Kilavan Sethupathi** d) Sadaikka Devar
42. The Marathas ruled Tanjore from _____.
 a) **1676** b) 1756 c) 1806 d) 1856
43. The first Maratha ruler of Tanjore was _____.
 a) **Ekoji** b) Venkoji c) Shahji d) Serfoji I
44. _____ was the last son of Venkoji.
 a) Shahji b) Venkoji c) **Tukoji** d) Serfoji I
45. _____ acted as the centre of Carnatic Music and Bharatha Natiyam.
 a) Madurai b) Mamallapuram c) Kanchipuram d) **Tanjore**
46. _____ was popularly known as modern Pathanjali.
 a) **Ramachandra Diksitar** b) Baskara Diksitar
 c) Swaminatha Diksitar d) Seerkali Arunachala Kavirayar
47. _____ was praised as Andhra Kalidasa.
 Baskara Diksitar b) Ramachandra Diksitar c) **Alurikuppanna** d) Swaminatha Diksitar
48. Saraswathi Mahal Library is situated at _____.
 a) **Tanjore** b) Madurai c) Trichy d) Madras
49. What was the important feature of the poligar administration?
 a) **Kaval system** b) Nayankara system c) Ayyangar system d) Palayam Administration
50. Kattabomman was a Polegar of _____.
 a) **Panchalamkurichi** b) Sivagangai c) Ramnad d) Dindugal
51. Kattabomman was executed at _____.
 a) **Kayathar** b) Sivagangai c) Ramnad d) Dindugal
52. Kattabomman was executed in the year _____.
 a) 1790 b) 1794 c) 1796 d) **1799**

Unit IV

53. The First Carnatic war took place in _____.
 (a) 1725 (b) 1775 (c) **1746** (d) 1730
54. The First Carnatic war came to an end with the treaty of _____.
 (a) Madras (b) Mangalore (c) **Aix-la-Chapelle** (d) Srirangapatnam
55. The Treaty of Aix-la-Chapelle was signed in _____.
 (a) 1725 (b) 1775 (c) **1748** (d) 1730
56. The Second Carnatic war took place in _____.
 (a) 1725 (b) 1775 (c) **1749** (d) 1730

57. The Second Carnatic war came to an end with the treaty of _____.
(a) Madras (b) Mangalore (c) **Pondicherry** (d) Srirangapatnam
58. The Third Carnatic war took place in _____.
(a) 1725 (b) 1775 (c) **1758** (d) 1730
59. The Third Carnatic war came to an end with the treaty of _____.
(a) Madras (b) Mangalore (c) **Paris** (d) Srirangapatnam

Unit V

60. Maruthu Pandiyan was a Polegar of _____.
a) Ramnad b) **Sivagangai** c) Panchalamkurichi d) Dindugal
61. Maruthu Pandiyan was affectionately called as _____.
a) **Chinna Maruthu** b) Periya Maruthu c) Vella Maruthu (d) Maruthu
62. Maruthu Pandiyan was praised as _____ of Sivagangai.
a) Tiger b) **Lion** c) Eagle d) Elephant
63. South Indian rebellion took place in the year _____.
a) 1795 b) 1799 c) **1800** d) 1801
64. Vellore Mutiny was broke out in the year _____.
a) 1799 b) 1800 c) 1801 d) **1806**

Section – B

Answer in about 50 words each:

Unit – I

1. Augustan Age.
2. Madhura Vijayam.
3. Saluvabhyudayam.
4. Krishnadevaraya.
5. Quarte Barbosa.
6. Irattai Pulavar.
7. Vedantha Desikar.
8. Diary of Anandaranga Pillai.
9. Saraswathi Mahal Library.
10. Perumpatta puliyur.
11. Nayankara system.
12. Ayyangar system.
13. Talikotta Battle
14. Battle of Thoppur.
15. Kaikolas.
16. Villuputhurayar.
17. Tholkappiya Devar.
18. Kalamekapulavar.
19. Athi Veerapandyar.
20. Paranjothi.

Unit – II

21. Pancha Pandyas.
22. Thirumalai Nayakar Mahal.
23. Sevappa Nayak.
24. Dalawai.

25. Pradhani.
26. Rasayam.
27. Kumarakurubarar.
28. Pillai Perumal Iyyangar.
29. Thayumanavar.
30. Robert De. Nobili.
31. Veeramamunivar.
32. Poligars.
33. Kaval System.
34. Agnew Proclamation.
35. Panchalamkurichi.
36. Lion of Sivagangai.
37. Serfoji II.

Unit – III

38. Sengamaladas.
39. Venkoji.
40. Shahji.
41. Serfoji I.
42. Tukoji.
43. Pratap Singh.
44. Tulgaji.
45. Amir Singh.
46. Serfoji II.
47. Shivaji II.
48. Samasthanam.
49. Saraswathi Mahal Library.

Unit IV

50. Tipu Sultan
51. Hyder Ali
52. Treaty of Aix-la Chappale
53. Treaty of Paris

Unit – V

54. Poligars.
55. Kaval System.
56. Amarum poens.
57. Catabudi poens.
58. Mercenary poens.
59. Agnew Proclamation.
60. Panchalamkurichi.
61. Lion of Sivagangai.
62. Agnew Turban.

Section – C

Answer in about 200 words each choosing either (a) or (b):

Unit – I

1. Explain the sources for the study of the Nayak period.
2. Assess the expedition of Harihara and his conquest of Tondaimandalam.

3. Narrate the expedition of Kumara Kampana.
4. Briefly explain about the administration of Kumara Kampana.
5. Explain the powers of the Governors during Vijayanagar period.
6. Explain Nayankara system.
7. What are the events leading to Talikotta battle in 1565.
8. Briefly sketch the events leading to Toppur battle in 1616.
9. Discuss the social institutions under the Vijayanagar rule.

Unit – II

10. Explain the successors of Virappa Nayak.
11. Write a note on ‘War of Noses’.
12. Explain the career and achievements of Chokkanatha Nayak.
13. Describe the glories of Chenji Nayaks.
14. Evaluate the economic conditions of Nayak rule.
15. Discuss the religious conditions under the Nayaks rule.
16. Trace the growth and development of Art and Architecture under the Nayak rule.

Unit III

17. Briefly sketch the Kaval system during the rule of the Poligars.
18. Explain the Local Administration of the Poligars.
19. Briefly sketch an account on the history of Marudhu Pandyan.
20. Bring out the contributions of Serfoji II.
21. Narrate the social and economic conditions of Marathas.
22. Explain the political activities of Venkoji.
23. Assess the contributions of Shahji.
24. Bring out the contributions of Serfoji II.
25. Bring out the historical importance of Saraswati Mahal Library.
26. Narrate the social conditions of Marathas.
27. Describe the economic conditions under Marathas.

Unit IV

28. Explain the causes for the second Mysore War.
29. Narrate the importance of advent of Europeans in Tamil Nadu.
30. Assess the religious activities of the Europeans in Tamil Nadu.

Unit V

31. Briefly sketch the Kaval system during the rule of the Poligars.
32. Explain the Local Administration of the Polegars.
33. Describe the courses of the South Indian Rebellion.
34. Trace the achievements of Vira Pandya Kattabomman.
35. Briefly sketch an account of Marudhu Pandyan.
36. Examine the causes for the failure of Vellore Mutiny.

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit – I

1. Narrate the sources for the study of Vijayanagar period.
2. Assess the sources for the study of preservation of records during the period of British.
3. Explain the four dynasties of Vijayanagar period.
4. Describe the temple administration of Vijayanagar period.
5. Explain the officials and powers of the governors who served under Vijayanagar rule.

6. Assess the local administrative system under Vijayanagar.
7. Examine the contributions of Christian Missionaries to education during the period of Vijayanagar.
8. Evaluate the economic conditions of the Vijayanagar period.
9. Discuss the religious conditions under the rule of Vijayanagar.
10. Describe the Growth of literature that flourished during Vijayanagar period.
11. Trace the growth and development of Art and Architecture during Vijayanagar kingdom.

Unit – II

12. Narrate the conquest and religious activities of Visvanatha Nayak.
13. Describe the character of Krishnappa Nayak I and his participation in Talikotta Battle.
14. Narrate the career and achievements of Thirumalai Nayak.
15. Estimate the character and accession of Muthu Virappa Nayak III.
16. “Rani Mangammal was one among the million women” – Explain.
17. Evaluate the political history of the Nayaks of Tanjore in Tamil Nadu.
18. Describe the administration of Nayaks.
19. Bring out the social conditions of the Nayak rule.
20. Trace the Growth of Literature under Nayaks.
21. Describe the Palayam Administration.
22. Describe the early history of Vira Pandya Kattabomman and his relation with British.
23. Explain the political history of the Marathas of Tanjore.
24. Assess the administration of the Maratha rulers of Tanjore.
25. Narrate the religious conditions of the Marathas.
26. Write an essay about the development of art and architecture under the Marathas.

Unit – III

27. Explain the Golden Age of Maravas under Kilavan Sethupathi.
28. Explain the political history of the Marathas of Tanjore.
29. Assess the administration of the Maratha rulers of Tanjore.
30. Narrate the religious conditions of the Marathas.
31. Write an essay about the development of art and architecture under the Marathas.

Unit IV

32. Explain the results of the second Carnatic War.
33. Analyse the causes for the Fourth Mysore War.
34. Examine the religious policy of the British in Tamil Nadu.

Unit – V

35. Describe the Palayam Administration.
36. Examine the causes for the South Indian Rebellion of 1800-1801.
37. Describe the early history of Vira Pandya Kattabomman and his relation with British.
38. What were the measures taken to suppress the revolt of 1806?
39. Trace the causes which led to the outbreak of Vellore Mutiny in 1806.

ST. MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001

Question Bank

I M.A. History

Core – 3

Contemporary World Since 1945

Sub. Code: 21PHIC23

Semester – II April 2022

(for those who joined in July 2021 and after)

Answer all questions

Section – A

Choose the correct answer:

Unit – I

1. In which year Harry Truman announced his doctrine?
a) **1947** b) 1948 c) 1950 d) 1955
2. In which year the RIO Pact was signed?
a) 1946 b) **1947** c) 1951 d) 1953
3. Which Pact was signed at Rio de Janeiro for peace and security?
a) Anzus Pact b) CENTO c) **RIO Pact** d) Warsaw Pact
4. In which year the Atlantic Charter was issued?
a) 1940 b) **1941** c) 1942 d) 1943
5. In which year the United Nations Organisation actually came into existence?
a) 1941 b) 1943 c) **1945** d) 1947
6. Where is the headquarters of the U.N.O?
a) Washington b) Dumberton Oaks c) Moscow d) **New York**
7. In which year the World Food Plan was executed?
a) **1961** b) 1964 c) 1966 d) 1968
8. Who was the first President of Vietnam?
a) Tow Bavo-Tai b) **Ho-chi-Minh** c) Dian Dhieum d) Johnson
9. In which year the democratic republic of Vietnam was created?
a) 1940 b) 1942 c) **1945** d) 1947
10. In which year the republic of Vietnam was established?
a) 1970 b) 1972 c) 1974 d) **1976**
11. Who was the President of Cuba?
a) **Fidel Castro** b) Johnson c) John F. Kennedy d) Khrushchev
12. _____ nationalized the Suez canal in 1956.
a) **President Nasar** b) Paul Henry c) Robert Scofman d) Jean Monet

Unit - II

13. In which year Iran-Iraq war came to an end?
a) 1982 b) **1988** c) 1986 d) 1990
14. Who was the leader of Iraq?
a) Gorbachev b) Winston Churchill c) **Sadam Hussain** d) Harry Truman
15. What was the cause for the Gulf War?
a) Petrol b) Diesel c) Water d) **Oil**
16. In which year the Organisation for European Economic Co-operation was formed?
a) **1948** b) 1949 c) 1950 d) 1952

36. SEATO was officially dissolved in _____.
 a) June 1966 b) **June 1977** c) June 1960 d) June 1975
37. CENTO was otherwise known as _____.
 a) **Baghdad Pact** b) Rio Pact c) Anzus Pact d) Warsaw Pact
38. Central Treaty Organization was established on _____.
 a) 24th April, 1955 b) 24th July 1955
 c) **24th February, 1955** d) 24th November, 1955
39. In which year Warsaw Pact was signed?
 a) 1956 b) **1955** c) 1950 d) 1954
40. In which year India joined as a member of the Common Wealth nation?
 a) **1955** b) 1956 c) 1957 d) 1958
41. Where is the headquarters of the Common Wealth?
 a) Washington b) **London** c) Moscow d) Dumberton Oaks
42. The Common Wealth was established by the London Declaration on _____.
 a) 1946 b) 1948 c) **1949** d) 1952
43. The Common Wealth Games were held at New Delhi on _____.
 a) 2004 b) 2006 c) 2008 d) **2010**
44. At present in which year the Common Wealth Games were held at _____.
 a) **Scotland** b) Netherland c) Ireland d) India
45. In which year the Annual Common Wealth Writers Prize was established _____.
 a) 1986 b) **1987** c) 1988 d) 1989
46. In which year the South Asian Association for Regional Co-operation was started?
 a) 1975 b) 1976 c) **1977** d) 1978
47. Who was the President of the Dacca Conference?
 a) P.V. Narasimha Rao b) Ziaur Rahman
 c) Chandrika Kumaratunga d) **H.M. Ershad**
48. The Secretariat of the SAARC is situated at _____.
 a) **Kathmandu** b) New Delhi c) Islamabad d) Colombo
49. Who was the first Secretary General of the SAARC?
 a) Ziaur Rahman b) **Abdul Ahsan**
 c) Benazir Bhutto d) Manmohan Singh
50. Organization of African Unity was established on _____.
 a) **1963** b) 2002 c) 1964 d) 1956
51. Group of Eight (G8) forum was originated in the year _____ with six Governments.
 a) 1989 b) 1964 c) 1971 d) **1975**
52. _____ was added to the group and then it known as Group of Eight (G8).
 a) Canada b) Germany c) **Russia** d) Japan
53. Group of 15 (G15) was established in _____.
 a) 1975 b) **1989** c) 1964 d) 1971
54. In which year the G77 International Association was started?
 a) 1956 b) 1960 c) **1964** d) 1968

Unit – V

55. The African National Society was founded by _____.
a) **African Nationals** b) The politicians of African
c) African Society d) Government of Africa
56. The African National Society conducted a mass rally against Apartheid policy in _____.
a) 1956 b) **1960** c) 1964 d) 1968
57. The party of South Africa is called as _____.
a) **African National Congress** b) African National Party
c) African Party d) African Congress
58. _____ was the leader of the African National Congress.
a) **Nelson Mandela** b) Hussein Onn c) Phan Van Khai d) Soeharto
59. In which year the Chartist movement was started?
a) **1838** b) 1839 c) 1964 d) 1965
60. Labour Party in British colonies was formed in _____.
a) 1890 b) **1891** c) 1900 d) 1901
61. The International Workingmen's Association was started on _____.
a) 1862 b) 1863 c) **1864** d) 1865
62. In which year was the worker's in France formed Paris commune?
a) 1868 b) 1869 c) 1870 d) **1871**
63. The first scientific society for women was founded in _____.
a) **1785** b) 1786 c) 1787 d) 1788
64. Labour Movement in Europe began during the _____.
a) Green Revolution b) Blue Revolution
c) White Revolution d) **Industrial Revolution**

Section - B

Answer in about 50 words each

Unit - I

1. Origin of UNO.
2. Security Council.
3. ECOSOC.
4. RIO Pact.
5. European Defence Community.
6. The Hague Conference.
7. Anzus Pact.
8. Hungarian Rebellion.
9. Suez crisis.
10. Cuban Missile crisis.

Unit - II

11. Oil Diplomacy.
12. OPEC.
13. European Coal and Steel Community.
14. Sadam Hussain.
15. Foreign Direct Investment.
16. Palestine.
17. EU.

Unit - III

18. Nuclear Non – Proliferation Treaty.
19. Nuclear Test Ban Treaty.
20. Uni-polar.
21. Multi-polar.
22. Bi-polar.
23. Gorbachev.
24. Khrushchev.
25. Terrorism.

Unit - IV

26. Regionalism.
27. SEATO.
28. NATO.
29. Dunkirk Treaty.
30. Brussels Treaty.
31. Baghdad Pact.
32. Warsaw Pact.
33. Commonwealth Learning Organisation.
34. SAARC.
35. SAARC and Human Rights.
36. Organization of African Unity.
37. African Development Bank.
38. Group of Eight.
39. Group of 15.
40. Group of 77.
41. Southeast ASEAN Games.
42. ASEAN Commemorative Summit of 2009.
43. South ASEAN Free Trade.

Unit - V

44. Apartheid.
45. Civil Rights Act of 1964.
46. Lusaka Manifesto of 1971.
47. Rosa Park.
48. African American Civil Rights Movements.
49. Montgomery Bus Boycott of 1956.
50. Lashkar-e-Taiba.
51. International Workingmen's Association.
52. Labour Parties.
53. Labour Festivals.
54. Labour and Racial Equality.
55. International Labour Organisation.
56. Third Wave of Feminism.
57. Radical Feminism.
58. Marxist Feminism.
59. Global Cultural Disarmament.

Section - C

Answer in about 200 words each choosing either (a) or (b):

Unit - I

1. What is Cold War?
2. Explain the features of Cold War.
3. Give an account of the effects of the cold war among the various countries of the world?
4. What are the objectives of UNO?
5. Write the organs of UNO?
6. Assess the functions of UNO.
7. Bring out the salient aspects of the Truman Doctrine.
8. Write a short note on Marshall plan?
9. Mention the aims of NATO?
10. Briefly discuss about SEATO.
11. Write a short note on Berlin crisis.
12. Describe the collapse of Berlin wall and German Re-unification.
13. Bring out the consequences of the Korean war of 1950.
14. Write a note about Cuban crisis.
15. Assess the role of Britain and France in 'Suez Canal Issue'.

Unit - II

16. Trace out the birth of Israel in 1948.
17. Write a note about Iran – Iraq war of 1980.
18. Trace the aims and objectives of European Union.
19. Examine the organs and functions of European Common Market.
20. Explain elaborately about European Coal and Steel Community.
21. Give an account on OPEC.

Unit - III

22. Give an account of the attempts made after 1945 to tackle the problem of disarmament?
23. Explain the emerging new world order after II World war.
24. Write a short note on Glasnost and Perestroika.
25. How far Soviet Disintegration was achieved under Gorbachev?

Unit - IV

26. Assess the aims of NATO.
27. Bring discuss about CENTO.
28. Describe the importance of Warsaw Pact.
29. Write a short note on origin of Commonwealth.
30. State the main objectives and charter of the SAARC.
31. Explain the aims of OAU.
32. What are the objectives of G – 15?
33. Examine the role of Group of 77 in the present trends of international relations.

Unit - V

34. What is meant by Apartheid Policy? Explain the cruel features of Apartheid.
35. Explain the Anti-Apartheid Movements. What are the measures taken by UNO to eradicate Apartheid?
36. Describe the causes for the Civil Rights Movement in U.S.A.

Section - D

Answer in about 400 words each choosing either (a) or (b):

Unit - I

1. Examine the various events of the cold war.
2. Enumerate the impact of the cold war.
3. Describe the aims and achievements of the UNO.
4. Give an account of the purpose and organization of UNO.
5. Examine the causes for the Korean War of 1950.
6. Assess the role of the United States in the Korean War.
7. Bring out the consequences of the Vietnam war.
8. Assess the role of United States in Vietnam War.

Unit - II

9. Explain the causes and results of Arab-Israel war.
10. Write an essay on Oil Diplomacy.
11. Give an account of the Gulf war of 1991.
12. Analyse the achievements of European Common market.
13. Trace out the origin and progress of European Union.

Unit - III

14. Explain UNO's achievements regarding Disarmament.
15. Bring out the consequences of Disarmament and Arms Control.
16. Write an essay on Soviet Disintegration.
17. Explain the Domestic policy of Gorbachev.

Unit - IV

18. Assess the importance of NATO.
19. Bring out the importance of SEATO.
20. Describe the role of SAARC in International Relations.
21. Explain the Achievements of OAU.
22. Enumerate the role of ASEAN media cooperation in ASEAN countries.
23. Examine the role of Group of Eight in the present trends of international relations.
24. Elaborate the role of Group of 15 in the present trends of international relations.

Unit - V

25. Assess the role of UNO in solving the issue of Apartheid in South Africa.
26. Enumerate the role of Martin Luther King in the Civil Rights Movement in U.S.A.
27. Assess the role of feminism in the contemporary world.
28. Describe the achievements of Labour Movement.

ST. MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001

I M.A. History --- Question Bank

Core – 4

Intellectual History of Tamil Nadu

Sub. Code: 21PHIC24

Semester – II April 2022

(for those who joined in July 2021 and after)

Answer all questions

Section – A

Choose the correct answer:

Unit – I

- Subramania Iyer founded the _____.
a) **Hindu** b) Indian Express c) The Mail d) Madras Times
- Swadesamitran was founded by _____.
a) Veeragavachariar b) **Subramaniya Iyer** c) Rangacharia d) Muthuswami Iyer
- Hindu was bought by Kasturi Ranga Iyengar in _____.
a) **1905** b) 1906 c) 1907 d) 1908
- Subramaniya Iyer was one of the _____ delegates present at the Bombay Conference.
a) 50 b) 61 c) 68 d) **78**
- In _____ Subramaniya Iyer was appointed as the member of the Standing Committee of the INC.
a) 1900 b) 1905 c) **1906** d) 1910
- Subramaniya Iyer conducted his widowed daughter's marriage in _____.
a) 1800 b) 1885 c) 1889 d) **1900**
- Swadesamitran the Tamil Newspaper was started in _____.
a) 1800 b) 1850 c) **1882** d) 1890
- Subramaniya Iyer felt the Viceroy _____ has sown the seeds for political education.
a) **Ripon** b) Dalhousie c) Clive d) Hastings
- _____ founded the Adi Dravida Mahajana Sabha in 1893.
a) **Rettamalai Srinivasan** b) Rajaji c) Gandhi d) Ambedkar
- _____ was the summer capital of the Madras Presidency.
a) Assam b) **Ooty** c) Shimla d) Kashmir
- Rettamalai Srinivasan was conferred the title of Diwan Bahadur in _____.
a) 1930 b) 1932 c) 1935 d) **1936**
- _____ was the last Governor General of India.
a) **Rajaji** b) Mountbatten c) Rajendraprasad d) Nehru
- Rajagopalachari founded the _____ party.
a) Dravida Kazhagam b) **Swatantraparty** c) Justice party d) Forward Bloc
- Rajaji was one of the first recipients of the highest civilian award _____.
a) **Bharat Ratna** b) Padma Bhushan c) Badma Vibhushan d) Chevalier
- Rajagopalachari was described by _____ as the "Keeper Of My Conscience".
a) **Mahatma Gandhi** b) Nehru c) Ambedkar d) Indra Gandhi
- At the age of _____ Rajaji joined the INC.
a) 20 b) 26 c) **28** d) 30
- _____ was the founder of Salem Literary Society.
a) **Rajaji** b) Karunanidhi c) V.V. Giri d) C.N. Annadurai
- Rajaji started the Tamil Scientific Terms Society in _____.
a) 1900 b) 1910 c) **1916** d) 1920

19. Rajaji was awarded the Sahitya Akademi Award in
a) 1950 b) 1956 c) **1958** d) 1960
20. M.C. Rajah became the secretary of the Adi-Dravida Mahajana Sabha in _____
a) **1916** b) 1920 c) 1923 d) 1925
21. Thillaiyadi Valliammal was a _____ girl.
a) South African b) **South African Tamil** c) Tamil d) Indian Tamil
22. Muthuramalinga Devar was elected _____ times to the national parliamentary constituency.
a) **3** b) 5 c) 2 d) 4
23. Muthuramalinga Devar belonged to _____ party.
a) **Forward bloc** b) Justice party c) Dravida kadhakam d) Swatantra party
24. Karunanidhi was _____ time president of D.M.K
a) **10** b) 15 c) 8 d) 13
25. Karunanidhi has the record of having won _____ times in the Tamil Nadu Assembly Election.
a) 10 b) 12 c) **13** d) 15
26. Karunanidhi was born in _____.
a) Thorapalli b) **Thirukkuvilai** c) Mannarkudy d) Mudukulathur
27. _____ started to organize school students for the Anti-Hindi Agitation.
a) **Karunanidhi** b) Rajaji c) Muthuramalinga Devar d) M.C. Raja
28. Dravida Munnetra Kazhagam was formed on _____.
a) **17 September 1949** b) 25 March 1948 c) 19 July 1950 d) 20 September 1952
29. Karunanidhi's letters to party in _____ volumes.
a) 3 b) 5 c) **7** d) 9
30. The 3rd World Tamil Conference was held at _____.
a) **Paris** b) Singapore c) America d) Srilanka
31. World Classical Tamil Conference was held at _____.
a) Madurai b) **Coimbatore** c) Chennai d) Thanjavur
32. Semmozhiyaam Tamil Mozhiyaam was the official theme song for the Tamil Conference of.
a) 2000 b) 2005 c) **2010** d) 2015

Unit - II

33. _____ founded the Panchamar Mahajana Sabha in 1891.
a) Iyothee Thass b) Muthuramalinga Devar c) M.C. Rajah d) Ambedkar
34. Iyothee Thass launched a magazine _____.
a) **Dravida Pandian** b) Thiruvalluvar Malai c) Dravida Nadu d) Tamilarasu
35. The Indian Buddhist Association was established in the year _____.
a) 1800 b) 1820 c) **1898** d) 1850
36. Iyothee Thass was the first notable scheduled caste leader to embrace _____.
a) **Buddhism** b) Christianity c) Islam d) Jainism
37. Amy Carmichael was an _____ Christian Missionary.
a) English b) **Irish** c) American d) African
38. Amy Carmichael opened an orphanage and founded a mission in _____.
a) Tirunelveli b) **Dohnavur** c) Tarangambadi d) Madurai
39. Christian Medical College Hospital was started in _____.
a) **1918** b) 1920 c) 1921 d) 1930

40. CMC was started by_____.
- a) Amy Carmichael b) **Ida scudder**c)Muthulakshmi Reddy d) Annie Besant
41. CMC is at_____.
- a) Chennai b) Madurai c)**Vellore** d) Bangalore
42. _____was the General Secretary Of Justice Party ever since its inception.
- a) Lakshmana Samy b) **Ramasamy Mudaliar** c) Venkata Reddy d) T. Panner Selvam
43. On 26 December organized a second conference at _____.
- a) **Amaravati** b) Hasam c) Vellore d) Bidar
44. _____was the President of ECOSOC.
- a) Ambedkar b) **Ramasamy Mudaliar** c) K.C. Reddy d) Poole
45. Ramasamy Mudaliar was appointed as the _____ in 1946.
- a) **Dewan** b) Governor c) Chief Minister d) President
46. _____ was awarded Padma Bhushan in 1954.
- a) Ramasamy Muddaliar b) M.C. Rajah c) Srinivasan d) Rajaji
47. _____ was the longest serving Vice-Chancellor of Madras.
- a) **Ramasamy Mudaliar** b) Lakshmana Mudaliar c) M.G. Ramachandran
d) Alagappa Chettiar

Unit - III

48. _____was conferred with the title of Puratchi Kavingyar by Periyar.
- a) Bharthi b) Kannadhasan c) Vaali d) **Bharathidasan**
49. ConstantineBeschi was a _____ Jesuit priest.
- a) German b) **Italian**c) Roman d) French
50. Constantine Beschi arraived Madurai in _____
- a) **1711** b)1913 c) 1915 d)1708
- 51.Constantine Beschi served as the Parish priest in _____
- a) **Kamanayakkan Patti** b) Punnaikayal c) Puliyampatti d) Uvari
52. _____ biggest political work is Thembavani.
- a) Bharathidasan b) **Constantine Beschi** c) Zeeganbalq d) Francis Xavier
53. _____ celebrated as one of the greatest Islamic poets of India
- a) Masthan Sahib b) **Umarupulavar** c) Nagoor Hanifa d) Diwan Bahadur
54. Umarupulavar was born in the town _____ in Thoothukudi district.
- a) **Nagalapuram** b) Kovilpatti c) Tiruchendur d) Srivaikundam
55. Umarapulavar was made as the court poet of _____ Zamin.
- a) **Ettayapuram** b) Singampatti c) Chevelaperi d) Attrangarai
56. _____ preached one caste and one religion
- a)**Vaikunda Swamigal** b) Annie Besant c) Kirubananda Variyar d) Shahajananda
57. Vaikunda Swamigal established _____ for the establishment of equality.
- a) NilalTankals b) **Samathuva Samajam** c) Sanmarga Sangam d) Fabian Society
58. Ayya vazhi was a unique way of life propagated by _____
- a) Vaikunda Swamigal b) Annie Besant c) Kirubananda Variyar d) Shahajananda
59. Who made saint Arunagirinathar's Thiruppugazh known to the entire world.?
- a) **Kirubananda Variyar** b) Umarupulavar c) Shajananda Swamigal d) Annie Besant
60. _____ established 'Thiruvarul Dhavaneri Manram'.
- a)Umarupulavar b) **Kirubananda Variyar** c) Shajananda Swamigal d) Annie Besant
61. Kirubananda Swamigal set up Ramakrishna home for oephan children in _____
- a) **Thiruparaithurai** b)Thiruparuthikuntram c)Thiruvadudurai d)Thirunelveli

61. _____ was popularly known as Swaminarayan.
a) Umarupulavar b) Kirubananda Variyar c) **Shajanananda Swamigal** d) Annie Besant

Unit - IV

62. _____ was regarded as the 'Father of Modern Tamil literary style'.
a) **Subramania Bharathiar** b) Kalyana Sundaranar c) Bharathidasan d) Srinivasa Iyer
63. At the age of _____, title 'Bharathi' was given by Raja of Ettayapuram seeing his excellence in poetry.
a) 10 b) 15 c) **11** d) 18
64. On April 1906, Bharathi edited Tamil weekly _____.
a) **India** b) Bala Bharatham c) Swadesamitran d) Suryodayam
65. 'Swadesa Geethangal' was published on the year _____.
a) 1890 b) **1908** c) 1880 d) 1990
66. C. Subramania Bharathiar considered _____ as his Guru.
a) Annie Besant b) Muthulakshmi Reddy c) **Sister Nivedita** d) Sarojini Naidu
67. _____ was the first musician who got the 'Bharat Ratna'.
a) **M.S. Subbulakshmi** b) Srinivasa Iyer c) Kalyana Sundaram d) Sundrambal
68. _____ was the first Indian musician to receive the Ramon Magsaysay Award on 1974.
a) Srinivasa Iyer b) Kalyana Sundaranar c) **M.S. Subbulakshmi** d) Bharathi
69. M.S. Subbulakshmi recorded her first song named _____.
a) **Maragatha Vadivum** b) Kurai Onrum Illai c) Sree Chakra Raja d) Vishamakara Kannan
70. On _____, M.S. Subbulakshmi made a stage debut at Madurai Sethupathi High School.
a) **1926** b) 1925 c) 1948 d) 1919
71. M.S. Subbulakshmi received the Hindustani Music under _____.
a) **Pandit Narayanrao Vyas** b) Srinivasa Iyer c) Sadasivam d) Bharathidasan
72. M.S. Subbulakshmi gave her first public performance on _____, in the hundred pillar hall inside the Rock Fort Temple at Trichy.
a) **1927** b) 1920 c) 1918 d) 1915
73. M.S. Subbulakshmi first movie titled _____.
a) **Sevasadanam** b) Savitri c) Meera d) Shakuntala
74. Sevasadanam film debut was released on _____.
a) 1930 b) 1925 c) 1935 d) **1938**
75. M.S. Subbulakshmi played a male role of the film _____ in Savitri.
a) **Narada** b) Brahma c) Kabir d) Thyagaraja Bhagavathar
76. 'Meera' film gave M.S. Subbulakshmi national prominence on _____.
a) **1945** b) 1940 c) 1948 d) 1950
77. _____ quoted about M.S. Subbulakshmi as, "Who am I, a mere Prime Minister before a Queen, a Queen of Music".
a) **Pandit Jawaharlal Nehru** b) Kishori Amonkar c) Sarojini Naidu d) Lata Mangeshkar
78. _____ called M.S. Subbulakshmi as 'Tapaswini'.
a) **Lata Mangeshkar** b) Sarojini Naidu c) Ghulam Ali Khan d) Sarojini Naidu
79. _____ termed M.S. Subbulakshmi as 'Suswaralakshmi' (Goddess of Perfect Note).
a) **Ustad Bade Ghulam Ali Khan** b) Sarojini Naidu c) Lata Mangeshkar d) Jawaharlal Nehru
80. _____ labelled M.S. Subbulakshmi as 'Eighth Note or Aathuvaan Sur' which is the seven notes basic to all music.

- a) **Kishori Amonkar** b) Sarojini Naidu c) Ghulam Ali Khan d) Lata Mangeshkar
81. _____ termed M.S. Subbulakshmi as ‘Nightingale of India’.
- a) **Sarojini Naidu** b) Kishori Amonkar c) Lata Mangeshkar d) Jawaharlal Nehru
82. _____ was the first musician to be honoured with India’s highest civilian award ‘Bharat Ratna’ on 1998.
- a) **M.S. Subbulakshmi** b) Sarojini Naidu c) Ghulam Ali Khan d) Lata Mangeshkar
83. _____ was awarded ‘Sahitya Akademi Award’ for the novel, ‘Cheraman Kathali’ on 1980.
- a) Bharathidasan b) **Kannadasan** c) Bharathiyar d) Kalyana Sundaram
84. _____ was frequently called ‘Kaviarasu’.
- a) **Kannadasan** b) Kalyana Sundaram c) Bharathiyar d) Padma Subramaniam
85. Kannadasan wrote his series of books on Hinduism titled _____.
- a) **Arthamulla Indhu Matham** b) Bhagavad Geetha c) Sri Krishna Kavasam d) Ramayana
86. Kannadasan was the first to receive National Film Award for Best Lyrics for the film _____.
- a) Paasam b) Mannadhi Mannan c) **Kuzhanthaikkaga** d) Anandha Jodhi
87. Kannadasan was the producer of the historic Tamil film _____ portraying Marudhu brothers in Indian freedom struggle.
- a) Marma Veeran b) **Sivangai Seemai** c) Kula Dheivam d) Maheswari
88. The notable autobiographies of Kannadasan were _____.
- a) **Vanavasam and Manavasam** b) Maangani c) Yesu Kaviyam d) Bajagovindam
89. Pattukottai Kalyana Sundaram got the first opportunity to write lyrics for Tamil movie _____.
- a) **Paditha Penn** b) Paasavalai c) Mahadhevi d) Karpukkarasi
90. Pattukottai Kalyana Sundaram’s songs first compilation was appeared on _____ in printed form.
- a) 1960 b) 1955 c) **1965** d) 1970
91. _____ is the well-known founder of the dance form ‘Bharatha Nrithyam’.
- a) M.S. Subbulakshmi b) **Padma Subramaniam** c) Bharathiyar d) Kalyana Sundaram
92. _____ was the first dancer to introduce ‘Pushpanjali’ dance piece.
- a) **Padma Subramaniam** b) M.S. Subbulakshmi c) Rukmani Devi d) Uday Shankar
93. Padma Subramaniam composed and choreographed dance – drama _____.
- a) Java b) Bali c) Kathakali d) **Meenakshi Kalyanam**
94. _____ is the first person to discover the long forgotten grammatical artistic base ‘Marga’ the path shown by sage Bharatha, common to all Indian forms.
- a) **Padma Subramaniam** b) M.S. Subbulakshmi c) Rukmani Devi d) Uday Shankar
95. _____ was awarded Lifetime Achievement Award for her contribution to development and harmony in Asia.
- a) **Padma Subramaniam** b) M.S. Subbulakshmi c) Rukmani Devi d) Uday Shankar

Unit V

96. _____ is referred as ‘Edison in India’.
- a) **G.D. Naidu** b) Santappa c) M.S. Swaminathan d) Rangarajan
97. G.D. Naidu is credited with the manufacture of first _____ in India on 1937.
- a) **Electric Motor** b) Microscope c) Rocket d) Space Engines
98. _____ is known as ‘Miracle Man’
- a) **G.D.Naidu** b) Santappa c) K.Sivan d) Abdul Kalam

99. _____ was an Indian polymer chemist and leather technologist.
a) **Mushi Santappa** b) Naidu c) Abdul Kalam d) Sivan
100. The Council of Scientific and Industrial Research awarded Santappa the ‘Shanti Swarup Bhatnagar Prize for Science and Technology in _____.
a) 1950 b) 1955 c) 1960 d) **1967**
101. Mushi Santappa was appointed as the Vice-Chancellor of Sri Venkateswara University at _____.
a) **Tirupati, Andhra** b) Aligarh c) Kolkata d) Mumbai
102. _____ is a global leader of Green Revolution.
a) **M.S.Swaminathan** b) Verghese Kurien c) Hiralal Chaudhuri d) Vishal Tewari
103. In _____ M.S. Swaminathan was awarded the first World Food Prize.
a) 1980 b) 1985 c) 1995 d) **1987**
104. M.S.Swaminathan Research Foundation is located at _____
a) **Chennai** b) Bombay c) Calcutta d) Bangalore
105. _____ has been described by the United Nations Environment Programme as “the Father of Economic Ecology”.
a) **M.S.Swaminathan** b) Abdul Kalam c) Santappa d) K.Sivan
106. M.S. Swaminathan received UNESCO Gandhitrophy _____.
a) 1990 b) 1993 c) **1999** d) 1995
107. A.P.J. Abdul Kalam was born in the pilgrimage centre of _____.
a) **Rameswaram** b) Kasi c) Madurai d) Kumbakonam
108. _____ served as the 11th President of India.
a) **A.P.J. Abdul Kalam** b) Rajendra Prasad c) Radhakrishnan d) K.R. Narayanan
109. _____ is popularly known as the ‘Missile Man of India’.
a) **A.P.J. Abdul Kalam** b) Rajendra Prasad c) Radhakrishnan d) K.R. Narayanan
110. _____ was responsible for the evolution of ISRO’s launch vehicle programme particularly PSLV configuration.
a) **A.P.J. Abdul Kalam** b) Rangarajan c) K.Sivan d) K.R. Narayanan
111. Bangladesh Prime Minister _____ described A.P.J. Abdul Kalam as “a rare combination of a great statesman, acclaimed scientist and a source of inspiration to the young generation of South Asia”.
a) **Sheikh Hasina** b) Indira Gandhi c) Benazir Bhutto d) I.K. Gujral
112. An autobiography book titled ‘Wings of Fire’ was written by _____.
a) **A.P.J. Abdul Kalam** b) Swami Vivekananda c) Paramahansa d) Sri Aurobindo
113. _____ was responsible for the development and operationalism of AGNI and PRITHVI Missiles.
a) **A.P.J. Abdul Kalam** b) K.Sivan c) Rangarajan d) Santappa
140. K. Sivan joined ISRO in _____ to participate on the Polar Satellite Launch Vehicle Project.
a) 1975 b) 1980 c) **1982** d) 1985
141. Under the chairmanship of K. Sivan, ISRO launched _____ to moon.
a) **Chandrayaan 2** b) Aryabhata c) GSAT d) PSLV C-14
142. K. Sivan served as a Secretary of ISRO from _____.
a) 2010 -2012 b) 2015 -2017 c) 2018 -2020 d) **2018 - 2022**

Section – B

Answer in about 50 words each:

Unit – I

1. Explain the founding of the “HINDU” News paper
2. Write a note on the Adi Dravida Mahajana Sabha
3. Narrate the early life of Rajaji.
4. Write a short note All India Depressed Classes Association
5. Narrate Write a note on Rajah-Moonje Pact
6. Describe the Forward Bloc
7. Describe the Ramnad Riots
8. Give a short on Tamil Inaththalaivar

Unit – II

9. Sketch a note on Dravida Pandian.
10. Narrate the Dohnavur Fellowship
11. Write a note on Christian Medical College, Vellore
12. Explain the brain of the Justice party.
13. Discuss the All-India Non-Brahmin Movement.
14. Describe the Twin Stars of Arcot.
15. Give an account of Puratchi Kavingyar.
16. Write a note on Alagapa Chettiar

Unit – III

17. Write a note on the Court poet of Ettayapuram Zamin.
18. Explain the Akila Thirattu
19. Sketch about Thembavani.
20. Give a short note on Theosophical society.
21. Describe the intellectual ideas of Swami Sahajananda.
22. Describe a note on Isai Perarignar.

Unit - IV

23. Give a note on ‘India’ the news paper
24. Sketch the importance of the movie Sevasadanam
25. Discuss about Shakuntala and Savitri
26. Write short note on Kaviarasu Kannadasan
27. Explain the Arthamulla Indhu Matham
28. Write short note on the movie Sivagangai Seemai
29. Narrate the Vanavasam and Manavasam
30. Explain Bharata Nrithyam
31. Write short note on Nrityodaya
32. Sketch a note on Padma Subramanian

Unit V

33. Describe the Edison in India
34. Write a note on the Botanic Marvels
35. Give an account of United Motor Service
36. Write a note on Robert Stanes
37. Sketch a note on Mushi Santappa
38. Explain Polymer Science
39. Discuss about the father of Green Revolution in India
40. Explain the Cobalt – 60 Gamma Garden
41. Sketch a note on Norman Borlaug
42. Describe the People’s President
43. Write a note on the ‘Missile Man of India’
44. Expand – ISRO
45. Write a note about A.P.J. Abdul Kalam Memorial
46. Sketch a note on K. Sivan
47. Give an account of Chandrayaan 2

Section – C

Answer in about 200 words each choosing either (a) or (b):

Unit – I

1. Analyse the contribution of G. Subramaniya Iyer to the newspaper Hindu
2. Examine the social reforms of Subramaniya Iyer.
3. Discuss about Diwan Bahadur Rettamalai Srinivasan
4. Assess the contribution of Rajaji to literature and music.
5. Rajaji is regarded as a “Pioneer of Social Reforms” – Justify it.
6. M.C.Rajaji was considered to be a Person Equal in Stature to Ambedkar- Discuss.
7. Enumerate the biography of Thillaydi Valliammai.
8. Assess the significance of Criminal Tribes Act.
9. Analyze the legacy of Devar.
10. Examine the significance of World Classical Tamil Conference

Unit – II

11. Assess the life and legacy of Iyothee Thass Pandithar
12. Discuss Amy Carmichael’s work in India and her legacy
13. Estimate the role of Ramasamy Mudaliar in Justice party
14. Analyse the legacy of Bharathidasan
15. Analyse contribution of Alagappa Chettiars charitable foundations.
16. Examine the contribution of Christian Medical College ,Vellore.

Unit – III

17. Assess the importance of Theosophical Society
18. Analyse the religious reforms of Vaikunda Swamigal
19. Examine the features of Ayyavazhi
20. Discuss Joseph Constantine’s contribution to Tamil literature
21. Analyze Kirubananada Variyar’s legacy in the field of religion
22. Examine the religious ideas of Swami Sahajananda

Unit IV

23. Examine the role of Bharathi as a journalist and editor.
24. Discuss the works of Subramania Bharathi towards patriotism.
25. Analyse the Musical career of M.S. Subbulakshmi.
26. Examine the film career of M.S. Subbulakshmi.
27. Illustrate the religious views of Kannadasan.
28. Estimate the contributions of Pattukottai Kalyana Sundaram to films.
29. Assume the role of Padma Subramaniam as singer and composer of dance style.
30. Examine the role of dancer and choreographer of Padma Subramaniam.

Unit V

31. Examine the role of G.D. Naidu in science
32. Assess the significance of Green Revolution.
33. Discuss the scientific contribution of Mushi Santappa.
34. Estimate the scientific research of M.S. Swaminathan.
35. Elucidate the career of A.P.J. Abdul Kalam as scientist.
36. Assess the contribution of A.P.J. Abdul Kalam to Science.
37. Examine the writings and works of S. Rangarajan
38. Analyse the role of S. Rangarajan in filmography
39. Illustrate the career of K. Sivan for the development of launch vehicles for ISRO
40. Classify the achievements and awards of K. Sivan

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit – I

1. Evaluate the life and legacy of G. Subramaniya Iyer.
2. Estimate the life and service of Rettamalai Srinivasan
3. Examine Rajaji's role as a political intellectual.
4. M.C. Rajah was considered to be a person equal in stature to Ambedkar-Discuss.
5. Assess the role of Thillaiyadi Valliammal in freedom struggle
6. Evaluate the life, service and legacy of Muthuramalinga Devar
7. Estimate the political career of Kalaignar Karunanidhi

Unit – II

8. Assess the contribution of Amy Carmichael to the poor.
9. Evaluate Jda scudder's service to the society.
10. Estimate the contributions of Arcot brothers in freedom struggle

Unit - III

11. Analyse Constantine Joseph Beschi's contribution.
12. Evaluate the services of Annie Besant to the Society
13. Assess the social reforms of Vaikunda Swamigal
14. Estimate the life and legacy of Kirubananda Variyar
15. Analyse the religious views of Sahajananda

Unit IV

16. Assess the role of C. Subramania Bharathiyar to Freedom struggle.
17. Evaluate the musical style and performance of M.S. Subbulakshmi.
18. Illustrate the role of M.S. Subbulakshmi, a globally renowned exponent of Carnatic Music.
19. Estimate the spiritual books, notable novels, poems, autobiography and filmography and lyrics in Tamil films of Kannadasan
20. Evaluate the contribution of Kannadasan contribution Tamil literature
21. Assess the career and legacy of Pattukottai Kalyana Sundaram
22. Evaluate the achievements of Padma Subramaniam
23. Estimate the life and legacy of Padma Subramaniam.

Unit V

24. Estimate the role of Gopalaswamy Doraiswamy Naidu in scientific invention.
25. Evaluate the various inventions of G.D. Naidu.
26. Assess the contributions of Mushi Santappa to chemical sciences
27. Estimate the role of M.S. Swaminathan towards Green Revolution
28. Estimate the career of M.S. Swaminathan
29. Evaluate the role of A.P.J. Abdul Kalam, the Missile man of India
30. Estimate the writings and achievements of A.P.J. Abdul Kalam.
31. Analyse the career and contributions of A.P.J. Abdul Kalam to India for the development of Missiles.
32. Examine the career of S. Rangarajan to Tamil literature.
33. Appraise the contribution of K. Sivan to India's space mission.

St. Mary's College (Autonomous) Thoothukudi

Question Bank

I M.A History

Indian Art

Sub. Code: 21PHIC25

Core 5

Semester II - April 2022

(for those who joined in July 2021 and after)

Time: 3 hours

Max: 100 marks

Section A

Choose the Correct Answer:

Unit I

1. _____ is the matrix of civilisation.
(a) **architecture** (b) economy (c) religion (d) philosophy
2. _____ site possessed step wells in the Indus valley civilisation.
(a) **Lothal** (b) Dholavira (c) Harappa (d) Mohenjodaro
3. The famous iron pillar at Mehruli belonged to _____ age.
(a) Maurya (b) **Gupta** (c) Pandya (d) Sungas
4. The first north India temple with Shikara was _____ temple.
(a) **Dasavatar** (b) Bhitargaon (c) Kedareswara (d) Chennakesava
5. Dhameka stupa was located at _____.
(a) **Saranath** (b) Sanchi (c) Bhopal (d) Kanpur
6. Paribhojika stupa was erected over the _____ of Buddha.
(a) **objects** (b) relics (c) birth place (d) Bodhi tree
7. _____ were influenced by ascetic life style of vedic priod.
(a) Chaitiyas (b) **Vikaras** (c) Stambhas (d) Stupas
8. _____ temple was considered as the crown of Pallava architecture
(a) **Kailasanatha** (b) Chennakesava (c) Vaikunda Perumal (d) Sea shore

Unit II

9. _____ are carved into the surface.
(a) Pictographs (b) **Petroglyphs** (c) Earth figures (d) Hieroglyphics
10. Adamgarh Rock shelter was discovered by
(a) **Manoranjan Ghosh** (b) Brown Hunter (c) Silberrad (d) Gordon
11. Bhimbetka Rock paintings are found in _____.
(a) **Bhopal** (b) Lucknow (c) Allahabad (d) Patna
12. The paintings and sculptures in the caves of Ajanta and Ellora, inspired by _____.
(a) **Buddhism** (b) Jainism (c) Sikism (d) Hinduism
13. Indus valley people used toys and figures made of _____.
(a) Iron (b) Copper (c) **Terracota** (d) Stucco
14. _____ bronze images are famous during Cholas period
(a) **Nataraja** (b) Vishnu (c) Murugan (d) Ganesa

15. _____ is the rock-cut Jain monastery
(a) **Sittanavasal Cave** (b) Kudimiyanmalai Cave (c) Amravathi Cave (d)

Tanjavur

16. _____ pottery ware was found in Mauryan period
(a) Red and Black (b) **Black polished ware** (c) Painted Greyware (d) Red and White
17. _____ statue at Mathura has been described as the best in the Gupta plastic
(a) Murugan (b) Shiva (c) Shakti (d) **Vishnu**
18. The pictures depicted in _____ caves are fine examples of paintings of the Gupta age.
(a) Bhimbetka (b) **Ajantha** (c) Jogimara (d) Adamgarh
19. _____ period bronzes were created using the Lost wax technique
(a) Guptas (b) Hoysalas (c) **Cholas** (d) Pallavas
20. The sculptures and the carvings are extraordinary specimen of Pandyan art at _____
(a) **Vettuvan kovil** (b) Kailasanatha Temple (c) Cheenakesava (d) Chidambaram

Unit III

21. The Mughal picture were small in size, and hence are known as _____.
(a) **Miniature Painting** (b) Mural Paintings (c) Tanjavur Painting (d) Pahari Painting
22. _____ is an umbrella term used for a form of Indian painting.
(a) **Minature Painting** (b) Mughal Painting (c) Mural Painting (d) Pahari Painting
23. _____ is the most famous Rajasthani school of painting.
(a) Tanjore (b) **Pahari** (c) Assami (d) Odisi
24. _____ was the Mughal emperor encouraged the miniature paintings.
(a) **Jahangir** (b) Shah Jahan (c) Akbar (d) Humayun
25. Bagh paintings are found in _____.
(a) Assam (b) **Madhya Pradesh** (c) Jharkhand (d) Andaman
26. Bagh paintings are belonged to the period of _____.
(a) Mughal (b) Vijayanagar (c) British (d) **Gupta**

Unit IV

27. The classical dance originated from the _____.
(a) **Natya Shastra** (b) Kathakali (c) Kuchipudi (d) Odisi
28. _____ is the oldest dance form in India.
(a) **Bharatnatyam** (b) Folk (c) Kuchipudi (d) Manipuri
29. _____ is the famous dance of Manipur.
(a) Kuchipudi (b) **Manipuri** (c) Classical (d) Folk
30. Kathakali is a state dance of _____.
(a) Tamil Nadu (b) **Kerala** (c) Karnataka (d) Andra

Unit V

31. Rukmani Devi Arundale was born on _____.
(a) **1904** (b) 1905 (c) 1906 (d) 1907
32. Raja Ravi Varma Puraskaram is awarded every year to people who show excellence in the field of _____.
(a) Dance (b) Social Services (c) Art and Culture (d) **Painting**

33. _____ was the first Indian film actor to awarded as a “Best Actor”
 (a)Lata Mangeshkar (b)**Sivaji Ganesan** (c)M. G. R (d)Gemini Ganesan
34. Jai Ho song as the famous song by _____
 (a) Asha Bhosle (b) **A.R Rahman** (c) Lata Mangeshkar (d) Shreya Ghosal
35. _____ was the founder of Bharata Muni Elango foundation for Asian culture.
 (a) **Padma Subramniam** (b) Sivaji (c) Satyajit (d) Asha
36. _____ was the first play of K.Balachander.
 (a) **Major Chandrakanth** (b) Mantravasal (c) Irrattai Uravugal (d) Ethirneechal
37. K.Balachander got a first national award for the film _____.
 (a) Major Chandrakanth (b) Mantravasal (c) Irrattai Uravugal (d)**Thanneer
 Thanneer**

Section B

Answer in about 50 words

Unit - I

1. Artificial Dockyard
2. Bronze images
3. Dhamekha stupa
4. Dasavatar Temple
5. Udayagiri caves
6. Terracota
7. Step wells
8. Cow Gate
9. Kailasanatha temple
10. Etymology of Hoysalas
11. Smarta worship
12. Taj mahal
13. Buland Darwaza
14. Kalugumalai

Unit - II

15. Steatite figures
16. Lost Wax Technique
17. Nataraja
18. Open Art Gallery
19. Monolithic Pillar
20. Descent of Ganges
21. Mahabalipuram
22. Kudimiyamalai inscriptions
23. Portrait making
24. Salabhanjika sculpture
25. Panchayatana Temple
26. Ardhachandra Mudra
27. Cinmudra
28. Ananda tandava
29. Lalitasana

Unit – III

30. Mural Paintings
31. Pandmapani
32. Dying Princes
33. Bagh Caves
34. Potrait Painting
35. Bhasholi Painting
36. Serfoji II

Unit –IV

37. Garba
38. Dandiya Raas
39. Paika
40. Bihu
41. Kaikottikali
42. Chakyar Koothu
43. Karma Naach

Unit – V

44. Kalashetra
45. Oil Painting
46. Asha Bhonsle
47. Parashakti
48. Jai Ho

Section C

Answer in about 200 wordschoosing either (a) or ((b).

Unit - I

1. Examine the significance of Bhimbetka caves.
2. Analyse the town planning of Indus valley civilization
3. Trace out the building materials and its measurements with reference to drainage and plumbing work of Indus valley civilization.
4. Examine the types of housing during Vedic period
5. Evaluate the the historicity of Sanchi stupa with the classification of stupas.
6. Examine the architectural style of Hoysalas ,
7. Analyse the styles of architecture during Pallavas reign.
8. Examine the chief contributions of Pandyas architecture
9. Analyse the principal elements of Taj Mahal architecture
10. Explain the importance of Virupaksa temple architecture

Unit - II

11. Explain the classification of Pre –historic art and the important sites
12. Discuss the Indus valley art with the special reference to terracotta, steatite and bronze figures.
13. Examine the Buddhist sulptor’s manual and the iconography of Buddha.
14. Enumerate the importance of Pandyas sculptures in Vettuvan Kovil.
15. Explain the attributes of Cholas iconography with reference to the bronze images of Nataraja.
16. Analyse the Open Art gallery of Pallavas.

17. Analyse the Sculptural art under Vijayanagar reign.
18. Examine the Mughal paintings and its Persian influence.
19. Examine the Nayak paintings of Thanjavur

Unit – III

20. Write a short note on murals in South India.
21. Given an account of miniature paintings
22. Write about the Kerala miniature paintings.
23. Explain the Tanjore paintings.
24. Discuss the materials and colours used in the Rajasthani paintings.

Unit – IV

25. Write a short note on “Kuchipudi”.
26. Write about any five folk dances of India.
27. Explain the elements of Bharatanatyam.
28. Discuss the main features of Disco.

Unit – V

29. Examine early life of Raja RaviVarma.
30. Discuss the Awards & honors received by Lata Mangeshkar.
31. Enumerate the role of Sivaji Ganesan in Tamil film industry.

Section D

Answer in about 400 words each choosing either (a) or (b).

Unit - I

1. Estimate the general characteristics of Pre Historic Art
2. Evaluate the engineering feat of Indus Valley civilization.
3. Enumerate the Vedic village architecture.
4. Estimate the salient features of Buddhist architecture
5. Estimate the Gupta’s Nagara style of architecture with illustrations
6. Justify the statement - Advent of Mughals epoched a new era in Indo- Islamic architecture
7. Evaluate the characteristics of Pallava architecture
8. Estimate the contribution of Cholas in the field of architecture.
9. Estimate the significance of Mughal architecture
10. Evaluate the Temple architecture under Nayak period.
11. Estimate the features of Vijayanagar architecture

Unit – II

12. Estimate the rock art and paintings of Pre Historic Art
13. Elucidate the Buddhist iconography under Mauryas
14. Estimate the religious tolerance of Gupts’s in iconography
15. Evaluate the legacy of Narasimhavarma Pallava in Mammallapuram
16. Enumerate the richness of Cholas iconography with reference to the postures and mudras.
17. Estimate the contribution of Pandyas iconography.

Unit – III

18. Explain the importance of Tanjore paintings.
19. Discuss the materials used in the Mural paintings.

20. Discuss the significance of Sitanavasal paintings and its colours.

Unit – IV

21. Justify the influence of Fusion Jazz in Indian art.

22. Examine the elements of Kathakali.

23. Examine the classical Dances of India.

Unit – V

24. Enumerate the role of Rukmani Devi Arundale to Bharatanatyam.

25. Assess the early life & career of K. Balachander.

26. Explain the contribution of A.R. Rahman to Indian Music.

St. Mary's College (Autonomous) – Thoothukudi

Question Bank

I M.A. History

Core Elective I

Archives Keeping Sub.Code: 21PHIE21

Semester II – April 2022

(for those who joined in July 2021 and after)

Answer all questions

Section A

Choose the correct answer:

Unit - I

1. The term 'Archives' is derived from _____ word.
a) **Greek** b) Latin c) German d) Arabic
2. The term 'Record' is originated from _____ word.
a) **Latin** b) German c) Greek d) Arabic
3. In which year the archives in England were designated as the 'Archives of the Exchequer'?
a) **1130** b) 1578 c) 1732 d) 1838
4. Queen Elizabeth established an archival office designated as 'State Record Office' on _____.
a) **1578** b) 1800 c) 1834 d) 1838
5. The King of England Charles II appointed _____ as the Keeper of Records.
a) **William Prynne** b) Justinian c) Epialates d) Max Millian
6. The Public archives of Canada were established in _____.
a) **1878** b) 1912 c) 1934 d) 1944
7. Parchment and Vellum are made from _____.
a) **Animal skins** b) Inks c) Paper d) Papyrus
8. The Registry System is originated in ancient _____.
a) **Rome** b) England c) France d) India

Unit - II

9. The National Archive of France was established in _____.
a) **1789** b) 1779 c) 1889 d) 1999
10. The "Archives Nationale" was located in _____.
a) **Paris** b) London c) England d) America
11. The _____ Archives of the United States is one among the largest archives in the world.
a) **National** b) Private c) Public d) International
12. _____ was appointed as the first Keeper of Records and Muniments of the Supreme Court, Calcutta.
a) **Thomas Scott** b) William Dolby c) James Hume d) Samuel Charles Hill
13. In which year the head of the archives was designated as the 'Keeper of Records'?
a) **1914** b) 1910 c) 1915 d) 1919
14. The French archives were created in _____.
a) **1789** b) 1879 c) 1889 d) 1899
15. In which year after independence, the Imperial Record Department was renamed as National Archives of India in _____.
a) **1947** b) 1957 c) 1967 d) 1977
16. In _____, the Government of India constituted the committee on archival legislation.

- a) **1959** b) 1969 c) 1979 d) 1989
17. The first archival legislation was passed in _____.
a) **1972** b) 1962 c) 1982 d) 1992

Unit – III

18. In which year John Bruce brought out his work entitled ‘Annals of the Honourable East India Company’?
a) **1806** b) 1606 c) 1706 d) 1906
19. _____ started the work of printing the records for the easy access of researchers and for long standing preservation.
a) **A. T. Pringle** b) John Bruce c) James Hume d) W.J. Barrow
20. In India the Curator of the National Archives visits every _____ years the State
a) **Three** b) Four c) Five d) Six
21. In 1952 _____ developed a modified technique of lamination in the National Archives of India at New Delhi.
a) **O.P. Goel** b) W.J. Barrow c) William Dolby d) James Hume

Unit – IV

22. The publication of a Bengal annual register was first taken by _____.
a) **Samuel Jones** b) William Dolby c) J.T. Brown d) W.J. Barrow
23. ‘History of the Sikhs’ book was written by _____.
a) **Joseph Cunningham** b) J.T. Brown c) W.J. Barrow d) M.W. Townfind

Unit – V

24. _____ is an inseparable aspect of life.
a) **Religion** b) Society c) Economy d) Education
25. During the _____ the entire Europe was known as Christendom.
a) **Middle Ages** b) Early period c) Ancient d) Modern
26. In the modern period a Private group popularly known as _____ administers many temples.
a) **Devasthanams** b) Mutts c) Kanchi Pedam d) Melmaruvattur Siddhar Pedam
27. The Maharajas of Travancore have records of variety of nature and still kept under their custody in the name of _____.
a) **Matilakam Records** b) Board of Control Records c) Marine Records d) Biographical Series

The Nehru Memorial Museum is located at _____.

- a) **New Delhi** b) Kolkatta c) Chennai d) Hyderabad
25. The American Studies Research Centre was started at _____.
a) **Hyderabad** b) New Delhi c) Kolkatta d) Chennai
26. In which year the American Studies Research Centre was started?
a) **1964** b) 1965 c) 1966 d) 1968
27. In which year the Parry and Company was started?
a) **1787** b) 1687 c) 1887 d) 1877
28. The Asiatic Society of Bengal was founded by _____.
a) **Sir William Jones** b) Sir Mortimer Wheeler c) Alexander Cunningham d) Pitt Rivers
29. Bengal Club was established at _____.
a) **Kolkatta** b) Madurai c) New Dehi d) Ahmedabad
30. The Bengal Club was established in _____.
a) **1827** b) 1704 c) 1800 d) 1950

31. Sringeri Mutt is located in the State of _____.
 a) **Karnataka** b) Tamil Nadu c) Goa d) Pondicherry
32. Archives of the Society of Jesus is located in _____.
 a) **Shenbaganoor** b) Madurai c) Madras d) New Delhi
33. National Register of private records launched by the Government on the year _____.
 a) **1959** b) 1947 c) 1957 d) 1960
34. Tamil Nadu Archives was established in _____.
 a) **1806** b) 1909 c) 1968 d) 1670
35. The Tamil Nadu Archives was reorganized in _____.
 a) **1909** b) 1806 c) 1968 d) 1850
36. Tamil Nadu Archives is situated in _____.
 a) **Chennai** b) New Delhi c) Kodaikanal d) Madurai
37. _____ was the first Curator of the Madras Record Office.
 a) **Henry Dodwell** b) Talboys Wheeler c) George Gaerrow d) William Hudleston
38. _____ was the first Indian trained in England for archival administration.
 a) **B.S. Baliga** b) S. Chidambaram c) S. Singarajan d) C.K. Gariyali
39. Tamil Nadu Council of Historical Research was formed in _____.
 a) **1973** b) 1925 c) 1950 d) 1975
40. In which year the Tamil Nadu Government created the post of Commissioner of Tamil Nadu Archives and Historical Research?
 a) **1973** b) 1974 c) 1968 d) 1988
41. From the year _____ research scholars were allowed to use the documents and books.
 a) **1925** b) 1910 c) 1920 d) 1930
42. The archive week was celebrated in _____ in Tamil Nadu.
 a) **7th – 13th August, 1978** b) 10th – 11th August, 1977, c) 12th August, 1980
 d) 8th – 12th August, 1990
43. In which year the Connemera Library was founded?
 a) **1860** b) 1960 c) 1855 d) 1680
44. Saraswathi Mahal Library was located in _____.
 a) **Thanjavur** b) Trichy c) Madurai d) Madras

Section – B

Answer in about 50 words each:

Unit - I

1. Define Archives.
2. Public Archives.
3. Historical Manuscripts.
4. Government Documents.
5. Sir. Hilary Jakinson.
6. Eugenio Essanora.
7. Archival institution.
8. Valarious Publicola.
9. Justinian and Archives
10. Ecclesiastical Archives.

Unit - II

11. England Archives.
12. French Archives.

13. Jatakas.
14. Buddhist Sambha.
15. Kautilya's Arthasastra.
16. Akshapatala.
17. Nilkapattu (Nilopitu).
18. Variputhagam.
19. Variputhaga Kanakku.
20. Sukranithi.

Unit - III

21. Deftar Kahana.
22. Kagazi Raj.
23. Record Department.
24. Archives Nationals of Paris.
25. Federal Records Act of 1950.
26. Parchment and Vellum.
27. Microfilms.
28. Registry system.
29. Vereniging Van Archivarissen.
30. Court Archives.
31. Public Department.
32. Revenue Department.
33. Secret Department.
34. Central Government Archives.
35. Functions of Archives.

Unit - IV

36. Preservation of Records.
37. Accession.
38. Thymol Fumigation.
39. Bleaching method.
40. Chiffon Repair.
41. Lamination.
42. Docketing.

Unit - V

43. Joseph Cunningham.
44. Private Archives.
45. Religious Archives.
46. Nehru Memorial Museum.
47. American Studies Research Centre.
48. Tamil Nadu Archives.
49. Henry Dodwell.
50. Macqueen.

Section – C

Answer in about 200 words each choosing either (a) or (b):

Unit - I

1. Define the term Archives.
2. Trace the origin and early history of Archives.
3. Explain the chief characteristics of Archives.
4. Discuss the development of Archives in Greece.
5. Write an account of the history of archives keeping in England.
6. Trace the history of archives keeping in USA.
7. Trace the history of Archives during the Ancient period.
8. Describe the contribution of the Mughals to Archives keeping.
9. Sketch an account about the creation of Archives.
10. What are the materials needed for the creation of Archives.

Unit - II

11. Explain micro-filming process.
12. Explain the Establishment of Registry System.
13. Explain Court Archives.
14. Describe the organization of Archives in England.
15. Point out the Administrative value of Tamil Nadu Archives.
16. Elucidate the rules of Archival Administration.
17. Mention the General Principles of Preservation.
18. Explain the Internal Agents of Deterioration.

Unit - III

19. What are the preventive measures undertaken for the preservation of archives.
20. Discuss the methods of restoring damaged records.
21. Write a short note on Thymol Fumigation.
22. Give a short note on Chiffon Repair.
23. Explain Docketing.
24. Write a short note on Leather Book Bindings.
25. Give a short note on Repair of Maps and Charts.
26. Narrate the functions of an Archivist.
27. Assess the functions of Archives in Ancient and Medieval period.
28. Assess the functions of Archives in Modern Period.

Unit - IV

29. Elucidate the Acquisition of Historical Material of records.
30. How to arrange the records properly?
31. Examine the measures of archival training.
32. How can Archival Awareness be created among the public?
33. Explain the uses of Archives.
34. Discuss the Research value of Archives.

Unit - V

35. Define Private Archives.
36. Explain the Nature of Private Archives.
37. Enumerate the differences between Private Archives and Public Archives.
38. What are the steps to be taken to improve the Private Archives?

39. Explain the different kinds of Private Archives.
40. Discuss the problems of Private Archives.
41. Give a short note on Business Archives.
42. Explain the Archives of Trade Unions.
43. Narrate the Archives of eminent personalities and families.
44. Briefly sketch about the Archives of interest groups.
45. Write about American Research Centre.
46. Sketch briefly about the Bengal Club.
47. Write a short note on the Society of Jesus of the Madurai Province.
48. Assess the origin and growth of Tamil Nadu Archives.
49. Assess the contribution of J.J. Cotton as the third curator of Tamil Nadu Archives.
50. Briefly sketch the Library of Tamil Nadu Archives.

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit - I

1. Explain the various definitions of Archives.
2. Assess the Nature of Modern Archives.
3. Explain the General History of Archives Keeping.
4. Trace the history of Indian Archives Keeping.
5. Discuss the development of Archives in Rome.
6. Trace the History of Archives during Medieval period.
7. Examine the creation of Archives.
8. Give an account of the materials used for the creation of archives.

Unit - II

9. Assess the characteristics of paper for permanent records.
10. What care should be given in the collection of records?
11. Explain the Central Government Archives.
12. Narrate the organization of archives in France.
13. Assess the organization of Archives in India.
14. Assess the Technical side of Archival Administration.
15. Explain the External Agents of Deterioration.

Unit - III

16. Describe the various methods involved in Preservation of Archives.
17. How to preserve the records from insects and mildew.
18. What are the protective measures undertaken to bring the old records in good condition.
19. Explain Lamination.
20. Describe the methods that are followed to re-strengthen old documents and records.
21. Estimate the functions of Archives.
22. List out the methods to be followed in preserving Archival materials.
23. What are the modern techniques to preserve the records?
24. List out the Allied functions and Reprographic Services for the function of Archives.

Unit - IV

25. “An archive is a friend, guide and a philosopher to researches” - Explain.

26. Sketch the historical value of archives.
27. Explain the utility value of Archives from the point of view of historical research.
28. Explain the utility value of Archives from the point of view of administration.
29. What are the rules and regulations access to the archives in India?

Unit - V

30. How far the Religious Archives and Communal Archives help to construct History.
31. Write an essay on the functions of various private archives of India.
32. What are the various steps to be undertaken to strengthen private archives to promote historical research in India?
33. Explain Nehru Memorial Museum.
34. Give an account of Parry and Company as a Private Archive.
35. Explain the Asiatic Society of Bengal.
36. Enumerate the General problems of Private Archives.
37. Explain the specific problems of Private Archives.
38. What are the suggestions to improve the Private Archives.
39. Trace the history of the Tamil Nadu Archives.
40. Bring out the contribution of Saraswati Mahal Library towards the historical writing.
41. Bring out the contribution of Connemara Library towards the historical writing.
42. Assess the role of Tallboys Wheeler contribution to Tamil Nadu Archives.
43. Estimate the role of Henry Dodwell as the First Curator of the Madras Record Office.
44. Explain the contribution of Macqueen to Tamil Nadu Archives.
45. Asses the contribution of B.S Baliga to Tamil Nadu Archives.
46. Trace S. Singarajan contributions to the Archives of Tamil Nadu.
47. Analyse the Structure and Functions of the Tamil Nadu Archives.
48. What are the various steps are undertaken to preserve the Tamil Nadu Archives.
49. What are the various measures undertaken for the promotion of Research in Archives.
50. What are the Rules and Regulations followed by the Tamil Nadu Archives?

St. Mary's College (Autonomous) – Thoothukudi
Question Bank
II M.A. HISTORY

Core 1

History of India from 1707 to 1858 C.E Sub. Code: 21PHIC31
Semester III – November 2022
(for those who joined in July 2021 and after)

SECTION - A

Choose the correct answer:

Unit – I

1. The dual government of Bengal was established by _____.
(a) **Robert Clive** (b) Warren Hastings (c) Lord Cornwallis (d) Lord Wellesley
2. In Which year the dual government was introduced?
(a) 1760 (b) **1765** (c) 1768 (d) 1770
3. The battle of Plessey took place in the year _____.
(a) 1750 (b) 1755 (c) **1757** (d) 1760
4. Who was the first Governor – General of Bengal?
(a) Robert Clive (b) **Warren Hastings** (c) William Bentinck (d) Lord Wellesley
5. Warren Hastings became the Governor – General of Bengal in _____.
(a) 1770 (b) 1772 (c) **1773** (d) 1774
6. Who abolished the dual government of Bengal?
(a) **Warren Hastings** (b) Robert Clive (c) Lord Wellesley (d) William Bentinck
7. Regulating Act was passed in the year _____.
(a) 1770 (b) **1773** (c) 1775 (d) 1778
8. The First Anglo – Maratha war took place in the year _____.
(a) 1770 (b) 1772 (c) 1774 (d) **1775**
9. The First Maratha War came to an end with the treaty of _____.
(a) Surat (b) Puradhai (c) Wadgaon (d) **Salbai**
10. In which year, the treaty of Salbai was signed?
(a) **1782** (b) 1783 (c) 1784 (d) 1785
11. In which year the First Mysore War took place _____.
(a) 1765 (b) 1766 (c) **1767** (d) 1770
12. The First Mysore War came to an end with the treaty of _____.
(a) Srirangapatnam (b) **Treaty of Madras** (c) Treaty of Surat (d) Mangalore
13. The Second Mysore War took place in the year _____.
(a) 1775 (b) **1780** (c) 1785 (d) 1790
14. Pitt's India Act was passed in the year _____.
(a) 1780 (b) **1784** (c) 1785 (d) 1789
15. In which year the Rohilla war took place?
(a) 1770 (b) 1772 (c) **1774** (d) 1775
16. Who codified the Laws?
(a) Robert Clive (b) Warren Hastings (c) **Cornwallis** (d) None
17. Who was called "The Father of Indian Administrative System?"
(a) Warren Hastings (b) **Cornwallis** (c) Robert Clive (d) None

Unit – II

18. Lord Cornwallis became the Governor – General of Bengal in _____.

- (a) 1780 (b) 1782 (c) 1785 (d) **1786**
19. Who has been rightly called as the ‘founder of civil services in India’?
a) **Cornwallis** b) Warren Hastings c) Wellesley d) William Bentinck
20. The district courts were called as _____.
a) **Diwan-i-Adalets** b) Mufti c) Munsiff d) Darogha
21. To hear and conduct the small criminal cases in small divisions of districts ----- courts were set up.
a) **Darogha** b) Circuit c) Lower d) District
22. Cornwallis Code was prepared by -----.
a) **George Barlow** b) Henry Colobrook c) John Shore d) Hastings
23. The Permanent Revenue Settlement was introduced in the year _____.
(a) 1790 (b) **1793** (c) 1795 (d) 1796
24. In order to enforce the Permanent Revenue Settlement, the Government enforced ----- law.
a) **Sun set** b) Dawn c) Dusk d) Sun rise
25. In which year the Third Anglo – Mysore War took place?
(a) 1788 (b) **1790** (c) 1792 (d) 1794
26. The Third Anglo – Mysore was came to an end with the treaty of _____.
(a) Mangalore (b) Surat (c) **Srirangapatnam** (d) Madras
27. Charter Act of 1813 was passed during the period of Governor General
(a) Warren Hastings (b) **Cornwallis** (c) Hastings (d) Wellesley
28. Which Act allocated money for education?
(a) **Charter Act of 1813** (b) Regulating (c) Pitt India Act (d) Charter Act of 1833

Unit – III

29. Lord Wellesley became the governor – general of Bengal in the year _____.
(a) 1790 (b) 1795 (c) **1798** (d) 1799
30. The Subsidiary Alliance System was introduced by _____.
(a) **Lord Wellesley** (b) Warren Hastings (c) Cornwallis (d) Robert Clive
31. Peshwa ----- concluded a subsidiary treaty with Wellesley in 1802.
a) **Baji Rao II** b) Balaji Rao c) Raghujji d) Tulgaji
32. Treaty of Deogaon was signed on -----.
a) **1803** b) 1800 c) 1802 d) 1805
33. The Fourth – Anglo Mysore War took place in the year _____.
(a) 1790 (b) 1798 (c) **1799** (d) 1800
34. During whose governor – generalship the Fourth Anglo - Mysore war was fought?
(a) **Wellesley** (b) Cornwallis (c) William Bentinck (d) None
35. The Second-Maratha war took place in the year _____.
(a) 1800 (b) 1801 (c) **1803** (d) 1804
36. The Second Anglo-Maratha war happened during the period of Governor General -----.
a) **Wellesley** b) William Bentinck c) Hastings d) Cornwallis
37. In which year the treaty of Bassein was signed?
(a) 1801 (b) **1802** (c) 1804 (d) 1805
38. Hastings was appointed as Governor General of Bengal in _____.
(a) 1800 (b) 1810 (c) **1813** (d) 1815
39. Gurkha war came to an end by the Treaty of Sagauli in -----.
a) **1816** b) 1810 c) 1815 d) 1818

40. The Third Anglo – Maratha war took place in the year _____.
 (a) 1814 (b) 1815 (c) **1817** (d) 1818
41. Who suppressed the Pathans?
 (a) Lord William Bentinck (b) **Lord Hastings** (c) Lord Canning (d) None of the above
42. Who introduced Ryotwari System?
 (a) Thomas Munroe (b) Dalhousie (c) Cornwallis (d) **Hastings**
43. Who started the Mahalwari system?
 (a) **Hastings** (b) Canning (c) Cornwallis (d) Warren Hastings
44. The first vernacular newspaper Bengali weekly, ‘Samachar Darpan’ was started in -----.
 a) **1818** b) 1815 c) 1810 d) 1812
45. The Third Anglo – Maratha war happened during the period of Governor General -----.
 a) Wellesley b) William Bentinck c) **Hastings** d) Cornwallis
46. The first Anglo – Burmese war happened on _____.
 a) **1824** b) 1820 c) 1815 d) 1818

Unit – IV

47. Lord William Bentinck became governor – general in the year _____.
 (a) 1820 (b) 1825 (c) **1828** (d) 1830
48. English language was accepted as the medium of instruction in higher education during the Governor – generalship of _____.
 (a) Cornwallis (b) Wellesley (c) Hastings (d) **William Bentinck**
49. Sati was abolished by _____.
 (a) Warren Hastings (b) Wellesley (c) Hastings (d) **William Bentinck**
50. In which year Sati was abolished?
 (a) 1820 (b) 1825 (c) **1829** (d) 1830
51. Who suppressed Thugs?
 (a) Cornwallis (b) Wellesley (c) Hastings (d) **William Bentinck**
52. Who was called the “Father of Indian Railways?”
 (a) Lord Wellesley (b) Hastings (c) **Lord Dalhousie** (d) Lord Canning
53. William Bentinck died in the year _____.
 (a) 1830 (b) 1832 (c) 1834 (d) **1839**
54. Lord Dalhousie became governor – general in the year _____.
 (a) 1840 (b) 1842 (c) 1845 (d) **1848**
55. The second Sikh war took place during the period of _____.
 (a) Hasting (b) William Bentinck (c) Minto (d) **Dalhousie**
56. Dalhousie introduced the vernacular education system in the year _____.
 (a) 1850 (b) 1852 (c) 1853 (d) **1855**
57. The religious disabilities act was passed in the year _____.
 (a) 1850 (b) 1852 (c) 1855 (d) **1856**

Unit – V

58. The Sepoy Mutiny took place in the year _____.
 (a) 1852 (b) 1855 (c) **1857** (d) 1858
59. Who was the governor – general when Sepoy Mutiny broke out?
 (a) Lord Curzon (b) Dalhousie (c) **Lord Canning** (d) Lord Amherst
60. What was the immediate cause for the Sepoy Mutiny?
 (a) **Greased Cartridges** (b) Religion (c) Annexation of the Oudh (d) Rani Lakshmi

Bai

61. Name the Peshwa who revolted against British in 1857.
(a) Nana Sahib (b) Baji Rao (c) **Balaji Baji Rao** (d) None
62. The first revolt broke out in _____.
a) **Barrackpur** b) Lucknow c) Meerut d) Gwalior

SECTION –B

Answer in about 50 words each:

Unit – I

1. Write a note on Robert Clive.
2. Explain Dual Government.
3. Write a note on Diwani Adalat.
4. Give a short note on Treaty of Salbhai.
5. Explain the provisions of Treaty of Madras.
6. Sketch a note on Treaty of Mangalore.
7. Write a note on Rohilla War.
8. Narrate the Nanda Kumar Case.
9. Explain the Case of Chet Singh.
10. Explain the treasures of Begums of Oudh.

Unit – II

11. Write a note on Munsiff Courts.
12. Explain Sadar Diwani Adalat.
13. Describe Sadar Nizamat Adalat.
14. Sketch a note on Darogha Court.
15. Write a short note on Circuit Courts.
16. Explain the provisions of Cornwallis Code.
17. Define Sun Set Law.
18. Explain Lord Cornwallis reforms of public services.
19. List out the Treaty of Srirangapattanam.
20. Describe the provisions of Charter Act of 1813.

Unit – III

21. Sketch a note on Tipu Sultan.
22. Define Subsidiary Alliance.
23. Explain the provisions of Treaty of Deogaon.
24. Describe the Treaty of Surji – Arjangaon.
25. Trace out the importance of Treaty of Bassein.
26. Write a short note on Lord Hastings.
27. Bring out the provisions of Treaty of Sagauli.
28. Explain Suppression of Pathans.
29. List out the Treaty of Poona.
30. Explain the provisions of the Treaty of Yandaboo.

Unit – IV

31. Write a note on Lord William Bentinck.
32. Explain the Indian Penal Code.
33. Define Sati.
34. Define Female Infanticide.

35. Explain the suppression of Thugs.
36. Sketch a note on Lord Dalhousie.
37. Describe Lord Macaulay's western educational reforms.
38. Write a note on Postal System.
39. Explain Widow Remarriage Act.

Unit – V

40. What are the immediate causes for the revolt of 1857?
41. Bring out the results of Meerut revolt.
42. What was the part of Rani Lakshmi Bai in the revolt?
43. Why was the revolt not widespread?
45. Prove that there was no common purpose among the leaders of the Great Revolt of 1857.
46. Write a note on Mangal Pandey.
47. Explain greased cartridges in the revolt of 1857.
48. Narrate the religious restrictions used in the military of 1857.

SECTION – C

Answer in about 200 words each:

Unit – I

1. Write a short note on Robert Clive.
2. Describe the evils of Dual Government.
3. Mention the importance of Bengal Indicative Act of 1781.
4. Narrate the administrative reforms of Warren Hastings.
5. Evaluate the revenue reforms of Warren Hastings.
6. Bring out the significance of judicial reforms of Warren Hastings.
7. Write about the commercial reforms of Warren Hastings.
8. Bring out the causes for the First Anglo – Maratha war.
9. Write a short note on Treaty of Surat.
10. Give an account of Treaty of Purandhar.
11. Evaluate the course of the First Maratha War.
12. Describe the Treaty of Wadgaon.
13. Write about the Treaty of Salbai.
14. Write a short note on First Mysore War.
15. Give an account of Treaty of Madras.
16. Evaluate the Second Mysore War.
17. Write about the importance of Treaty of Mangalore.
18. Give a short note on Regulating Act.
19. Narrate the provisions of Pitt's India Act.
20. Briefly discuss the Rohilla War.
21. Write about the trial of Nandakumar affairs.
22. Narrate the case of Chait Singh.
23. Evaluate the Warren Hastings relations with the Begums of Oudh.

Unit – II

24. Give an account of judicial reforms of Lord Cornwallis.
25. Write about the Cornwallis code of law.
26. Describe the reforms in civil service of Lord Cornwallis.

26. Evaluate the Cornwallis reforms of public services.
27. Write a short note on Police reforms of Lord Cornwallis.
28. Sketch the Commercial reforms of Lord Cornwallis.
29. Briefly discuss the revenue reforms of Cornwallis.
30. Estimate the objects and features of the Permanent Land Revenue Settlement.
31. Write about the significance of Third Mysore War.
32. Explain the courses of Third Mysore War.
33. Write about the provisions of Treaty of Srirangapatnam.
34. Give an account of provisions of the Charter Act of 1813.

Unit – III

35. Explain the aims and Wellesley's policy of annexation.
36. Distinguish the differences subsidiary treaties with smaller states and bigger states of Lord Wellesley.
37. Narrate the causes and courses of Fourth Mysore War.
38. Write a short note on the causes of the Second Maratha War.
39. Write about the significance of Treaty of Bassein.
40. Narrate the significance of the treaty of Suraj Arjangaon.
41. Give an account of provisions of the treaty of Rajpurghat.
42. Sketch a note on the Gurkha war.
43. Estimate the suppression of the Pindaris.
44. Briefly discuss the judicial reforms of Hastings.
45. Sketch the Revenue reforms of Hastings.
46. Narrate the educational reforms of Hastings.
47. Explain the causes of Third Anglo - Maratha War.
48. Evaluate the Treaty of Mandasor.
49. Describe the causes of the First Anglo – Burmese War.

Unit – IV

50. Write about the financial reforms of William Bentinck.
51. Trace out the importance of judicial reforms of William Bentinck.
52. Evaluate the Social reforms of William Bentinck.
53. List out the provisions of the Charter Act of 1833.
54. Explain the results of First – Anglo Sikh war.
55. Point out the provisions of Treaty of Lahore.

Unit – V

56. Trace out the Economic causes of the Great revolt of 1857.
57. Analyse the social causes of the revolt of 1857.
58. Estimate the religious causes of the revolt of 1857.
59. Narrate the Military causes of the revolt of 1857.
60. Evaluate the causes for the failure of the great revolt of 1857.

SECTION- D

Answer in about 400 words each:

Unit – I

1. Write an essay about the Warren Hastings.
2. Explain the reforms of Warren Hastings.
3. Write about the causes and effects of the First Maratha War.
4. Discuss the causes and course of the First Mysore War.

5. Evaluate the Second Mysore War.
6. Write an essay about the impeachment of Warren Hastings.

Unit – II

7. Write an essay about the Governor – General Cornwallis.
8. Explain the reforms of Lord Cornwallis.
9. Sketch the Permanent Revenue settlement of Bengal of Lord Cornwallis.
10. Narrate the merits of Permanent Revenue settlement of Cornwallis.
11. Evaluate the demerits of Permanent Revenue settlement of Cornwallis.
12. Discuss the causes and effects of the Third Mysore War.
13. Describe the Charter Act of 1813.
14. Estimate the circumstances leading to the Charter Act of 1813.

Unit – III

15. Write an essay about Lord Wellesley.
16. Explain the Subsidiary alliance system of Lord Wellesley.
17. Evaluate the features of the Subsidiary system of Lord Wellesley.
18. Explain the subsidiary treaties with Marathas.
19. Evaluate the Merits of Subsidiary Alliance.
20. Describe the Demerits of Subsidiary Alliance of Lord Wellesley.
21. Narrate the administrative reforms of Lord Wellesley.
22. Discuss the significance of Fourth Mysore War.
23. Sketch the results of the Fourth Mysore War.
24. Narrate the importance of Second Maratha War.
25. Evaluate the courses and effects of the Second Maratha War.
26. Write an essay about the Lord Hastings.
27. Write about the reforms of Hasting.
28. Evaluate the revenue reforms of Hasting.
29. Discuss the Ryowari settlement of Hasting.
30. Sketch the Mahalwari system of Hasting.
31. Describe the educational reforms of Hastings.
32. Evaluate the significance of Third Anglo - Maratha War.
33. Estimate the courses and significance of the First Anglo – Burmese War.

Unit – IV

34. Write an essay about the Lord William Bentinck.
35. Narrate the provisions of the Charter Act of 1833.
36. Describe the reforms of Lord William Bentinck.
37. Explain the social reforms of Lord William Bentinck.
38. Discuss the industrial and commercial reforms of Lord William Bentinck.
39. Analyze the causes and courses of First – Anglo Sikh War.
40. Write an essay about the Lord Dalhousie.
41. Describe the Doctrine of Lapse.
42. Write about the reforms of Lord Dalhousie.
43. Evaluate the administrative reforms of Lord Dalhousie.
44. Write about the Wood’s Dispatch on Education.

Unit – V

45. Explain the causes of the Great revolt of 1857.
46. Write an essay about the immediate causes of the Great revolt of 1857.

47. Write about the nature of the Great revolt of 1857.
48. Narrate the courses of the Great revolt of 1857.
49. Describe the suppression of the revolt of 1857.
50. Trace the role played by Rani Lakshmi Bai in the revolt of 1857.
51. Explain the causes for the failure of the revolt of 1857.
52. Sketch the results of the revolt of 1857.
53. Narrate the effects of the revolt of 1857.

ST. MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001

Question Bank

II M.A. HISTORY

Core – 2 History of Tamil Nadu from 1806 to 2001 C.E Sub. Code: 21PHIC32

Semester – III November 2022

(for those who joined in July 2021 and after)

Answer all questions

Section – A

I. Choose the correct answer:

Unit – I

1. The Marathas ruled Tanjore from _____.
a) **1676** b) 1756 c) 1806 d) 1856
2. The Maratha rule of Tanjore was ruled by _____.
a) **Ekoji** b) Venkoji c) Shahji d) Serfoji I
3. _____ was the last son of Venkoji.
a) Shahji b) Venkoji c) **Tukoji** d) Serfoji I
4. During which Governor General of India, radical changes took place in the politics of Tanjore.
a) **Lord Wellesley** b) Lord William Bentinck c) Lord Dalhousie d) Lord Canning
5. _____ acted as the centre of Carnatic Music and Bharatha Natiyam.
a) Madurai b) Mamallapuram c) Kanchipuram d) **Tanjore**
6. Like Karnataka and Ramnad, _____ was called as 'Samasthanam'.
a) **Tanjore** b) Madurai c) Trichy d) Sivagangai
7. _____ was popularly known as modern Pathanjali.
a) **Ramachandra Diksitar** b) Baskara c) Swaminathan d) Arunachala Kavirayar
8. _____ was praised as Andhra Kalidasa.
a) **Alurikuppanna** b) Vaidyanantha c) Swaminatha d) Baskara Diksitar
9. The Saraswathi Mahal Library is located at _____.
a) **Tanjore** b) Vellore c) Erode d) Karur
10. Vellore Mutiny was broke out on the year _____.
a) 1799 b) 1800 c) 1801 d) **1806**
11. _____ was the main reason for the outbreak of revolt in the fort at Vellore.
a) **Patriotic** b) Tradition c) Revenge d) Reforms
12. _____ was the Military General who introduced turban in his name.
a) **Agnew** b) Manoj Pande c) Mountbatten d) Bipin

Unit – II

13. Ryotwari system was implemented during the administration of Governor _____.
a) **Thomas Munroe** b) Cornwallis c) Canning d) William Bentinck
14. What was the system of land tax introduced by Thomas Munro?
a) **Ryotwari system** b) Jamabandy system c) Ayyangar system d) Nayankara system
15. In which year the Jamabandy system was introduced?
a) **1885** b) 1886 c) 1887 d) 1888
16. Charter Act of _____ was considered to be the milestone in the history of Indian education.
a) **1813** b) 1717 c) 1803 d) 1819
17. _____ was considered as the Magnacarta in the history of education in India.

- a) **Wood's Report** b) Hunter Commission c) Hartak Commission d) Charter Act of 1813
18. Hunter Commission was constituted on the year _____.
a) **1882** b) 1813 c) 1857 d) 1871
19. Hartak Commission Report was constituted on _____.
a) **1929** b) 1925 c) 1900 d) 1922
20. Mont – Ford reforms was constituted on _____.
a) **1919** b) 1941 c) 1842 d) 1929
21. The company administration constituted a new court named Mayor's Court on _____.
a) **1687** b) 1604 c) 1600 d) 1629
22. The first Indian Chief Justice of the High Court of Madras was _____.
a) **P.V. Rajamannar** b) Frederick c) Minto d) Thomas Munroe
23. In which year a printing press was installed at Punnakayal?
a) **1677** b) 1712 c) 1781 d) 1784

Unit - III

24. "Dravidian Society Hostel" was started in the year _____.
a) **1919** b) 1920 c) 1922 d) 1924
25. In which year the "Madras Dravidian Association" was started?
a) **1912** b) 1914 c) 1916 d) 1918
26. South Indian Liberal Federation was organized in the year _____.
a) 1910 b) 1912 c) **1916** d) 1918
27. South Indian Liberal Federation was pioneered by _____.
a) **C. Natesa Mudaliyar** b) T.M. Nair c) EVR d) Thayagaraja Chettiyar
28. South Indian Liberal Federation was organized by _____.
a) **Thayagaraja Chettiyar** b) Natesa Mudaliyar c) T.M. Nair d) E.V.R
29. _____ served as the editor of the political newspaper 'Justice'.
a) **T.M. Nair** b) Natesa Mudaliyar c) E.V.R d) Thayagaraja Chettiyar
30. The Justice English daily edited was published on _____.
a) **February 1917** b) January 1918 c) March 1917 d) April 1920
31. Self - Respect Movement was started in the year _____.
a) **1925** b) 1926 c) 1928 d) 1930
32. Self Respect Movement was started by _____.
a) Thayagaraja Chettiyar b) Natesa Mudaliyar c) T.M. Nair d) **E.V.R**
33. EVR started a revolt at _____, against inhuman attitude of Brahmins and launched historic struggle to get permission to enter the temples.
a) **Vaikom** b) Vedaranyam c) Thondi d) Vellore
34. E.V.R. formed a party called _____.
a) Democratic Party b) **Dravida Kazhagam** c) D.M.K d) A.D.M.K
35. Who was affectionately called as "Vaikkom Veerar"?
a) **E.V.R. Periyar** b) Rajaji c) Annadurai d) Kamaraj

Unit - IV

36. Rajaji established an ashram at _____.
a) **Tiruchengode** b) Sabarmathi c) Vedaranyam d) Dandi
37. Tiruchengode ashram was inaugurated by _____.
a) **EVR** b) Rajaji c) Kamaraj d) Annadurai
38. Gandhi started the historically important salt satyagrahain _____.

- a) 1900 b) **1930** c) 1920 d) 1925
39. Who introduced the shift system in the educational institutions on 1953?
a) **Rajaji** b) E.V.R. Periyar c) Annadurai d) Kamaraj
40. “Swatandra Party” was started by _____.
a) Annadurai b) Kamaraj c) **Rajaji** d) E.V.R. Periyar
41. In which year the “Swatandra Party” was started?
a) **1959** b) 1960 c) 1961 d) 1962
42. Who wrote ‘Vyasavirutham, Sakravarthi Thirumagal, Baja Govindam’ religious philosophical book?
a) **Rajaji** b) Kamaraj c) Annadurai d) EVR
43. To help the poor student’s free education, free uniform, free noon meal was introduced by _____.
a) **Kamaraj** b) C.N. Annadurai c) E.V.R. Periyar d) M.G. Ramachandran
44. _____ was praised to be ‘Kalvikanthiranthavar’.
a) **Kamaraj** b) C.N. Annadurai c) E.V.R. Periyar d) M.G. Ramachandran
45. Who was called as the “King Maker”?
a) **Kamaraj** b) C.N. Annadurai c) E.V.R. Periyar d) J.Jeyalalitha
46. C.N. Annadurai formed a D.M.K party in the year _____.
a) 1945 b) 1946 c) **1949** d) 1950
47. Who was affectionately called as “Arignar Anna” by Tamil people?
a) **C.N. Annadurai** b) Kamaraj c) E.V.R. Periyar d) J.Jeyalalitha
48. “Kamparasam” and “Ariya Mayai” books were published by _____.
a) Kamaraj b) **C.N. Annadurai** c) Rajaji d) E.V.R. Periyar
49. The scheme of Padiyarichi was introduced by _____.
a) **C.N. Annadurai** b) Kamaraj c) Rajaji d) E.V.R. Periyar
50. C.N. Annadurai was honoured with doctoral degree by Annamalai University on _____.
a) **1968** b) 1958 c) 1950 d) 1986
51. Kudichaimattu Variyam was introduced by _____.
a) **M. Karunanidhi** b) E.V.R. Periyar c) C.N. Annadurai d) Rajaji

Unit – V

52. _____ got his first role in picture as an actor ‘Sathi Leelavathi’.
a) **M.G. Ramachandran** b) E.V.R. Periyar c) C.N. Annadurai d) Rajaji
53. Who directed ‘Nadodimannan’ and ‘Ulagam Chuttum Valiban’?
a) **M.G. Ramachandran** b) M. Karunanidhi c) EVR d) Kamaraj
54. M.G. Ramachandran formed a new party named AIADMK on _____.
a) **1972** b) 1970 c) 1965 d) 1982
55. Nutritious Food Scheme was introduced in schools by _____.
a) **M.G. Ramachandran** b) C.N. Annadurai c) EVR d) Rajaji
56. A revolutionary change was brought in the police department during the reign of
a) **Selvi Jeyalalitha** b) M.G. Ramachandran c) M. Karunanidhi d) EVR
57. _____ period in Tamil Nadu is remembered as the golden era of Hinduism.
a) **Selvi Jeyalalitha** b) M.G. Ramachandran c) M. Karunanidhi d) Annadurai

Section – B

II. Answer in about 50 words each:

Unit – I

1. Write a note on Alagiri.
2. Sketch a note on Venkanna.
3. Give an account of Sengamaladas.
4. Explain the political history of Venkoji.
5. Sketch an account of Serfoji I.
6. Discuss the relations of Pratap Singh in Tanjore.
7. Write a short note on Tulgaji.
8. Explain Serfoji II political history of Marathas.
9. Point out the importance of Saraswathi Mahal Library.
10. Define Agnew Turban.

Unit – II

11. Write a short note on Ryotwari System.
12. Explain the provisions of Thomas Munroe.
13. Define Jamabandy System.
14. List out the Charter Act of 1600.
15. Explain Lord Minto reforms.
16. Point out the provisions of Charter Act of 1813.
17. Explain School Book Society.
18. Give an account of Lord Elphinstone.
19. Explain University Board in British system of education.
20. List out the importance of Wood's Report.
21. Point out the significance of Hunter Commission Report.
22. Define Meckenzie Manuscripts.
23. Describe Hartak Commission Report.
24. Define Choultry Court.
25. Explain the provisions of Charter of 1726.

Unit – III

26. Define South India Liberal Federation.
27. Explain Madras Dravidian Association.
28. Describe Dravidian Society Hostel.
29. Define Meston Proclamation
30. Why Periyar was known as Vaikom Veerar?
31. Explain Prohibition Struggle.
32. List out the principles of Self - Respect Movement.
33. Give a short note on Anti – Hindi Agitation.
34. Describe Dravida Kazhagam.

Unit – IV

35. Explain Tiruchengode Ashram.
36. Define New Education Policy of Rajaji.
37. Describe Swatandra Party.
38. Define Kamaraj Plan.
39. Write a short note on King Maker.

40. Give a short note on Dravidanadu.
41. Explain Padiyarichi Scheme.
42. Analyse Mother Tongue Scheme.
43. How Madras city was beautified during the period of Kalaignar?
44. Explain the growth of education during Karunanidhi.

Unit - V

45. Explain Nutritious Food Scheme.
46. Analyse Drinking Water Scheme.
47. Why M.G. Ramachandran was called as 'Man of the Masses' by people?
48. Explain Hindu Religious Trust Act.
49. Describe Prohibition Scheme.
50. Point out the Sale Tax reform during the period of Jeyalalitha.
51. List out the Police force improvement Scheme of Jeyalalitha.

Section – C

III. Answer in about 200 words each choosing either (a) or (b):

Unit – I

1. Sketch an account of the reinstation and removal of Sengamaladas.
2. Explain the political history of Shahji.
3. Give a short note on Pratap Singh in Tanjore.
4. Bring out the civil war in Tanjore between Amir Singh and Serfoji II.
5. Write a short note on Shivaji II.
6. Narrate the social and economic conditions of Marathas.
7. Trace the patriotic fervour for Vellore Mutiny in 1806.
8. Evaluate the military reforms of Vellore Mutiny.

Unit – II

9. Give a short introduction and implementation of the Ryotwari system.
10. What are the salient features of the Ryotwari system?
11. Trace the beginning of British education.
12. Explain School Book Society.
13. Write a short note on Lord Elphinstone and University Board.
14. What are the recommendations of the Wood's Report?
15. Describe the Hartak Commission Report.
16. Write a note on Mont – Ford reforms of 1919.
17. Mention the Social evils prevalent in the Tamil society. What were the measures taken by the British Government to remove them?
18. Assess the contribution of Christian Missionaries for the growth of education.
19. Give a short note on the Mayor's Court.
20. Explain the growth of judiciary after independence.

Unit – III

21. Write a short note on South Indian Liberal Federation.
22. Narrate the role of Justice Party in the politics of Tamil Nadu.
23. Explain Meston Proclamation.
24. Estimate the achievements of Justice Party.
25. Assess the role of E.V.R. Periyar in the politics of Tamil Nadu.

26. Describe the doctrines of Self – Respect Movement.
27. Sketch an account of Dravida Kazhagam.
28. Explain the achievements and fall of the Dravida Kazhagam.

Unit – IV

29. Write a short note on Rajaji and Salt Satyagraha.
30. Assess the New Education Policy of Rajaji.
31. Describe Kamaraj’s party work and high posts in politics.
32. Explain Kamaraj welfare measures for the upliftment of the society.
33. Examine C.N. Annadurai and his relationship with Dravida Kazhagam.
34. Evaluate the formation and growth of Dravida Munnetra Kazhagam.
35. Explain the schemes of C.N. Annadurai during his chief ministership.
36. Sketch an account of the growth of Tamil language during the period of M. Karunanidhi.
37. Estimate the achievements of M. Karunanidhi for the growth of education.

Unit - V

38. Describe the role of M.G. Ramachandran in Tamil Cinema.
39. Explain the formation of AIADMK and M.G. Ramachandran role in Tamil politics.
40. Sketch an account of the reform of Sale Tax during the chief ministership of Selvi Jeyalalitha.
41. Trace the growth of industrial reforms during the period of Selvi Jeyalalitha.

Section – D

IV. Answer in about 400 words each choosing either (a) or (b):

Unit – I

1. Describe the political history of Venkoji.
2. Explain the political history of the Marathas of Tanjore.
3. Assess the administration of the Maratha rulers of Tanjore.
4. Narrate the art and literature which developed during the period of the Marathas.
5. Estimate the causes for the Vellore Mutiny.
6. Discuss the reactions of the Government of Indian sepoy.
7. What were the measures taken to suppress the revolt of 1806?

Unit – II

8. Explain the merits and demerits of Ryotwari system.
9. Write an essay on the formation of Universities under the British rule.
10. Describe about the Hunter Commission Report.
11. Write an essay on the evolution of judiciary reforms during British period.
12. Write an essay on the Local Self-Administration during the British rule.
13. Trace the growth of Tamil literature.
14. Describe the social life of the Tamils under the British.
15. Explain the frequent famines which occurred in Tamil Nadu. What are the relief measures taken by the Government?
16. Write an essay on the progress of Education under English East India Company’s rule?

Unit – III

17. What are the reasons for the advent of the Justice Party?
18. Estimate the activities and growth of Justice Party.
19. Write an essay on the administration of Justice Party.
20. What are the reasons for the fall of the Justice Party?
21. Explain the principles and spreading doctrines of the Self Respect Movement.

22. Describe the achievements of the Self – Respect Movement.

Unit – IV

23. Evaluate the contributions of the ministry headed by C. Rajagopalachari to the Tamil society.

24. Explain the involvement of Rajaji for the struggle for freedom.

25. Estimate the contributions of Kamaraj to Tamil society.

26. Kamaraj was called as the “King Maker” – Explain.

27. “Anna a good administrator” – Comment.

28. Describe the social welfare schemes of M. Karunanidhi.

Unit - V

29. Narrate the growth of education during the period of M.G. Ramachandran.

30. Explain the schemes of M.G. Ramachandran during his chief ministership.

31. Examine the scheme of temple renovation during the chief ministership of Selvi Jeyalalitha.

32. Describe the social welfare schemes of Selvi Jeyalalitha.

St. Mary's College (Autonomous) – Thoothukudi

Question Bank

II M.A History

Core – 3

History of U.S.A up to 1865 C.E Sub.Code:21PHIC33

Semester III November 2022

(for those who joined in July 2021 and after)

SECTION A

Choose the correct answer:

Unit I

- _____ stands second in the world in the production of iron and steel.
a) **America** b) Russia c) Germany d) India
- The fall of Constantinople under the Turks in _____ was yet another factor for geographical discoveries.
a) **1493** b) 1490 c) 1500 d) 1349
- _____ were the pioneers and path finders in U.S.A.
a) British b) **Portuguese** c) Germans d) Spain
- Who was called as the Navigator?
a) **Prince Henry** b) Prince Peter c) Prince Albert d) Prince James
- In 1509, _____ founded the city Santo Domingo.
a) Bartholomeo Columbus b) Henry c) Christopher Columbus d) Vasco-da-gama
- Which one of the following was the first colony of Britain in America?
a) Plymouth b) **Virginia** c) Rhode Island d) Delaware
- The American war of independence was held in the year of _____.
a) **1783** b) 1784 c) 1785 d) 1786
- The first continental congress was held at _____.
a) Portsmouth b) Plymouth c) **Philadelphia** d) Lexington
- _____ was the immediate cause for the American War of Independence.
a) **Boston Tea Party** b) Continental Congress c) Boston Massacre d) Declaratory Act
- John Jay treaty was signed in _____ with Britain.
a) **1794** b) 1796 c) 1795 d) 1790
- Thomas Pinkney, the American ambassador signed a treaty with Spain in _____.
a) **1795** b) 1794 c) 1796 d) 1790
- _____ was the first president of United States of America.
a) Lincoln b) Jefferson Davis c) Franklin D.Roosevelt d) **George Washington**

Unit II

- _____ was one of the greatest founding fathers of USA.
a) **Thomas Jefferson** b) Lincoln c) Washington d) Jackson
- In _____ Ohio became a part of United States of America.
a) 1801 b) 1803 c) 1804 d) **1802**
- _____ was hailed as the fourth President and 'Father of American Constitution'.
a) **James Madison** b) James Monroe c) George Washington d) Andrew Jackson
- The war of 1812 is otherwise known as _____ in the history of America.
a) Munroe war b) Jefferson war c) **Madison war** d) Jackson war
- _____ a Red Indian leader checked the possibilities of American westward expansion.

- a) **Tecumseh** b) Henry Clay c) Jefferson d) John Jay
18. Treaty of Ghent was concluded between _____ and _____ on 24th December, 1814.
 a) **America and Britain** b) America and Russia
 c) Russia and Austria d) America and Austria
19. The period of James Munroe is called as _____ in the history of U.S.A.
 a) Era of progress b) Era of recession c) **Era of good feeling** d) Era of depression
20. Rush-Bagot agreement was signed in the year _____.
 a) **1817** b) 1810 c) 1803 d) 1805
21. In 1829, _____ became the first President of USA who hailed from a poor family.
 a) **Andrew Jackson** b) Thomas Jefferson c) James Monroe d) James Madison
22. The democratic principles of Jackson were known as _____.
 a) Spoils system b) Kitchen Cabinet c) Nullification Doctrine d) **Loco-Focoism**
23. The opponents of Jackson functioned as a new party called as _____.
 a) **Whig party** b) Spoils system c) Kitchen Cabinet d) Nullification Doctrine

Unit III

24. The purchase of Louisiana by Jefferson in _____ widened the scope of westward movement.
 a) **1803** b) 1810 c) 1805 d) 1811
25. The Mexican war was broke out in the year _____.
 a) 1845 b) **1846** c) 1847 d) 1848
26. Who was called as the hero of Tippicanoe?
 a) Van Buren b) Buchanan c) **William Henry Harrison** d) John Taylor
27. Who declared war on Mexico?
 a) **Polk** b) John Slidell c) James Knox d) Peter
28. Treaty of Guadalupe Hidalgo was signed between America and _____.
 a) Florida b) Virginia c) Alabama d) **Mexico**
29. In which year the Adam – Onis Treaty was signed?
 a) 1718 b) 1719 c) 1818 d) **1819**
30. In which year Texas was annexed by America?
 a) 1819 b) 1820 c) 1821 d) **1833**
31. The colonization Law was passed in the year _____.
 a) 1623 b) 1723 c) **1823** d) 1923

Unit IV

32. Uncle Tom's Cabin was written by _____.
 a) **Harriet Beecher Stowe** b) Leo Tolstoy c) John Milton d) Edward Frost
33. Slave trade was first carried in _____.
 a) California b) Mexico c) Pennsylvania d) **Virginia**
34. Kansas-Nebraska Act was passed in _____.
 a) 1864 b) **1854** c) 1844 d) 1834
35. _____ was the chief justice in Dred Scott vs Sanford Case.
 a) John b) Robert c) **Taney** d) William Calhous
36. Dred Scott was a slave of _____.
 a) Mexico b) Brazil c) **Missouri** d) Argentina
37. Trial of Tears took place in _____.
 a) 1831 b) **1830** c) 1832 d) 1834
38. Treaty of new Echota removed _____ tribe.

- a) **Cherokee** b) Shawnee c) Choctaws d) Gothics
39. The signing and braking of treaties was the pattern of _____ movement in U.S.A.
 a) Pan American b) **Westward** c) Civil Right d) Loco Focoism
40. _____ championed manifest destiny of European settlers.
 a) Lincoln b) Thomas Jefferson c) **Andrew Jackson** d) Willson
41. The Indian Removal Act was passed n _____.
 a) 1831 b) **1830** c) 18 32 d) 1834

Unit V

42. The civil war lasted for _____ years.
 a) 2 b) 3 c) 4 d) **5**
43. Emancipation of slaves was proclaimed in _____.
 a) 1823 b) 1833 c) 1853 d) **1863**
44. Gettysburg speech of _____ was a great turning point during Civil war.
 a) **Lincoln** b) Jefferson Davis c) Franklin D. Roosevelt d) Wilson
45. The compromise of 1850 was signed during the presidency of _____.
 a) David b) **Fillmore** c) Lincoln d) Taft
46. Missouri compromise accepted during the presidentship of _____.
 a) Lincoln b) David c) **Munroe** d) Fillmore
47. The _____ line was considered as the traditional boundary between Free soil and south.
 a) **Mason-Dixon** b) Oregan c) Ohio d) Texas
48. Stephen A. Douglas championed _____ sovereignty.
 a) State b) **Popular** c) Territorial d) Regional
49. The Civil War came to an end in _____.
 a) 1895 b) 1885 c) 1875 d) **1865**
50. U.S Grant was general of _____ army during Civil war.
 a) West b) East c) **North** d) South
51. The Union army defeated Confederate army in the battle of _____.
 a) Appamatox b) **Bull Run** c) Antietem d) Gettysburg
52. The victory of the _____ army strengthened the Union
 a) **Federal** b) Southern c) Confederate d) Northern
53. The _____ amendment of the constitution made the Negroes as freed citizens.
 a) 16th b) 15th c) **14th** d) 13th

SECTION B

Answer in about 50 words:

Unit - I

1. May flower.
2. Massachusets
3. Connecticut
4. Virginia
5. Maryland
6. Newhampshire and Maine
7. New Jersey
8. Pennsylvania

9. New York
10. Delaware
11. Georgia
12. Puritans
13. Quakers
14. Pontiac Riots
15. Grenville's Taxation policies
16. Shoyce Riot
17. Sugar Act
18. Stamp Act
19. Sons of Liberty
20. Townsend Acts
21. Boston Tea Party.
22. Internal Cess.
23. Federal Bank
24. Jenet Issue
25. John Jay Treaty.
26. Pinkney Treaty.

Unit - II

27. Aaron – Burr case.
28. Embargo Bill
29. Chesapeake Affair.
30. Barbary Pirates
31. Tecumseh
32. War Hawks
33. Era of Good Feelings.
34. Missouri Compromise, 1820.
35. Rush-Bagot Agreement.
36. Adams-Onis Treaty.
37. Monroe Doctrine.
38. Loco-Focos
39. Kitchen Cabinet.
40. Spoils system.
41. Nullification Doctrine.
42. Whig Party.

Unit - III

43. Westward Movement.
44. Purchase of Louisiana.
45. Acquisition of Florida.
46. Manifest Destiny.
47. Van Buren.
48. The Great Trial.
49. The Webster – Ashburton Treaty.
50. Lone Star Republic.
51. Oregon settlement.

Unit - IV

52. Uncle Tom's Cabin.
53. The Liberator.
54. William Lloyd Garrison.
55. Dred Scott Case.
56. Indian Removal Act
57. Wilmot Proviso .
58. Shawnee
59. Missouri Compromise 1820.
60. Thomas Amendment.

Unit - V

61. Kansas – Nebraska Act.
62. Stephen Douglas.
63. Election of 1860.
64. Gettysburg speech.
65. Emancipation of Slave Act.

SECTION C

Answer the following in about 300 words:

Unit - I

1. Explain the effects and consequences of the geographical conditions of USA.
2. Trace the origin and rise of early colonies in America.
3. Describe the course of American war of Independence.
4. Point out the results of the American war of Independence.
5. What are the circumstances that led to a federation?
6. Describe the career and achievements of George Washington.

Unit - II

7. Describe the Internal policy of President Jefferson.
8. Explain Marbury Vs Madison case.
9. Examine the Foreign policy of President Jefferson.
10. Trace the courses of the War of 1812.
11. List out the provisions of the treaty of Ghent.
12. Sketch the results of the War of 1812.
13. What are the circumstances which led to the Monroe Doctrine?
14. Explain the defects of the Monroe Doctrine.
15. Bring out the democratic principles of Andrew Jackson.
16. Briefly explain the foreign policy of Jackson.

Unit - III

17. Mention the effects of the Westward Movement.
18. Write a short note on Annexation of Texas.
19. Describe the Annexation of Oregon.
20. Explain briefly about the purchase of Louisiana.
21. Discuss about the acquisition of Florida.
22. Describe the results of the Mexican War of 1846.
23. Explain the importance of the Wilmot Provision.

Unit -IV

24. Write a note on the causes for Sectional Conflict.
25. Write a short note on Abolition Movement in the 19th century.
26. Describe the Missouri Compromise of 1820.
27. Write a short note on John C. Calhoun.
28. Explain the measures taken by USA for the removal of Indian tribes.

Unit - V

29. Examine the Bleeding Kansas- Question.
30. Write a comment on Dred-Scott vs Sanford Case.
31. Point out the provisions of the Kansas Nebraska Act.
32. Enumerate the contribution of Abraham Lincoln to America.
33. List out the results of the Civil war.

SECTION D

Answer the following in about 300 words:

Unit - I

1. Bring out the role of the geographical features in the history of USA.
2. Estimate the colonisation of America.
3. Analyse the causes of American War of Independence.
4. Describe the course of the American War of Independence.
5. Explain the defects and problems of the Confederation.
6. Explain the contribution of George Washington as the first President of America.
7. Assess the foreign policy during the period of George Washington.

Unit - II

8. Critically examine the work and achievements of President Jefferson.
9. Why the War of 1812 is called as the Second War of Independence?
10. Trace the causes which led to the outbreak of War of 1812.
11. Describe the significance of James Munroe's period in the history of USA.
12. Explain Jacksonian Democracy and point out how far he achieved success in implementing them?

Unit - III

13. Give an estimate of the Westward expansion in America and trace its consequences.
14. Describe the Manifest Destiny and its impacts.
15. Describe the causes of the Mexican War of 1846.
16. List out the courses of the Mexican War of 1846.
17. What were the circumstances which led to the compromise of 1850?
18. Explain its provisions and significance of the compromise of 1850.

Unit - IV

19. Examine the circumstances which were responsible for the introduction of Slavery in America.
20. Trace the History of the Anti-Slavery Movement.

Unit - V

21. Examine the main provisions of the Kansas-Nebraska Bill and also consequences of the bill.
22. "Dred Scott decision was a severe blow to the North since it upheld slavery as a legal institution"-Examine the statement.
23. Give an estimate of the achievements of Henry Clay.

24. Bring out the career and achievements of Abraham Lincoln.
25. Examine the circumstances which led to the Civil War in U.S.A. and state reasons for the failure of the southern states.
26. Trace the course of the American Civil War and describe the results of the war.

St. Mary's College (Autonomous) – Thoothukudi
Question Bank

II M.A. History

Core 4

Epigraphy

Sub.Code: 21PHIC34

Semester III – November 2022

(for those who joined in July 2021 and after)

Answer all questions

Section – A

Choose the Correct Answer:

Unit I

1. The study of inscription is called -----
(a) **Epigraphy** (b) Archaeology (c) Paleography (d) Pictography
2. The term 'Epigraphy' is derived from ----- word.
(a) Greek (b) Latin (c) Italian (d) Portuguese
3. The Sanskrit word 'Sasanam' means -----
(a) **an order** (b) a record (c) a book (d) documents
4. The Records on stones are called -----
(a) Tamarasasanam (b) Tamarapattayam (c) **Silasasanam** (d) Seppupattayam
5. The Records on Copper Plates are called -----
(a) **Tamarasasanam** (b) Rajasasanam (c) Silasasanam (d) Sasanam
6. Who was the founder of the 'Asiatic Society of Bengal'?
(a) **William Jones** (b) Charles Wilkins (c) George Buhler (d) J.F.Fleet
7. Who laid the foundation of epigraphical studies in India?
(a) William Jones (b) **Charles Wilkins** (c) George Buhler (d) J.F.Fleet
8. The earliest Copper Plate record is -----
(a) Tolappiyam (b) **Ahapporul** (c) Nattinai (d) Silappadikaram
9. ----- copper plate is the largest copper plates.
(a) Pallankoil (b) **Karandai** (c) Kuram (d) Sinnamanur
10. The Karandai Copper Plates has ----- sheets of copper
(a) **55** (b) 65 (c) 75 (d) 85
11. The Thiruvallangadu Copper Plates were belonged to period of -----
(a) Rajaraja I (b) **Rajendra I** (c) Rajaraja II (d) Rajendra II
12. The Velvikkudi Copper Plates were engraved by -----.
(a) Ravikirti (b) Harisena (c) Narayana (d) **Yudhakesari Perumbani-kkaran**

Unit II

13. The study of ancient handwriting is known as _____
(a) Ideography (b) logography (c) **Palaeography** (d) Pictography
14. Ideography means _____
(a) **Ideas of writing** (b) Word writing (c) Study of picture (d) Study of inscription
15. Logography means _____.
(a) Study of picture (b) **Word writing** (c) Study of Inscription (d) Ideas of writing
16. _____ is the natural means of written communication.
(a) Ideography (b) logography (c) Palaeography (d) **Pictography**
17. _____ is a set of letters of a language.
(a) **Alphabet** (b) Decipherment (c) Aramic Alphabet (d) Cuneiform

18. _____ is finding the meaning of the secret letters.
 (a) Ideography (b) logography (c) **Decipherment** (d) Pictography
19. The sign of Kharosathi system was borrowed from _____.
 (a) Alphabet (b) Decipherment (c) **Aramic Alphabet** (d) Cuniefore
20. The earliest Tamil inscriptions were written in the ----- script.
 (a) **Brahmi** (b) Sanskrit (c) Grantha (d) Kharosti
21. The Grantha script was developed from ----- script.
 (a) **Brahmi** (b) Sanskrit (c) Grantha (d) Kharosti
22. The Grantha script was developed in the Tamil country to write -----.
 (a) Tamil (b) **Sanskrit** (c) Brahmi (d) Nagari
23. The present Tamil script was developed from ----- script.
 (a) Brahmi (b) Sanskrit (c) **Grantha** (d) Kharosti
24. The word 'Graffiti' is derived from the Italian word -----
 (a) **Graffiato** (b) Graffito (c) Graffita (d) Graffitia

Unit III

25. Name the King who started the tradition of including Meykkirti in inscriptions.
 (a) **Rajaraja I** (b) Rajendra I (c) Rajaraja II (d) Rajendra II
26. The Aihole Prasasti was composed by -----
 (a) **Ravikirti** (b) Harisena (c) Narayana (d) Lord Shiva
27. The Allahabad Prasasti was composed by -----
 (a) Ravikirti (b) **Harisena** (c) Narayana (d) Lord Shiva
28. The Thiruvalluvar Prasasti was composed by -----
 (a) Ravikirti (b) Harisena (c) **Narayana** (d) Lord Shiva
29. The Velvikkudi Copper Plates were engraved by -----.
 (a) Ravikirti (b) Harisena (c) Narayana (d) **Yudhakesari Perumbani-kkaran**
30. The Meykkirti of Rajaraja begins with the phrase of -----
 (a) **Thirumagal Pola** (b) Thirumunia Valara (c) Thirumagal Maruviya (d) Thirumagal Nintra
31. The Prasasti of Rajendra I begins with the phrase called -----
 (a) Thirumagal Pola (b) **Thirumunia Valara** (c) Thirumagal Maruviya (d) Thirumagal Nintra
32. The Prasasti of Rajendra II begins with the phrase called -----
 (a) Thirumagal Pola (b) Thirumunia Valara (c) **Thirumagal Maruviya** (d) Thirumagal Nintra
33. Vikrama Samrat was otherwise known as _____.
 (a) **Krta** (b) masi (c) mela (d) masiman
34. Chalukya Vikrama Era was introduced by _____.
 (a) **Vikramaditya IV** (b) Venkayya (c) Gopinath Rao (d) Hultsch
35. Saka Era is called as _____.
 (a) Yudhisthira Era (b) **Salivahana Era** (c) Vikrama Era (d) Chalukya Vikrama Era
36. The Gupta Era was begins in _____.
 (a) AD 310 (b) **AD 320** (c) AD 385 (d) AD 386
37. Saka Era was begins in _____.
 (a) **AD 78** (b) AD 79 (c) AD 85 (d) AD 86
38. Kaliyuga Era is called as _____.
 (a) **Yudhisthira Era** (b) Saka Era (c) Vikrama Era (d) Chalukya Vikrama Era
39. Hijira Era was first used by _____.

(a) **Ghazni** (b) Ghori (c) Balban (d) Muhamad bin Tughluq

Unit IV

40. _____ published the journal orient and occident.

(a) **George Buhler** (b) James Burgess (c) Krishna Sastri (d) Robert Sewell

41. _____ started Epigraphica Indica a quarterly journal from the archaeological Survey.

(a) Krishna Sastri (b) George Buhler (c) Robert Sewell (d) **James Burgess**

42. _____ edited the famous maski inscription of Asoka.

(a) Robert Sewell (b) **Krishna Sastri** (c) George Buhler (d) James Burgess

43. _____ wrote Forgotten Empire.

(a) James Burgess (b) **Robert Sewell** (c) George Buhler (d) Krishna Sastri

44. _____ discovered the hospital inscription of Asoka.

(a) **K.V.Subramanya Ayyar** (b) James Burgess (c) George Buhler (d) Robert Sewell

45 K.V.Subramanya Ayyar discovered _____ Copperplates.

(a) **Velvikkudi** (b) Tiruvalangadu (c) Pallankovil (d) Kurram

46. _____ deciphered Kharosthi and Brahmi script.

(a) **James Prinsep** (b) James Burgess (c) Robert Sewell (d) Krishna Sastri

Unit V

47. Mandagapattu inscription was discovered by _____.

(a) **Venkayya & Gopinath Rao** (b) Krishnasastri (c) Hultsch (d) Vikramaditya

48. Kudimiyamalai inscription is situated in _____.

(a) **Sikhanathar temple** (b) Meenakshi temple (c) Nataraja temple (d) Bhrahadeswari

49. Kuram Copper plates were published by _____.

(a) **Hultsch** (b) Krishnasastri (c) Venkayya (d) Gopinath Rao

50. Thirupparankunram stone inscription belonged to the period of _____.

(a) Rajaraja Chola (b) Mahendra Varman I (c) Vikramaditya (d) **Parantaka**

Nedunchelivan

51. Kudimiyamalai inscription was discovered by _____

(a) **Krishnasastri** (b) Venkayya (c) Hultsch (d) Gopinath Rao

52. Uttiramerur is a village in _____ district

(a) Madurai (b) Tirunelveli (c) **Chengalpet** (d) Sivagangai

53. _____ copper plates mention the Kalabhra occupation of Pandya country.

(a) **Velvikkudi** (b) Pandya Copper (c) Tiruvalangadu (d) Pallankovil

54. The first earliest Tamil Brahmi inscription was found at _____

(a) Uttramerur (b) **Mangulam** (c) Tanjore (d) Thiruparangundram

55. Mandagapattu inscription is in _____

(a) Vatteluthu (b) Grantha (c) **Sanskrit** (d) Brahmi

56. Tirupparankundram inscription is in Tamil _____ script.

(a) Brahmi (b) Kharoshti (c) **Vatteluthu** (d) Grantha

57. _____ inscription deals about Kudavolai system.
(a) Maangulam (b)Tanjore (c)Uttramerur
(d)Thiruparangundram

Section B

Answer in about 50 words each:

Unit - I

1. Epigraphy.
2. Age of Inscriptions.
3. Religious Records.
4. Memorial Records.
5. Swastisri.
6. Prasasti.
7. Meykirti.
8. Legal Records.
9. Commemorative Inscriptions.
10. Dating of Inscriptions.
11. Copper Plate.

Unit - II

12. Pictographic script.
13. Ideographic script.
14. Paleography.
15. Logogram.
16. Syllabic writing.
17. Alphabetic script.
18. Brahmi script.
19. Vatteluthu.
20. Graffiti.
21. Grantha script.

Unit - III

22. Estampages.
23. Photocopy.
24. Kali era.
25. Saka era.
26. Kollam era.
27. Hijira era.
28. Vikrama era.

Unit - IV

29. Asiatic Society.
30. Tamilzhi.
31. V.Venkayya.
32. James Princep.
33. Hieroglyphics.
34. Sundaram Pillai.
35. Kielhorn.

36. J.F. Fleet.
37. H.Krishna Sastri.

Unit - V

38. Tiruparankunram Inscription.
39. Tiruengoimalai Inscription.
40. Pallankoil Copper Plates.

Section – C

Answer in about 200 words each choosing either (a) or (b):

Unit - I

- 1.State the meaning of Epigraphy.
- 2.Explain the nature of Inscriptions.
3. Narrate the historical value of Inscriptions.
4. Mention the Contents of Inscriptions.
5. Sketch an account on Literary Inscriptions.
6. Write a note on Religious Inscriptions.
7. Discuss about the Commemorative Inscriptions.
- 8.Explain about the welfare records and the spurious records.
9. Give an account of Memorial Stones.
10. Sketch a brief account of Copper plates.

Unit - II

11. Write a short note about ‘Nadukal’.
12. Define Paleography.
13. Describe the Pictographic writings.
14. List out the importance of Ideographic writing.
15. Write a short note on Syllabic writing.
16. Assess the achievements of Indrapala.
17. Write a short note on Graffiti.
18. Trace the evolution of Brahmi script.
19. Explain the importance of Vatteluthu.
20. Trace the evolution of Grantha script.
21. Write about the origin and evolution of Tamil script.

Unit - III

22. Mention the different stages for taking an Estampage.
23. Give an account of Meykirti.
24. Write a short note on Kali era.
25. Sketch a note on Saka era.
26. Give an account of Vikrama era.

Unit - IV

27. Narrate the contribution of George Buhler to Epigraphy.
28. Enumerate the contributions of J.F. Fleet.
29. Elucidate the services rendered by James Princep to Epigraphy.
30. Describe the role of V. Venkayya to Epigraphy.
31. Point out the contribution of Robert Sewell to Epigraphy.
32. Give an account of Iravatham Mahadevan’s contribution to Epigraphy.
33. Assess the services rendered by D. C. Sircar to Epigraphy.

Unit - V

34. Describe the Mannur Inscription.
35. Narrate the importance of Nivandakkara Inscription.
36. Give an account of Tirruparankunram Inscription.
37. Explain the historical value of Tiruengoimalai Inscription.
38. Assess the importance of Uttiramerur Inscriptions.

Section – D

Answer in about 400 words each choosing either (a) or (b):

Unit - I

1. Explain the historical value of Epigraphy.
2. Trace the historical value of Inscriptions.
3. Explain the scope and purpose of Epigraphy.
4. Write an essay about the Memorial Stones.
5. Discuss the importance of the Copper Plates.
6. Narrate the Epigraphical forms and contents of Inscriptions.
7. Describe the Kinds of inscriptions.
8. Assess the contributions of R. Nagaswamy, Indirapala, T.A. Gopinatha Rao to Tamil Epigraphy.

Unit - II

9. Write an essay on Paleography.
10. Discuss about Pictogram and Ideogram.
11. Explain the various forms of scripts.
12. Discuss the various theories about the Brahmi Script.
13. Discuss about the Evolution of Tamil scripts.

Unit - III

14. Enumerate the various steps in taking an Estampage of an Inscription.
15. Discuss the various eras in history and their implications.
16. Write an essay on Kollam era and Hijira era.
17. Discuss about the Meykirti.
18. Explain about the dual dating in the Pandya Inscriptions.
19. Describe the Nivandakkara Inscription of Raja Raja I.

Unit - IV

20. Assess the role of George Buhler to Epigraphy.
21. Point out the contributions of James Burgess to Epigraphy.
22. Critically assess the achievements of Hultzch Eugen as an Epigraphist.
23. Estimate Hoskote Krishna Sastri contribution to Epigraphy.
24. Narrate the contribution of K.V. Subramania Iyer to Epigraphy.
25. Evaluate the role of T.V. Mahalingam to Epigraphy.

Unit - V

26. Estimate the historical value of Mangulam Inscription.
27. Write an essay on Poolankurichi Inscription.
28. Explain about the Mandagapattu Inscription of Vichitra Chitta.
29. Narrate the important of Pallankoil Copper Plates.
30. Give an account of the Velvikkudi Copper Plates.

St. Mary's College (Autonomous) – Thoothukudi

Question Bank

II M.A. History

Core – 5

Historical Methods - Theory and Practice

Sub. Code: 21PHIC35

Semester III – November 2022

(for those who joined in July 2021 and after)

Answer all questions

Section - A

Choose the correct answer:

Unit - I

1. The term 'research' is derived from the word _____.
a) **French** b) Latin c) Greek d) German
2. _____ research may formulate new principles and generalizations on a scientific basis.
a) **Positive** b) Negative c) Conceptual d) Empirical
3. _____ research may dismantle old assumptions and conclusions.
a) **Negative** b) Quantitative c) Qualitative d) Descriptive
4. _____ research is also known as Fundamental research.
a) **Basic** b) Interpretative c) Descriptive d) Conceptual
5. An M.Phil dissertation may have to be completed within _____ months.
a) **3 months** b) 6 months c) 10 months d) 11 months

Unit – II

6. After deciding to do research, the first step of a research scholar is to select a suitable _____.
a) **Guide** b) Topic c) Hypotheses d) Collection of sources
7. After deciding the topic for research the scholar has to develop _____.
a) **Hypothesis** b) Selection of topic c) Footnotes d) Bibliography
8. _____ is the second stage in the process of historical research.
a) **Collection of sources** b) Immaterial sources c) Written sources d) Material sources
9. The written sources are called _____.
a) **Documents** b) Notes c) Reports d) Orders
10. _____ is the study of coins.
a) **Numismatics** b) Epigraphy c) Archaeology d) Literary
11. _____ source serves as a primary evidence to understand the social and cultural conditions of the people.
a) **Literary** b) Archaeology c) Epigraphy d) Numismatics
12. _____ are authentic official documents.
a) **Government Orders** b) Reports c) Books d) Manuals

Unit - III

13. The term 'heuristics' is derived from the _____ word.
a) **Greek** b) Latin c) Arab d) Chinese
14. Harmonistic is otherwise called as _____.
a) **Internal Criticism** b) External Criticism c) Plagiarism d) Historical Criticism
15. Heuristics is otherwise called as _____.
a) **External Criticism** b) Historical Criticism c) Internal Criticism d) Plagiarism

16. The evolution of documents is therefore known as _____.
- a) **Historical Criticism** b) Internal Criticism c) External Criticism d) Bias
17. _____ Criticism is used to detect and determine whether the document contains errors or lies.
- a) **Internal** b) External c) Positive d) Negative
18. _____ Criticism is confined to detect and determine whether the document is the trace of forgery or not.
- a) **External** b) Internal c) Historical d) Positive
19. _____ is an essential impediment for historical research to establish truth.
- a) **Objectivity** b) Subjectivity c) Bibliography d) Footnotes
20. The 'finest and maturest work' England under Queen Anne was written by _____.
- a) **G.M. Trevelyan** b) Edward Gibbon c) Herodotus d) Tacitus
21. _____ is a stealing and publication of another author's language, thoughts, ideas or expressions.
- a) **Plagiarism** b) Survey c) Bias d) Case Study
22. Plagiarism is derived from _____ word.
- a) **Latin** b) Greek c) Chinese d) Arabic
23. In _____ method a list of questions is prepared and answers for these questions are obtained from the respondents.
- a) **Interview** b) Case Study c) Survey d) Interpretative
24. How many types of interview are conducted?
- a) **Two** b) One c) Three d) Four
25. _____ yield information about the political and social condition of that time the diary belongs.
- a) **Personal Diaries** b) Interpretation c) Observation d) Bias
26. _____ is the list of questions used in survey method for collection of data.
- a) **Questionnaire** b) Plagiarism c) Index Card d) Personal Diaries

Unit - IV

27. _____ is a process of examining the collected raw data to detect errors and omissions.
- a) **Editing** b) Coding c) Classification d) Tabulation
28. _____ refers to the process of assigning numerals or other symbols to answers.
- a) **Coding** b) Editing c) Tabulation d) Classification
29. _____ Analysis is often known as Statistical Analysis.
- a) **Inferential** b) Descriptive c) Hypotheses d) Strategic
30. _____ Analysis is the study of distributions of one variable.
- a) **Descriptive** b) Strategic c) Inferential d) Hypotheses
31. _____ Analysis is concerned with drawing inferences and conclusions from the findings of research study.
- a) **Inferential** b) Hypotheses c) Strategic d) Descriptive
32. _____ research aimed at joining a deep understanding of a specific organization or event.
- a) **Qualitative** b) Simulation c) Quantitative d) Experimental
33. _____ research used in numerical analysis.
- a) **Quantitative** b) Experimental c) Descriptive d) Qualitative

34. In which year the first version of Statistical Package for Social Sciences was founded?
a) **1968** b) 1958 c) 1948 d) 1938

Unit – V

35. _____ is an introductory statement at the beginning of the thesis.
a) **Preface** b) Abstract c) Appendix d) Glossary
36. _____ should be as brief as possible and run about one or two pages.
a) **Abstract** b) Acknowledgement c) Preface d) Introduction
37. _____ summarize the contents of articles and citation of the references.
a) **Index** b) Appendix c) Glossary d) Abstract
38. _____ refers to the section that gives extra information at the end of thesis.
a) **Appendix** b) Preface c) Conclusion d) Glossary
39. In _____ the researcher may thank all those who helped him in the preparation of thesis.
a) **Acknowledgement** b) Preface c) Abstract d) Appendix
40. _____ Bibliography consists of a comprehensive list of books, journals and papers consulted.
a) **General** b) Select c) Annotated d) Reference-cum
41. Footnotes should be given at the _____ of every page.
a) **Bottom** b) Top c) Left side d) Right side
42. The Primary sources are _____.
a) **Original** b) Contemporary c) Published works d) Unpublished works
43. The Secondary sources are _____.
a) **Published works** b) Contemporary c) Original d) Unpublished works
44. _____ is the last part of a research work.
a) **Bibliography** b) Foot Notes c) Preface d) Glossary
45. _____ is a list of published works and unpublished materials.
a) **Bibliography** b) Preface c) Annexure d) Foot Notes
46. _____ consists of a comprehensive list of books, journals and papers consulted.
a) **General Bibliography** b) Select Bibliography c) Annotated Bibliography d) Foot Notes
47. _____ are authentic statements.
a) **Quotations** b) Tables, Charts and Maps c) Appendix d) Annexure
48. _____ is the concluding operation.
a) **Exposition** b) Interpretation c) Synthesis d) Foot Notes
49. _____ is the spice of the thesis and soul of research reporting.
a) **Brevity** b) Headings c) Paragraphs d) Chapterisation
50. _____ is the heart of Exposition.
a) **Serialisation** b) Synthesis c) Chronology d) Brevity
51. Documentation consists of _____ components.
a) **Six** b) Four c) Seven d) Ten

Section – B

Answer in about 50 words each:

Unit - I

1. What is Research- Meaning.?
2. Define Inductive Method.
3. Define Deductive Method.

4. Narrate Sociology.
5. What is Diplomatic History.?
6. Explain Geography.
7. Define Political Science.
8. What is Challenge and Response Theory?
9. Narrate the Concept of Idea.
10. Discuss the Role of Imagination.

Unit - II

11. Explain Selection of Topic.
12. Define Hypothesis.
13. What is Primary Source?
14. What is Secondary Source.
15. Define Chronology.
16. Narrate Sigiliography.
17. Give an account of Heraldry.
18. Write a short note on Edward Gibbon.
19. Give an account of Oswald Spengler.
20. Write a short note on Logographers.
21. Discuss the Cyclic Theory.
22. Write a short note on Arnold J. Toynbee.
23. Give an account of Thomas Carlyle.

Unit - III

24. Discuss Objectivity.
25. Explain Subjectivity.
26. Narrate Bias in History.
27. Define Heuristics.
28. Define Hermeneutics.
29. What is Card System.
30. Explain Positive Criticism.
31. Narrate Negative Criticism.
32. Discuss Plagiarism.
33. Narrate Case Study.
34. What is an Interview.
35. List out the importance of Personal Diaries.
36. What is a Questionnaire.?

Unit - IV

37. What is an Analysis.?
38. Define Editing.
39. Explain Coding.
40. Narrate Descriptive Analysis.
41. What is an Inferential Analysis.
42. Explain Qualitative Research.
43. Narrate Quantitative Research.

Unit - V

44. Define Synthesis.
45. What is Arrangement of facts.

46. Define Interpretation.
47. Explain Statistical Method.
48. What is Exposition.
49. Explain Quotations.
50. Define Documentation.
51. Narrate Footnotes.
52. What is Bibliography.?
53. Define Abstract.
54. Discuss Index.
55. What is an Appendix.?
56. Define Preface.

Section – C

Answer in about 200 words choosing either (a) or (b):

Unit - I

1. What is Research?
2. What are the major types of Research?
3. Illustrate the relationship between History and Geography.
4. Differentiate between Method and Methodology.
5. Assess the importance of Chronology in Indian History.
6. What are the Pre – requisites of a research scholar?
7. Write an account of the Inductive Method in History?
8. Briefly explain the Deductive Method.

Unit - II

9. What are the deciding factors in selecting a Topic?
10. What are the criteria's to be taken into account before selecting a Topic.
11. Assess the qualities of a research guide.
12. Explain the relationship between scholar and guide.
13. Examine Positive Reasoning in Historical Research.
14. Describe Negative Reasoning in Historical Research.
15. How to build a Hypothesis and build a super frame on the Hypothesis?
16. How an outline can be drawn to undertake a project?
17. Analyse the importance of Primary Sources.
18. Write an account of the various secondary sources?

Unit - III

19. What is Objectivity?
20. How Subjectivity can be overcome in writing Thesis?
21. What are the hurdles to be faced while collecting data?
22. Describe the card system while collecting sources.
23. Describe the File system.
24. What is Plagiarism?
25. How to avoid Plagiarism?
26. Describe Descriptive Method in research.
27. Explain Methodology.
28. Define Case Study Method?
29. Explain Survey Method and its functions.
30. Describe the Survey Method of Research.

31. Explain Interview Method.
32. Examine the merits and demerits of Questionnaire Method?
33. Explain about the Personal Diaries.

Unit - IV

34. Explain the meaning of Analysis.
35. What are the characteristics of Analysis?
36. Assess the purpose of Statistical Analysis of Data.
37. Describe Qualitative Research and its nature.
38. Explain Quantitative Research and what are the methods used in Quantitative Research.
39. Examine the differences between Quantitative and Qualitative research methods.
40. Write about the Statistical Package for Social Sciences?

Unit - V

41. Explain the meaning, prerequisites and principles of Synthetic Operation?
42. Write the differences between Positive and Negative Reasoning.
43. What do you mean by Exposition?
44. Explain the importance of Interpretation.
45. What is Post-Modernism?
46. Write about Format?
47. How to prepare Abstract?
48. What do you mean by Documentation?
49. Explain Preface.
50. How to write Foot Notes?
51. What is the purpose and placement of Foot Notes?
52. What is Bibliography?
53. How to write Bibliography?
54. How to include Tables, Charts and Maps?
55. Explain End Notes.
56. What is Appendix?
57. Briefly sketch about Glossary.

Section – D

Answer in about 400 words choosing either (a) or (b):

Unit - I

1. Write an essay on the various Types of Research?
2. Narrate the various disciplines which are related to History.
3. What are the various limitations while doing Research in History?
4. Write an essay on how to make Notes.
5. “Economic factors decide the course of History” – Explain.
6. Discuss the relations between history and its allied subjects.
7. Describe about Scientific Method and its Limitations.
8. Critically analyse the inter-disciplinary and multi-disciplinary approach in historical research.
9. Critically analyse the multi-disciplinary approach in historical research.
10. Enumerate the role of recent trends in historical writing.
11. Discuss the ways and means of collection of historical data.

Unit - II

12. Describe the steps in selecting a topic for research?
13. Explain the role of the research guide in the process of research.
14. How the Primary Sources determine the efficiency of Research?
15. “Chronology and Geography are the two eyes of history” – Explain.
16. Explain the problems faced by a Research scholar.
17. Enumerate the recent trends in research methodology.
18. Enumerate the role of interpretative method in historical writing.
19. Discuss narrative method in historical research.
20. How to formulate a thesis?
21. Explain the objectives and the importance of Hypothesis.
22. Analyse the importance of Online Sources.
23. Discuss Structuralism in History.
24. Examine the role of Annals School in Historical research.

Unit - III

25. What is Objectivity? How to attain Objectivity in historical writing?
26. How objectivity differs from subjectivity?
27. “Bias and Prejudice for event historians from writing Objective History” – Explain.
28. Evaluate the need for Historical Objectivity.
29. How to examine the credibility of a document? Explain.
30. Define external criticism. Explain its functions.
31. Define internal criticism. Explain its importance.
32. What are the chief sources of data collection for historical writings?
33. Discuss the ways and means of collection of historical data.
34. Examine the Card system used for recording the evidences.
35. Describe the File system for recording the evidences.
36. Define Plagiarism and its importance in historical writing.
37. Examine the Survey Method and its advantages and disadvantages.
38. Explain the Case Study Method and its assumptions.
39. Describe the merits and demerits of Interview Schedule.

Unit - IV

40. Critically analyse the Marxian interpretation of history.
41. Describe the processing operations of Analysis of Data.
42. Assess the types of Strategical Analysis.
43. Elucidate the Quantitative research in history.
44. Examine the role of Synthesis in historical research.
45. What is synthetic operation? Explain.
46. Explain the importance of facts in the Synthesis and point out some of the important problems involved in it?

Unit - V

47. Assess the Historical Facts in Synthetic Operation.
48. How to prepare the Format of the thesis?
49. What are the preliminaries of thesis writing? Explain with illustrations.
50. Elucidate the importance of Exposition in historical writing.
51. How perfection of thesis is achieved through Exposition?

52. Mention the significance of Documentation in history.
53. Define Foot Notes. What are the uses and purpose of Foot notes?
54. How to prepare Bibliography? Explain with illustrations.
55. Describe the ways and methods of Quotations.

St. Mary's College (Autonomous) Thoothukudi
Question Bank
II M.A. History

Core Elective 2 A

History of Modern West
Semester III – November 2022

Course. Code: 21PHIE31

(for those who joined in July 2021 and after)

Answer all questions

Section A

Choose the correct answer:

Unit I

1. The word Feudalism is derived from the _____ word.
(a) **Latin** (b) Greek (c) Chinese (d) English
2. Modern Era flourished in Europe in _____.
(a) 1460 (b) **1453** (c) 1458 (d) 1454

Unit II

1. Prince Henry, the Navigator belonged to _____.
(a) **Portugal** (b) Spain (c) France (d) Italy
2. Lopo Gonsalves crossed the _____.
(a) Tropic of Cancer (b) **Equator** (c) Tropic of Capricorn (d) Polar Region
3. _____ was the first vessel to circumnavigate the world.
(a) **Victoria** (b) May Flower (c) Spanish Armada (d) Titanic
4. _____ found a new sea route to India.
(a) Columbus (b) **Vasco-da-Gama** (c) Cabral (d) Henry
5. Bartholomew Diaz reached the southernmost tip of _____ and named as Cape of Storms.
(a) **Africa** (b) America (c) Asia (d) Europe
6. Vasco-da-Gama reached Calicut in India in _____.
(a) 1496 (b) **1498** (c) 1494 (d) 1492
7. Mundus Novus known as the 'New World' was discovered by _____.
(a) Bartholomew Diaz (b) Vasco-da-Gama (c) **Columbus** (d) Henry
8. Columbus discovered America in _____.
(a) **1492** (b) 1491 (c) 1493 (d) 1494
9. Constantinople was captured by Ottoman Turks in _____.
(a) 1452 (b) 1553 (c) 1450 (d) **1453**
10. Ferdinand Magellan found the sea calm called _____ Ocean.
(a) Indian (b) Atlantic (c) **Pacific** (d) Arctic
11. Francis Drake became the first English sailor to circumnavigate the globe in his ship _____.
(a) Victoria (b) **Golden Hind** (c) May Flower (d) Titanic
12. The Duke of _____ became the enemies of France.
(a) **Burgundy** (b) Lancashire (c) Paris (d) Liverpool

Unit III

1. _____ learning became popular during Renaissance period.
(a) Scholastic (b) Old (c) **New** (d) Vedic
2. Paradise lost and Paradise Regained was written by _____.
(a) **John Milton** (b) Thomas Moore (c) Cervantes (d) Celini
3. _____ collected money for the reconstruction of St. Peter's Basilica.

- (a)Pope Bernard (b) Pope Paul (c) Pope Julius II (d) **Pope Leo X**
4. St. Peter's Basilica was built in _____ style of architecture.
(a)Gothic (b) **Romanesque** (c) Dravidian (d) Vesvara
 5. Printing Press was invented in _____.
(a)**1470** (b) 1472 (c) 1740 (d) 1450
 6. _____ wrote Don Quixote.
(a)Thomas Moore (b) John Milton (c) **Cervantes** (d) Shakespeare
 7. _____ presented helio-centric theory.
(a)**Copernicus** (b) Francis Bacon (c) Galileo (d) Newton
 8. _____ was burnt at Stake by the Church.
(a)John Milton (b) **John Huss** (c) John James (d) John Hawkins
 9. _____ was the first to translate Bible into English.
(a) John Hawkins (b) John Milton (c) **John Wycliffe** (d) John Huss
 10. _____ discovered the theory of gravitation.
(a) Galileo (b) Francis Bacon (c) Copernicus (d) **Issac Newton**
 11. _____ is a wonderful masterpiece of Leonardo Davinci.
(a) Last Judgement(b) **Monalisa** (c) Sistine Madonna (d) St. Mark
 12. _____ was the important characteristic feature of Renaissance.
(a)**Humanism** (b) Scholastic Learning (c) Spiritualism (d) Modernism
 13. _____ was the Father of Humanism.
(a) **Petrarch** (b) Thomas Moore (c) Ghiderti (d) John Milton

Unit IV

1. _____ was the first country affected by the Protestant Movement.
(a)Switzerland (b) France (c) Germany (d) **England**
2. Pope _____ was involved in the sale of indulgences to reconstruct St. Peter's Church.
(a)Julius II (b) **Leo X** (c) Leo IX (d) Paul
3. The Lollard Movement was started in _____.
(a)Spain (b) Poland (c) Switzerland (d) **England**
4. _____became the first Bishop of Rome.
(a)Frederic (b) **St. Peter** (c) Louis (d) Catherin
5. Pope _____ issued a Bull of ex. Communication against state officials.
(a)Boniface VIII (b) **Leo X** (c) Julius II (d) Alexander

Unit V

1. Martin Luther was born in _____.
(a)**1485** (b) 1445 (c) 1455(d) 1475
2. Diet of Speyer was held in_____.
(a)1626 (b) **1526** (c) 1726 (d)1826
3. _____ was known as "Defender of Faith"
(a)Louis XIV (b) Julius II (c) Paul (d) **Henry VIII**
4. Ignatius Loyola belonged to _____.
(a)Germany (b) **Spain** (c) Russia (d) Prussia

Section B

Answer the following questions in about 50 words each:

Unit I

1. Explain the characteristic features of Feudalism.
2. Write a note on impacts of Capitalism.
3. Outline the special features of Feudalism and Capitalism.
4. Write about the powers of Pope of Rome.

Unit II

1. Give an account on the history of Constantinople.
2. Narrate the importance of Mariner's Compass.
3. Write a note on the Voyages of Marco Polo.
4. Give an account on Henry, the Navigator.
5. Discuss the voyages of Bartholomew Diaz.
6. Outline the geographical significance of Cape of Storms.
7. Narrate the importance of Cape of Good Hope.
8. Explain the geographical exploration of Vasco-da-Gama.
9. Write about the historical importance of Calicut.
10. Give an account on Christopher Columbus.
11. Sketch the importance of Americo Vespucci and his explorations.
12. Discuss the importance of Strait of Magellan.

Unit III

1. Define New Learning.
2. Outline the importance of Monalisa.
3. Explain the inventions of Copernicus.
4. Narrate the theory of Helio-centric theory.
5. Define Humanism.
6. Define Renaissance
7. Illustrate the city of Florence and its historical importance.
8. Explain the contribution of Lorenzo Ghiberti to architecture.
9. List out the works of Francis Bacon.
10. Discuss the special features of St. Peter's Basilica.
11. Outline the works of Petrarch.
12. Describe the significance of Utopia.

Unit IV

1. Explain Calvinism.
2. Explain about Sale of Indulgence.
3. Define Counter Reformation.
4. Give an account on Crammer's Prayer book.
5. Discuss the role of Pope Leo X during Renaissance.

Unit V

1. Explain about Society of Jesus.
2. Explain Zwinglism.
3. Discuss about Augsburg Confession.

4. Give an account on John Calvin and his religious activities.

Section C

Answer the following questions in about 200 words each:

Unit I

1. Evaluate the decline of Feudalism.
2. Assess the causes for the birth of Capitalism.
3. Narrate the significant characteristic features of Capitalism.

Unit II

1. Analyse the causes for the geographical discoveries.
2. Examine the significance of the geographical discoveries.
3. Analyse the factors which influenced for the geographical discoveries.
4. 'Christopher Columbus rightly deserves to be called as the 'Discoverer of the New World' – Justify the Statement.
5. Assess the political impact of geographical discoveries.

Unit III

1. Analyse the characteristic features of Renaissance.
2. Examine the contribution of Leonardo da Vinci in the art of paintings.
3. Assess the evolution of the reconstruction of St. Peter's basilica in Romanesque Style.
4. Analyse the advancement of astronomy during Renaissance period.
5. Assess the significance of paintings of Raphael.
6. "Florence the Home of Renaissance" – Elucidate.
7. Examine the development of sculptures during Renaissance period.
8. Examine the contribution of architecture during Renaissance.
9. 'Florence is regarded as the Home of Renaissance' - Validate the Statement.

Unit IV

1. Assess the factors for the development of Renaissance.
2. Analyse the results of the Reformation Movement.
3. Examine the importance of the Counter Reformation.

Unit V

1. Narrate the services rendered by John Calvin.
2. Analyse the contribution Ulrich Zwingli.
3. Examine the importance of Council of Trent.

Section D

Answer the following questions in about 400 words each:

Unit I

1. Examine the causes for the growth of Feudalism.
2. Examine the causes for the birth of Capitalism.
3. Analyse the growth of Capitalism and its impact.

Unit II

1. Analyse the importance of the geographical discoveries of the 15th and 16th centuries in the history of Europe.
2. Evaluate the Henry - The Navigator and Portuguese geographical discoveries.
3. Assess the Spanish geographical discoveries and its impact.
4. Analyse the results of geographical discoveries in Europe.

Unit III

1. Estimate the development and changes in the paintings during Renaissance period.
2. Evaluate the causes for the growth of Classical literature during Renaissance.
3. Assess the impact of Renaissance in the field of science.
4. Estimate the outcome of new vernacular literature during Renaissance period.
5. Evaluate the results of Renaissance.

Unit IV

1. Assess the causes for the Reformation Movement.
2. Analyse the Effects of Reformation.
3. Examine the Reformation Movement in England.
4. Evaluate the results of Reformation.

Unit V

1. Assess the Counter Reformation with special reference to Society of Jesus.
2. Estimate the Contribution of Martin Luther in the Protestant Movement.
3. Examine the impact of Counter Reformation in Europe.
4. Analyse the importance of Council of Trent.

St. Mary's College (Autonomous) Thoothukudi
Question Bank
II M.A History
Core - I History of India from 1858 to 1950 C.E Sub.Code: 21PHIC41
Semester IV – April 2023
(for those who joined in July 2021 and after)

SECTION A

Choose the Correct Answer:

Unit I

1. Indian National Congress was founded in the year _____.
(a) **1885** (b) 1887 (c) 1884 (d) 1899
2. Where was the Indian National Congress founded?
(a) **Bombay** (b) Lacknow (c) Simla (d) Calcatta
3. _____ is said to be the father of Indian National Congress.
(a) **A.O. Hume** (b) C.R. Das (c) Sinha (d) Tilak
4. Who partitioned Bengal?
(a) Ripon (b) **Curzon** (c) Canning (d) Lytton
5. Who was the author of Anand Math?
(a) **Bankim Chandra Chattergy** (b) C.R. Das (c) Sinha (d) Tilak

Unit II

6. The leader of the Moderates was _____.
(a) **G.K. Gokhale** (b) Nehru (c) Gandhi (d) Jinnah
7. C.R. Das was popularly known as _____.
(a) **Deshabandhu** (b) Bose (c) Hume (d) Prince of workers
8. _____ was known as the Grand old man of India.
(a) **Dadabai Naoroji** (b) Annie Besant (c) Gokhale (d) C.R. Das
9. _____ was the magazine published by Tilak.
(a) **The Kesari** (b) Gita Rahsya (c) The Times (d) New India
10. Who wrote the book Poverty and Un-British Rule in India?
(a) **Dadabhai Naoroji** (b) C.R. Das (c) Sinha (d) Tilak
11. When did Gopal Krishna Gokhale join the Congress?
(a) 1885 (b) 1887 (c) 1888 (d) **1889**
12. Who was the President of the Indian National Congress in 1905?
(a) **G.K. Gokhale** (b) Nehru (c) Gandhi (d) Jinnah
13. Who was the leader of the Extremists?
(a) M.K. Gandhi (b) Nehru (c) **B.G. Tilak** (d) S.N. Banerjee
14. _____ was called the Father of Indian Revolution.
(a) **Tilak** (b) Gokhale (c) Gandhiji (d) Motilal Nehru
15. Who organised the Shivaji festival?
(a) Dadabhai Naoroji (b) C.R. Das (c) Sinha (d) **B.G. Tilak**
16. Where was Congress split?
(a) Punjab (b) **Surat** (c) Simla (d) Calcatta
17. Who started Home Rule Movement?
(a) **Mrs. Annie Besant** (b) Nehru (c) Gandhi (d) Jinnah

18. Who was the founder of the Aligarh Movement?
 (a) M.K. Gandhi (b) Nehru (c) B.G. Tilak (d) Sir Syed Ahmad Khan
19. Where was the Lucknow Pact signed?
 (a) Punjab (b) **Lacknow** (c) Simla (d) Calcutta
20. Home Rule Movement was started in _____.
 (a) 1902 (b) 1904 (c) 1905 (d) **1915**
21. _____ started a weekly the Common Weel
 (a) **Mrs. Annie Besant** (b) C.R. Das (c) B.C. Pal (d) Sinha
- Unit III**
22. When was the Rowlatt Act passed?
 (a) June 5, 1919 (b) **April 5, 1919** (c) August 5, 1919 (d) Dec. 5, 1919
23. When was the Jallianwalabagh Massacre took place?
 (a) **April 13, 1919** (b) July 13, 1919 (c) August 13, 1919 (d) Sep 13, 1919
24. When was the Khilafat Movement started?
 (a) 1917 (b) 1918 (c) **1919** (d) 1920
25. Who was elected as the President of All India Khilafat Conference held in Delhi in 1919?
 (a) Nehru (b) C.R. Das (c) Jinnah (d) **Mahatma Gandhi**
26. When was the Non-Cooperation movement launched?
 (a) 1917 (b) 1918 (c) 1919 (d) **1920**
27. Which leader died on the day the Non cooperation movement was launched in 1920?
 (a) Gokhale (b) **Bala Gangadhar Tilak** (c) Tirupur Kumaran (d) Theeran Sinnamalai
28. When was the Non-Cooperation movement suspended?
 (a) 1920 (b) 1921 (c) **1922** (d) 1923
29. When did the Chauri Chaura massacre take place?
 (a) 1920 (b) 1921 (c) **1922** (d) 1923
30. Name of the commission which was appointed to Investigate the Jallianwalla Bagh Massacre.
 (a) **Hunter Commission** (b) Peel Commission (c) Mudiman Commission (d) Sarkaria Commission
31. Who were the founders of Swaraj Party ?
 (a) C.R. Das and Jawaharlal Nehru (b) C.R. Das and Rajaji (c) C.R. Das and Annie Besant
 (d) **C.R. Das and Motilal Nehru**
32. When did the Simon commission come to India?
 (a) 1927 (b) **1928** (c) 1929 (d) 1930
33. In which session of Indian National Congress moved a resolution of complete independence ?
 (a) **Lahore** (b) Calcutta (c) Ahmadabad (d) Delhi
34. Who was the president of Lahore session of Indian National Congress?
 (a) C.R. Das (b) Annie Besant (c) Rajaji (d) **Jawaharlal Nehru**
35. When did Indian National Congress adopt a resolution demanding complete independence for the first time?
 (a) 1927 (b) **1929** (c) 1928 (d) 1929
36. When did the Indian National Congress celebrate its Independence Day for the first time?
 (a) 1928 January 26 (b) **1930 January 26** (c) 1929 January 26 (d) 1927 January 26

Unit IV

37. When was the Dandi March started?
(a) **March 12, 1930** (b) May 12, 1930 (c) April 12, 1930 (d) Sep 12, 1930
38. How many followers of Gandhiji participated in Dandi March?
(a) 73 (b) 74 (c) 75 (d) **78**.
39. When did the Gandhi - Irwin pact sign?
(a) **Mar 5, 1931** (b) April 5, 1931 (c) May 5, 1931 (d) June 5, 1931
40. Name the person, who represented Indian National Congress in the second round table conference in 1931
(a) Nehru (b) Patel (c) **Mahatma Gandhi** (d)
41. Name the national leader of India who participated in all of the three Round Table Conferences.
(a) **B.R. Ambedkar** (b) Gandhi (c) Nehru (d) Patel
42. When was the communal award announced?
(a) **16th August 1932** (b) April 5, 1931 (c) May 5, 1931 (d) June 5, 1931
43. When was the Poona pact signed?
(a) May 5, 1931 (b) April 12, 1930 (c) **25 Sep, 1932** (d) June 5, 1931
44. When did the White Paper publish?
(a) May, 1931 (b) April, 1931 (c) Sep, 1932 (d) **March 1933**
45. When was the 'Day of Deliverance' observed by the Muslim League?
(a) May 5, 1931 (b) **Dec 22, 1939** (c) May 5, 1931 (d) March 7, 1933

Unit V

46. When was the Individual Civil Disobedience Movement started?
(a) Sep 1940 (b) **Oct 1940** (c) Nov. 1940 (d) Dec. 1940
47. Who commented "The Cripps Mission was a post dated cheque drawn on a crushing bank?"
(a) Jinna (b) Subhash Chandra Bose (c) **Gandhiji** (d) Nehru
48. Where did the Congress Working committee first accept the idea of the Quit India Movement?
(a) Calcutta (b) **Wardha** (c) Ahmadabad (d) Chennai
49. When was the Quit India movement started?
(a) 1942 August 5 (b) 1942 August 6 (c) 1942 August 7 (d) **1942 August 8**
50. Who gave the slogan "Dilli Chalo" or "March to Delhi"?
(a) Jinna (b) **Subhash Chandra Bose** (c) Gandhiji (d) Nehru
51. When did the Cabinet Mission visit India?
(a) 1944 (b) 1945 (c) 1942 (d) **1946**
52. Who presided over the Cabinet Mission?
(a) Amir Chand (b) **Sir. P. Lawrence** (c) Lord Mountbatten (d) Prem Sehgal
53. Who headed the Interim Government in 1946?
(a) Patel (b) Jinna (c) **Jawaharlal Nehru** (d) Subhas Chandra Bose
54. When did Lord Mountbatten announce transfer of power to India?
(a) **Feb 20, 1947** (b) March 20, 1947 (c) April 20, 1947 (d) May 20, 1947
55. When was Indian Independence Act passed by the British Parliament?
(a) **July 1947** (b) June 1947 (c) May 1947 (d) August 1947

SECTION B

Answer in about 50 words

Unit - I

1. A.O. Hume
2. Vandemataram
3. Grand old man of India
4. Bankim Chandra Chatterjee
5. "Poverty – un British rule in India
6. Drain wealth Theory
7. Arms Act
8. Vernacular Press Act
9. Ilbert Bill
10. Indian Association
11. Arya Samaj
12. Raja Ram Mohan Rai
13. W.C. Banerjee
14. Kesari
15. Bengal Gazettee
16. Servant of India Society
17. Ramakrishna Mission

Unit - II

18. Muslim League
19. Surat Split
20. Gokale
21. Tilak
22. Moderates
23. Extremists
24. Lucknow Pact 1916

Unit - III

25. Aligarh movement
26. Rowlat Act
27. Jallian Wala Bagh Massacre
28. Michael O Dyer
29. Ali Brothers
30. Khilafat Movement
31. Non Co-operation Movement
32. Chauri – Chaura Incident
33. Swarajya Party
34. Desabandhu
35. No-Changes
36. Pro-Changers
37. Poorna Swaraj Resolution
38. Simon Commission

39. Nehru Report

Unit - IV

40. Dandi March

41. Vedaranyam March

42. Round Table Conferences

43. Gandhi-Irwin Pact

44. Communal Award

45. Day of Deliverance

46. Poona Pact

Unit - V

47. Direct Action Day

48. Individual Satyagraha

49. August Offer

50. C.R. Formula

51. Delhi Chalo

52. Naval Mutiny

53. Azad Hind Fauj

54. Noakali

55. Wavell Plan

56. Simla Conference

57. Mountbatten Plan

SECTION C

Answer in about 200 words each choosing either (a) or (b).

Unit - I

1. List out the factors for the rise of Indian Nationalism
2. Examine the role of Literature and Press in promoting Nationalism
3. Give an account of Ilbert Bill
4. Give a brief account of the social and religious ideas of Raja Ram Mohan Roy

Unit - II

5. What were the causes and impact of the partition of Bengal?
6. Give an account of the Swadeshi Movement
7. Write a note on the Surat Split
8. Examine the works of Gokhale
9. Write a short note on Thilak
10. Estimate the contribution of Lala Laj pat Rai
11. Write about the objectives and techniques of the Moderates
12. Explain the achievements of Moderates
13. Sketch the importance of Aligarh Movement
14. Write a short note on Annie Besant
15. Describe the Home Rule Movement
16. Explain the significance of Lucknow Pact

Unit - III

17. Give an account of Rowlat Act of 1919
18. Give an account of the Jallian Wala Bagh Massacre
19. Write a note on the Khilafat movement

20. Sketch briefly about Gandhiji and Khilafat Movement
21. Explain the causes of the Non – Cooperation Movement
22. Describe the Swaraj Party
23. Enumerate the achievements of the Swarajist
24. Give an account of the report of the Simon Commission
25. Bring out the salient features of the Nehru Report
26. Explain Jinnah’s fourteen points

Unit -IV

27. Estimate the work of the second Round Table Conference
28. Explain the Mac Donald Award
29. Describe the Poona Pact
30. Write a note on C.R.Formula
31. Discuss the Civil Disobedience Movement

Unit - V

32. Give an account of the Quit India Movement
33. Explain the importance of the Individual Satyagraha
34. Evaluate the provisions of the Cripps Mission
35. List out the causes for the failure of Cripps Mission
36. Write a note on Subash Chandra Bose
37. Sketch the importance of Simla Conference
38. Discuss briefly about the Wavell Plan
39. Give an account of the Cabinet Mission
40. Explain the Mountbatten Plan
41. Narrate the Indian Independence Act

SECTION D

Answer in about 400 words each choosing either (a) or (b).

Unit - I

1. Describe the causes that were responsible for the political awakening in India
2. Examine the role of the socio - religious movements for the awakening of the Indian nationalism.
3. Trace the circumstances leading to the foundation of the Indian National Congress

Unit - II

4. Trace the origin and growth of the Indian National Congress
5. Narrate the original aims and objects of the Indian National Congress
6. How did the partition of Bengal become a turning point in the history of the freedom struggle?
7. Exhibit the services of the moderates of Indian National Congress
8. Examine the events that determined the congress split
9. Explain the role of Tilak in freedom struggle
10. Give an account of the contributions of Gokhale
11. Examine the Origin of Muslim League and its responsibility for the Partition of India
12. Enumerate the causes for the emergence of militant nationalism
13. Estimate the services of Mrs. Annie Besant to Freedom Movement

14. Give an account of the Home Rule Movement and its repercussions
15. Describe the role of Ali brothers and Gandhiji in the khilafat movement

Unit - III

16. Sketch an essay about the Non-Cooperation Movement
17. Estimate the work and achievements of Swarajya Party
18. Give an account of the report of Simon Commission
19. Discuss about the fourteen points of Jinnah

Unit - IV

20. Describe the Civil Disobedience Movement
21. Estimate the work of the Round Table Conferences

Unit - V

22. Give an account of the Quit India Movement
23. Evaluate the provisions of the Cripps Mission
24. Assess the role of Subhas Chandra Bose in the Freedom Struggle
25. Write an essay on the role of Mahatma Gandhi in freedom Movement
26. Assess the role of Indian National Army in the Freedom Movement
27. Describe the Cabinet Mission
28. Narrate the Indian Independence Act.

St. Mary's College (Autonomous) Thoothukudi
Question Bank
II M.A. History
Core –2 Contemporary History of India from 1947 to 2014 C.E Sub. Code: 21PHIC42
Semester – IV April 2023
(for those who joined in July 2021 and after)

Answer all questions
Section – A

Choose the correct answer:
Unit – I

1. The constitution of India was drafted by _____.
a) Drafting committee b) **Constituent Assembly** c) Draft Constitution d) Indian Constitution
2. _____ was the President of the Constituent Assembly.
a) Pandit Jawaharlal Nehru b) **Dr.Rajendra Prasad** c) Dr.Ambedkar d) M.N.Rao
3. In which year the constitution was promulgated?
a) 1946 b) 1948 c) **1950** d) 1962
4. The Constitution of India came into force in _____.
a) **1950** b) 1952 c) 1962 d) 1965
5. _____ was the chief architect of the Indian Constitution and the chairman of the Drafting committee.
a) Pandit Jawaharlal Nehru b) Dr.Rajendra Prasad c) **Dr.Ambedkar** d) M.N.Rao
6. In which year the Indian Constituent Assembly was formed?
a) **1946** b) 1948 c) 1950 d) 1962
7. The Drafting Committee was set up on _____.
a) **29th August, 1947** b) 29th August, 1948 c) 29th September, 1950 d) 29th February, 1947
8. _____ of the constitution is rightly regarded as the Magna Carta of India.
a) Part I b) Part II c) **PartIII** d) Part IV
9. In which year and by which Amendment the fundamental duties was added in the constitution?
a) 1972 by 40th Amendment b) 1973 by 42nd Amendment c) 1974 by 41st Amendment
d) **1976 by 42nd Amendment**
10. The Dar Commission was formed on the year _____.
a) **1948** b) 1949 c) 1950 d) 1952
11. The JVP Committee was formed on _____.
a) 1946 b) **1949** c) 1952 d) 1956
12. The First Five Year Plan was implemented on _____.
a) **1951** b) 1961 c) 1956 d) 1958
13. 'Panch Sheel' agreement was signed between _____ and _____.
a) India and America b) India and Russia c) **India and China** d) India and Pakistan
14. The Sanskrit term 'Panch Sheel' means _____.
a) one codes of conduct b) three codes of conduct c) **five codes of conduct**
d) seven codes of conduct
15. Who moulded the foreign policy of India?
a) **Jawaharlal Nehru** b) Madame Cama c) Mahatma Gandhi d) Rabrindranath Tagore
16. _____ was the chief architect of India's foreign policy.
a) **Jawaharlal Nehru** b) Madame Cama c) M.N.Rao d) Bankim Chandra Chatterjee
17. What is the meaning of Non – Alignment?
a) **Policy of peace** b) Racialism c) Apartheid d) Disarmament

Unit – II

18. In which year the Food Crises was happened during Shastri period?
a) 1960 b) **1964** c) 1967 d) 1980
19. The Anti-Hindi Agitation was formed on _____.
a) 1945 b) 1955 c) **1965** d) 1975
20. The Tashkent Agreement was signed on the year _____.
a) 2nd January, 1966 b) 4th January, 1966 c) 6th January, 1966 d) **10th January, 1966**
21. The Tashkent Agreement was signed between which two nations?
a) **India and Pakistan** b) India and China c) India and Russia d) India and America
22. ‘Kitchen Cabinet’ was happened during the period of _____.
a) Rajiv Gandhib) **Indira Gandhi** c) Narasimha Rao d) Lal Bahadur Shastri
23. _____ was the first Muslim President of the Indian Republic.
a) Yahya Khan b) Sheikh Mujibur Rehman c) **Zakir Hussain** d) Zulfiqar Ali Bhutto

Unit - III

24. The Monopolies and Restrictive Trade Practices Act was passed on _____.
a) 1940 b) 1960 c) 1955 d) **1969**
25. MISA (Maintenance of Internal Security Act) was passed on _____.
a) **1971** b) 1972 c) 1974 d) 1976
26. In which year the 20 Point Programme was announced?
a) 1st July 1970 b) **1st July 1975** c) 1st July 1974 d) 1st July 1972
27. In which year Jaiprakash Narayan launched the Janata party?
a) 1972 b) 1974 c) **1976** d) 1971
28. Ashok Mehta Committee was appointed on _____.
a) 1974 b) 1975 c) 1976 d) **1977**
29. Kissa Kursi Ka film narrates the story against _____.
a) **Indira Gandhi** b) Sanjay Gandhi c) Rajiv Gandhi d) Jawaharlal Nehru
30. _____ a renowned agriculture scientist and the member in charge of the Planning Commission helped to revamp and reconstruct the earlier 20 Point Programme.
a) P.V. Narasimha Rao b) **Dr. M.S. Swaminathan** c) R. Venkatraman d) R.K. Dawan
31. The New 20 Point Programme was formed on _____.
a) 12th July, 1962 b) 10th January, 1972 c) **14th January, 1982** d) 1st July, 1992
32. An Indian Airlines Corporation Plane was hijacked on _____.
a) 1980 b) 1962 c) 1954 d) **1984**
33. Operation Blue Star was happened during the period of _____.
a) **Indira Gandhi** b) Rajiv Gandhi c) Jawaharlal Nehru d) Narasimha Rao
34. Operation Blue Star was happened on _____.
a) 2nd June, 1984 b) **5th June, 1984** c) 4th June, 1984 d) 7th June, 1984
35. Indira Gandhi was assassinated on _____.
a) 28th October, 1984 b) 29th October, 1984 c) 30th October, 1984 d) **31st October, 1984**

Unit - IV

36. Bhopal poisonous gas leak Tragedy was happened on _____.
a) **3rd December, 1984** b) 4th December, 1980 c) 6th December, 1984 d) 5th December, 1980
37. Rajiv Gandhi Government introduced the _____ Bill on 25th February, 1986.
a) Banatwala Bill b) **Muslim Women’s (Protection of Rights of Divorce)**
c) Anti- Deflection d) Anti - Defamation
38. _____ Government formulated a four – fold strategy in economy.
a) Indira Gandhi b) Jawaharlal Nehru c) **Rajiv Gandhi** d) V.P. Singh
39. National Policy on Education was adopted on _____.
a) 1968 b) 1972 c) 1984 d) **1986**
40. Operation Black Board system provides _____.
a) **Minimum essential facilities in primary schools** b) to give basic education
c) Opening rural universities d) Autonomous colleges

41. Indian Postal Act (Amendment) Bill was passed on _____.
 a) 1982 b) **1986** c) 1984 d) 1988
42. Rajiv Gandhi made his 10 Point Declaration with _____ Soviet General Secretary.
 a) Ronald Reagan b) Deng Xiaoping c) **Mikhail Gorbachev** d) Jayawardene
43. Rajiv Gandhi 10 Point Declaration was otherwise known as _____.
 a) Anti- Deflection Bill b) Anti – Defamation Act c) Indian Postal Act (Amendment) Bill d) **New Delhi Declaration**
44. Rajiv Gandhi was assassinated at _____.
 a) Mumbai b) **Sriperumbudur** c) New Delhi d) Kolkatta
45. Mandal Mania Commission was appointed for the welfare of _____.
 a) **Backward classes** b) Forward classes c) Most Backward classes d) Tribes
46. _____ was the first Prime Minister from the South.
 a) Deve Gowda b) **P.V. Narasimha Rao** c) J.H. Patel d) Chandrababu Naidu
47. Cauvery Water Dispute was held between which two states?
 a) Tamil Nadu and Maharashtra b) Kerala and Tamil Nadu c) **Tamil Nadu and Karnataka** d) Karnataka and Andhra
48. _____ was called as the Architect of India’s New Economy.
 a) Dr. Montek Singh Ahluwalia b) V.P. Singh c) P.V. Narasimha Rao d) **Dr. Manmohan Singh**
49. The domes of Babri Masjid were demolished on _____.
 a) **6th December, 1992** b) 6th December, 1855 c) 6th December, 1859 d) 23rd December, 1949
50. The 73rd Constitutional Amendment Act came into force on _____.
 a) 24th April, 1992 b) **24th April, 1993** c) 24th July, 1989 d) 24th September, 1991

Unit – V

51. _____ for the first time, a Chief Minister-in-office of a state became the Prime Minister of the country.
 a) **H. D. Deve Gowda** b) V.P. Singh c) P.V. Narasimha Rao d) Dr. Manmohan Singh
52. _____ Government introduced the Women’s Reservation Bill.
 a) P.V. Narasimha Rao b) **H. D. Deve Gowda** c) I. K. Gujral d) Indira Gandhi
53. The Women’s Reservation Bill was passed on the year _____.
 a) 10th September, 1994 b) 11th September, 1996 c) **12th September, 1996** d) 12th September, 1994
54. _____ was the first Pakistan born Prime Minister of India.
 a) L.K. Advani b) Nawaz Sharif c) Benazir Bhutto d) **I.K. Gujral**
55. In which year the nuclear explosions rocked the desert sands of Pokhran Test Range in the Rajasthan desert?
 a) **11 & 13th May, 1998** b) 10 & 12th May, 1998 c) 14 & 12th May, 1998 d) 15 & 16th May, 1998
56. _____ the anti-nuclear activist termed 11th May as “the blackest day for India along with 6th December.
 a) Kushabai Thakare b) **Praful Bidwai** c) Nurul Hasan d) Yashwant Sinha
57. The Pokhran II Nuclear test code was called as _____.
 a) Operation Talwar b) Operation Saped Sagar c) **Operation Shakti** d) Operation Vijay
58. The two Prime Ministers Vajpayee and Nawaz Sharif signed the famous _____.
 a) Nuclear Non-Proliferation Treaty b) New Delhi Declaration c) New Education Policy d) **Lahore Declaration**
59. Kargil War was happened on the year _____.
 a) **May 1999** b) February 1999 c) June 1999 d) April 1999
60. In which year the Red Fort Attack was happened?
 a) 21st December, 2000 b) **22nd December, 2000** c) 20th December, 2000 d) 23rd December, 2000
61. The modern system of census was started in _____.

- a) Denmark b) Switzerland c) **Sweden** d) Norway
62. The first synchronous census was taken in India in _____.
- a) 1749 b) 1875 c) 1865 d) **1881**
63. _____ the Census Commissioner for the first time launched the householding operation (i.e., door-to-door enumeration) and collected data from every member of the family.
- a) **J.K. Banthiab)** M.N. Venkatachaliah c) K. Subramaniam d) K.R. Narayanan
64. The National Commission for Women came into existence in _____.
- a) 2001 b) **1991** c) 1981 d) 1996
65. The Terrorist Attack on Parliament was happened on the year _____.
- a) January 2001 b) April 2001 c) **December 2001** d) September 2001
66. Godhra Train Tragedy was happened on _____.
- a) 24th April, 2001 b) 20th January, 2001 c) 25th September, 2001 d) **27th February, 2002**
67. Prevention of Terrorism Act (POTA) was passed on _____.
- a) **March 2002** b) February 2002 c) April 2002 d) January 2002
68. In September 2002 the Akshardhan Attack was held at _____.
- a) Ahmedabad b) **Gujarat** c) Hyderabad d) New Delhi
69. In 2002 the Sarva Shiksha Abhiyan was introduced with the objectives of _____.
- a) Friendship b) Peace c) **Universal education and universal retention** d) Mutual relationship
70. The National Curriculum Framework for School Education was introduced in _____.
- a) January 2002 b) March 2002 c) June 2002 d) **April 2002**
71. Swarnajayanti Gram Swarozgar Yojana self-employment programme introduced on _____.
- a) **1st April, 1999** b) 1st April, 2000 c) 25th April, 2000 d) 25th December, 2000
72. Antyodaya Anna Yojana Scheme launched on the birthday of Prime Minister _____.
- a) P.V. Narasimha Rao b) **Atal Bihari Vajpayee** c) I. K. Gujral d) V.P. Singh
73. Indira Awaas Yojana Scheme was implemented in _____.
- a) 1st April, 2000 b) 1st April, 1996 c) **1st January, 1996** d) 1st January, 2000
74. The two Prime Ministers Vajpayee and Vladimir Putin signed a _____ to enhance cooperation and to combat terrorism.
- a) Lahore Declaration b) 10 Point Declaration c) New Education Policy d) **Delhi Declaration**
75. UPA's Common Minimum Programme was officially released on _____.
- a) **27th May, 2004** b) 20th May, 2000 c) 10th May, 2004 d) 27th May, 2003
76. Rural Employment Guarantee (NREGS) Act was launched on _____.
- a) 30th January, 2006 b) **2nd February, 2006** c) 1st February, 2006 d) 2nd February, 2005

Section – B

Answer in about 50 words:

Unit – I

1. Constituent Assembly.
2. Drafting Committee.
3. Preamble.
4. Fundamental Rights.
5. Fundamental Duties.
6. First Five Year Plan, 1951-1956.
7. Balwantrai Mehta Study Team.
8. Panch Sheel.
9. JVP Committee.

Unit – II

10. King Maker.
11. Akali Demand.
12. Operation Gifralter.

13. Official Languages Act of 1963.
14. Kitchen Cabinet.
15. Nationalisation of Bank on 1969.
16. Abolition of Privy Purses of 1970.
17. Birth of Awami League.
18. Monopolies and Restrictive Trade Practices Act of 1969.
19. Kesavananda Bharati Judgement of 1973.
20. Green Revolution.

Unit - III

21. Railway Strike on 1974.
22. Pokharan Nuclear Test of 1974.
23. MISA of 1974.
24. Indo-soviet treaty of 1971.
25. General Gurdial Singh.
26. Kachativu Issue.
27. Janata Manifesto.
28. Shah Commission Inquiry, 1977.
29. Ashok Mehta Committee, 1977.
30. Time Capsule.
31. Alexander Committee.
32. Kissa Kursi Ka Case, 1979.
33. Blue Star Operation.

Unit -IV

34. Anti- Sikh Riots in 1984.
35. Bhopal Gas Tragedy (1984).
36. Assam Accord on 1985.
37. Rajiv-Laldenga Accord on 1986.
38. Operation Blackboard.
39. Navodaya Vidyalayas.
40. Open University and Distance Education.
41. Bofors Scandal.
42. Fair Fax Controversy.
43. South Africa Fund.
44. SAARC Summit of December 1989.
45. Cauvery Water Dispute of July 1991.
46. Macro Economic Management.
47. Tenth NAM Summit on 1992.
48. SAPTA.

Unit -V

49. Common Minimum Programme.
50. Think Tank.
51. Sri Krishna Commission.
52. Chidambaram Reforms.
53. Gujral Projects.
54. Gujral Doctrine.
55. Pokhran Test II (Operation Shakti).
56. Murder of G.S. Stains on 1999.
57. Lahore Declaration.
58. Red Fort Attack on 2000.
59. Census India.
60. National Commission for Women.
61. The Tehelka Scam.
62. Terrorist Attack on Parliament, 2001.
63. Akshardham Attack.

64. Antyodaya Anna Yojana.
65. Vikas Purush.
66. Nanavati Commission Report.
67. Tsunami Tragedy.
68. Right to Information Act.
69. Operation Duryodhana.
70. Operation Chakravayuth.

Section - C

Answer in about 200 words each choosing either (a) or (b):

Unit - I

1. Explain the unique features of the Constitution.
2. Give an account of India is a Sovereign, Democratic, Socialist, Secular and Republic.
3. Write briefly about Preamble.
4. Give a short note on Quasi Federal.
5. Describe the role of Dr.B.R. Ambedkar as the chairman of the Drafting Committee.
6. Assess the principles of the Linguistic Basis.
7. Examine the report of Dar Commission on 1948.
8. State the demand for separate Telangana in Andhra region.
9. Explain the objectives of the Planning Commission.
10. Describe the importance of the First Five Year Plan.

Unit - II

11. Trace the circumstances led to the assumption of power by Sastri as a Prime Minister.
12. Explain the Language Policy of Sastri.
13. Explain the significance of Simla Agreement on 1972.
14. Examine the historic case of Kesavananda Bharati Judgement and its basic features o 1973.
15. Explain the Gujarat and Bihar agitation of 1974.
16. Mention the significance of Pokaran Test on May 1974.
17. Give a short account on the Railway Strike on April-May 1974.
18. Elaborate MISA, 1974.
19. Explain the 20 point programme of Indira Gandhi.
20. What are the importances of Swaran Singh Committee?
21. Explain the significance of Jaya Prakash Narayan's Total Revolution.

Unit - III

22. Narrate the significance of the election of 1977.
23. Describe the salient features of the Ashok Mehta Committee on December 1977 and Time Capsule.
24. What are the causes for the fall of Janata government?
25. Assess the Indo-Soviet relationship during Indira Gandhi's Era.
26. Estimate Operation Blue Star and its impact.
27. Explain the achievements and failures of Indira Gandhi Government.

Unit - IV

28. Explain the Accord of Rajiv Gandhi and Longowal on July 1985.
29. Narrate the historical importance of Shah Bano Case on 1985-1986.
30. Explain the relations of Rajiv Gandhi Government with foreign countries.
31. Describe the values of Rajiv – Gorbachev 10 Point Declaration.
32. Enumerate the role of Rajiv Gandhi in Indo- Sri Lankan relations.
33. Assess Rajiv Gandhi Nuclear Policy and the causes for the fall of Rajiv Gandhi's Government.
34. Explain the issues of V.P. Singh Government.
35. Describe the causes for the Anti-Mandal agitation?
36. What are the amazing achievements and scandals and scams responsible for the fall of P.V.Narasimha Rao's Government?
37. Explain Rao's Nuclear Policy.

Unit - V

38. Give a short account on Women's Reservation during Deve Gowda period.
39. Explain the reasons for the fall of the Deve Gowda Government.
40. Point out the value of Gujral Doctrine in the foreign policy of United Front Government.
41. Explain India's relation with neighbouring countries during Gujral period.
42. Describe the fall of BJP-led Government on 1999.
43. Examine the Godhra train tragedy followed by Gujarat communal program on 2002.
44. Briefly explain about the POTA.
45. Assess the features of Sarva Shiksha Abhiyan.
46. Briefly explain about the Interlinking of Rivers and Telecom Revolution on 2002.
47. Assess the social sector schemes during the period of Vajpayee.
48. Sketch an account of the Report of Sachar and Veerapa Moily Report.
49. Estimate the Nuclear Doctrine of Vajpayee.
50. Describe India's relation with foreign countries during Manmohan Singh period.

Section - D

Answer in about 400 words each choosing either (a) or (b):

Unit - I

1. What were the Salient features of the Indian Constitution?
2. Explain the importance of the Fundamental Rights and Duties.
3. Describe the significance of the Directive Principles of State Policy.
4. Assess the formation of the Andhra State on 1953.
5. State the reorganization of States on Linguistic basis.
6. Examine the features and the importance of the Second Five Year Plan and the Third Five Year Plan.
7. Estimate Panch Sheel.

Unit - II

8. Trace the causes for the Anti-Hindi Agitation of 1965.
9. Analyse the causes and courses for the Indo-Pak War of 1965.
10. Illustrate the provisions and significance of the Tashkent declaration of 1966.
11. Estimate the role of Sastri as Prime Minister of India and his foreign policy.
12. Explain the events and circumstances that led to the Indo-Pakistan war of 1971 and its impact.
13. What are the seeds of Green Revolution? Explain its results.
14. Narrate the circumstances that led to the declaration of Emergency.
15. Enumerate the role of India in the Non-Proliferation treaty during the period of Indira Gandhi.
16. What are the significances of the election of 1983 and its aftermath.
17. Explain the importance of the foreign policy of Indira Gandhi during the years between 1966 - 1977.

Unit - III

18. Assess the economic policy, plan and programmes of the Janata Government.
19. Explain the importance of Janata government's foreign policy.
20. Analyse the assessment of the Janata Government.
21. Examine the Assam agitation and the atrocities.
22. Explain the troubles in Kashmir during the period of Indira Gandhi Government.
23. Narrate the role of Indira Gandhi during Punjab Crisis.
24. Assess the foreign policy of Indira Gandhi from the period 1980-1984.
25. Explain the Assassination of Indira Gandhi.

Unit - IV

26. Write briefly about the Rajiv Gandhi's Perestroika (New Economic Policy).
27. Describe the Rajiv Gandhi's New Education Policy.
28. Assess the Corruption, Scandals and Controversies of Rajiv Gandhi Government.
29. Explain the foreign policy of Rajiv Gandhi from 1984-1989.
30. Examine the relations of Rajiv Gandhi Government with neighbouring countries.
31. Explain the importance of the Mandal Commission.
32. Narrate the issue of Ayodhya during V.P.Singh Era.

33. Enumerate the role of P.V. Narasimha Rao's Government New Economic Policy and its measures.
34. Bring out the causes for the demolition of Babri Masjid in 6th December, 1992.
35. Analyse the responsibility of Narasimha Rao's Government for the making of 73rd Constitutional Amendment Act. Explain its salient features and significance.
36. Explain India's relation with foreign and neighbouring countries during Narasimha Rao Government.

Unit – V

37. Bring out the important functions and features of Gowda's Government in 1996.
38. Explain the functioning of Gujral Government.
39. Write an essay on Pokhran II Nuclear Tests (Operation Shakti).
40. Explain about the events of the Kargil War on 1999.
41. Assess the Time of Troubles during the National Democratic Alliance Government from 1999-2004.
42. Describe the rural employment programmes of the National Democratic Alliance Government.
43. Narrate the foreign policy of Vajpayee Government.
44. Assess the foreign policy of Manmohan Singh with the neighbouring countries.

St. Mary's College (Autonomous) – Thoothukudi

Question Bank

II M.A. History

Core 3

Dravidian Movement upto 1969 C.E

Sub.Code:21PHIC43

Semester IV – April 2023

(for those who joined in July 2021 and after)

Answer All Questions

Section A

Choose the correct answer:

Unit -I

1. Who wrote the book “A comparative Grammar of the Dravidian of Languages?
(a) **Robert Caldwell** (b) Maraimalai Adigal (c) Natesa Mudaliyar (d) G.U.Pope
2. Who was the author of the book Dravida Dhai?
(a) Maraimalai Adigal (b) **Pavanar** (c) Ranghaiah Naidu (d) Robert de Nobili
3. Who was the author of the book Muthalthaimozhi?
(a) Maraimalai Adigal (b) **Pavanar** (c) T.M.Nair (d) Robert de Nobili
4. Who was the author of the book Ariuraikotthu?
(a) Robert Caldwell (b) Pavanar (c) G.U.Pope (d) **Maraimalai Adigal**
5. Who was called the father of Pure Tamil movement?
(a) **Maraimalai Adigal** (b) Robert Caldwell (c) Sundaram Pillai (d) T.M.Nair
6. Who was the author of the book Suruvarukkana Senthamil?
(a) Sundaram pillai (b) Pavanar (c) G.U.Pope (d) **Maraimalai Adigal**
7. Who was the first person translated the Bible from English to Tamil?
(a) Robert Caldwell (b) Maraimalai Adigal (c) Pavanar (d) **G.U.Pope**
8. Who translated Thiruvacakam from Tamil to English?
(a) **G.U.Pope** (b) Robert Caldwell (c) Sundaram Pillai (d) T.M.Nair
9. Manimekalai was translated by _____.
(a) Robert Caldwell (b) Pavanar (c) **G.U.Pope** (d) Robert de Nobili

Unit -II

1. In which year Madras Native Association was formed?
(a) 1851 (b) **1852** (c) 1853 (d) 1854
2. Who was the founder of the Madras Mahajana Sabha?
(a) C.N. Annadurai (b) Sundaram pillai (c) Ranghaiah Naidu (d) **Sri Sankaran Nair**
3. Who were the founders of Madras non – Brahmin Association?
(a) **P.Subramaniam & M.Purushothama** (b) V.Vannamuthu & T.M.Nair (c) Sundaram Pillai & Ranghaiah Naidu (d) V.V.S.Iyer & C.N. Annadurai
4. In which year Madras non – Brahmin Association was started?
(a) 1908 (b) **1909** (c) 1910 (d) 1911
5. When did the Madras League found?
(a) 1907 (b) 1908 (c) 1911 (d) **1912**
6. In which year Madras Dravida Sangam was started?
(a) 1911 (b) 1912 (c) **1913** (d) 1914
7. Dravidian Home was founded in -----
(a) 1913 (b) **1914** (c) 1915 (d) 1917

8. Who wrote the book “Dravidian Worthies”?
 (a) C.N. Annadurai (b) M. Purushothama (c) Ranghaiah Naidu (d) **Sri Sankaran Nair**
9. In which year was non – Brahmin announced Non Brahmin Manifesto?
 (a) **1916** (b) 1917 (c) 1918 (d) 1919
10. Who was the first editor of Andra prakasika?
 (a) Sundaram pillai (b) **A.C. Partha Sarathi** (c) N. Baktavatsalam (d) Samy Ruthra
11. In which year the English weekly Justice was published?
 (a) 1912 (b) 1913 (c) 1916 (d) **1917**

Unit -III

1. The Communal GO was passed in the year -----
 (a) 1925 (b) 1926 (c) 1927 (d) **1928**
2. The Communal GO was passed by ----- party
 (a) Congress (b) **Justice** (c) DK (d) DMK
3. The Meston Award was issued on -----
 (a) March 1925 (b) March 1926 (c) March 1927 (d) **March 1920**
4. The first ministry of Justice Party assumed power on -----
 (a) **Dec. 17 1920** (b) Dec. 17 1926 (c) Dec. 17 1927 (d) Dec. 17 1921
5. The second ministry of Justice Party assumed power on -----
 (a) **Nov. 19, 1923** (b) Nov. 19 1926 (c) Nov. 19 1927 (d) Nov. 19 1921
6. T.M. Nair died in the year -----
 (a) 1920 (b) **1919** (c) 1918 (d) 1916
7. Thiyagaraya Chetty died in the year -----
 (a) **1925** (b) 1926 (c) 1927 (d) 1928
8. ----- was called as ‘Velludaiventhan’
 (a) **Thiyagaraya Chetty** (b) T.M. Nair (c) N.S. Krishnan (d) Periyar
9. In 1927 the Justice Conference was held at -----
 (a) Thiruvarur (b) **Madurai** (c) Chengalpet (d) Virudhunagar

Unit -IV

1. Periyar joined in the congress party in the year -----
 (a) 1917 (b) 1918 (c) 1919 (d) **1920**
2. Periyar was elected as the secretary of the Madras State Congress Committee in the year -----
 (a) 1918 (b) 1919 (c) 1920 (d) **1921**
3. ----- was the first successful agitation of Periyar.
 (a) Cheranmagadevi issue (b) **Vaikkam Satyagraha** (c) Dandi march
 (d) Non Cooperation Movement
4. ----- was called ‘Vaikkam Hero’
 (a) N.S. Krishnan (b) T.M. Nair (c) C.N. Annadurai (d) **Periyar**
5. The news paper ----- praised Periyar for his heroic deeds in Vaikkam.
 (a) **Navasakthi** (b) Kudiarasu (c) Justice (d) Dravidan
6. The Cheranmahadevi Gurukulam was conducted by -----
 (a) C.N. Annadurai (b) **V.V.S. Iyer** (c) Sundaram pillai (d) Periyar
7. ----- started the weekly called Kudiarasu
 (a) N.S. Krishnan (b) T.M. Nair (c) S.S. Rajendran (d) Periyar
8. The Self Respect movement was founded by -----
 (a) **Periyar** (b) Soundarapandian (c) T.A. Ramalingam chettiar (d) R. Ramanathan

9. The Rationalist forum was founded in the year -----
(a) 1932 (b) **1933** (c) 1934 (d) 1935
10. The founder of the Rationalist Forum was -----
(a) C.N. Annadurai (b) T.M. Nair (c) T.A. Ramalingam chettiar (d) **Periyar**
11. The journal 'Pahutharivu' was started in the year -----
(a) 1932 (b) **1933** (c) 1934 (d) 1935
- 12..The first Anti- Hindi agitation was conducted between -----
(a) **1938 -1940** (b) 1939 -1940 (c) 1940-1941 (d) 1941-1942
13. The Anti-Hindi volunteers conference held in Chennai under -----
(a) **Maraimalai Adigal** (b) Periyar (c) Annadurai (d) W.P.A. Soundarajan
14. The title 'Periyar' was given to EVR by women in the year -----
(a) 1935 (b) 1936 (c) 1937 (d) **1938**
15. The second Anti-Hindi agitation was conducted between -----
(a) 1938 -1940 (b) 1939 -1940 (c) 1940-1941 (d) **1948-1949**
16. The third Anti-Hindi agitation was held in the year -----
(a) 1940 (b) 1940 (c) **1952** (d) 1949
17. ----- was called as the 'Rousseau of Tamilnadu'
(a) C.N. Annadurai (b) **Periyar** (c) M. Karunanithi (d) W.P.A. Soundarajan
18. EVR was elected as the president of Justice Party in -----
(a) **1938** (b) 1939 (c) 1940 (d) 1942
19. Periyar took direct interest in Justice Party on -----
(a) **22 May 1939** (b) 23 May 1939 (c) 24 May 1939 (d) 25 May 1939
20. The slogan 'Dravidanadu for Dravidians' was raised in the Justice Conference held at -----
(a) **Thiruvarur** (b) Madurai (c) Chengalpet (d) Virudhunagar
21. The Justice Party was renamed as Dravida Kazhagam in the year-----
(a) 1940 (b) 1942 (c) 1943 (d) **1944**

Unit -V

1. The Dravida Munnetra Kazhagam was founded in -----.
(a) 1940 (b) 1942 (c) 1943 (d) **1949**
2. The founder of Dravida Munnetra Kazhagam was -----
(a) **C.N. Annadurai** (b) M. Karunanithi (c) M.G. Ramachandran (d) Nedunjelian
3. On _____ C.N. Annadurai became the chief minister of Tamilnadu.
(a) 6th March 1940 (b) 6th March 1945 (c) 6th March 1949 (d) **6th March 1967**
4. The Second World Tamil Conference was conducted in Chennai in 1968 by -----
(a) **C.N. Annadurai** (b) M. Karunanithi (c) M.G. Ramachandran (d) Nedunjelian
5. C.N. Annadurai conducted the Second World Tamil Conference in 1968 at -----
(a) **Chennai** (b) Madurai (c) Chidambaram (d) Thanjavur
6. C.N. Annadurai conducted the Second World Tamil Conference in Chennai in
(a) **1968** (b) 1967 (c) 1969 (d) 1965
7. Rajamanar Committee was set up on
(a) 2nd September, 1968 (b) 2nd September, 1967 (c) 2nd September, 1965
(d) **2nd September, 1969**
8. Rajamanar Committee was set up by the ----- Government of Tamil Nadu
(a) **DMK** (b) DK (c) AIDMK (d) MDMK

Section B

Answer in about 50 words each:

Unit-I

1. Write a note on Robert Caldwell.
2. Give an account on G.U.Pope.
3. Write a note on Robert de Nobili.
4. Give a brief account on Maraimalai Adigal.
5. Write a note on Pavanar.
6. Give an account on Prof.Sundaram Pillai.

Unit -II

1. Write a note on Madras Mahajan Sabha.
2. Trace out the role of Madras Dravidian Association.
3. Explain Dravidian Home.
4. Give an account on South Indian Liberal Federation.
5. Explain the aims of Madras Non-Brahmin Association.
6. Write a note on T.M.Nair.
7. Give an account on P.T.Thiyagaraya Chetty.
8. List out the Journals of the Justicites.

Unit- III

1. Write a note on Meston Award.
2. Explain the term Dyarchy.
3. Give an account on First ministry of the Justice Party.
4. Write a note on Second Ministry of Justice Party.
5. Give an account on Natesa Mudaliar.
6. Explain the role of Justice party in the context of the arrival of Simon Commission.
7. Enumerate the significance of Communal G.O.

Unit -IV

1. Write a note on 'Vaikam Satyagraha'.
2. Narrate the significance of 'Kudi Arasu'.
3. Write a note on the Cheranmahadevi Gurukulam controversy.
4. Trace out the significance of Salem Conference.
5. Narrate the aims of Self-Respect Movement.
6. Explain the role of Periyar in Congress.
7. Discuss briefly on 'Dravida Nadu for Dravidians'.
8. Write short note on Kanchipuram Conference, 1925.
9. Give a short note on superstition eradication conference.
10. Discuss briefly about Periyar and Self-Respect Marriage.
11. Explain the triple aspects of Dravida Kazaham.
12. Trace out the origin of Dravida Kazahgam.
13. Describe the objectives of Dravida Kazaham.

Unit - V

1. Explain the causes for the split in DK.
2. Describe the genesis of DMK.
3. Sketch a note on the impact of the general election of 1967.
4. Explain the role of C.NAnnadurai in Anti-Hindi agitation.

5. Write a note on Padiarisi scheme.
6. Trace out the significance Second World Tamil Conference.
7. Discuss briefly about C.N.Annadurai and two language formula.
8. Sketch a note on Rajamannar Committee.

SectionC

Answer in about 200 words each:

Unit - I

1. Examine the services of Dr. G.U.Pope to Tamil.
2. Analyse the pivotal role played by Robert Caldwell in Non-Brahmin Movement.
3. Examine the works on Devaneya Pavanar.
4. Examine the literary contribution of Prof. Sundaram Pillai.
5. Analyse the services of Irattaimalai Srinivasan.
6. Assess the role of Devanaya Pavanar to Pure Tamil movement.
7. Analyse the role of Maraimalai Adigal to Pure Tamil movement.
8. Examine the works of Rev.G.U.Pope

Unit - II

1. Assess the importance Dravidian Home.
2. Analyse the significance of Madras Dravidian Association.
3. Examine the importance of the principles of Justice party.
4. Examine the role of Non-Brahmin Manifesto in Dravidian movement.
5. Assess the role of Thiyagaraja Chetty to Justice Party.
6. Analyse the role of T.M. Nair to Justice Party.
7. Critically examine the conflict between Justice Party and Home Rule league.

Unit - III

1. Examine the role of First Ministry of the Justice Party.
2. Analyse the work of the second ministry of the Justice party.
3. Assess the role of Justice Party in the evolution of Dravidian movement.
4. Analyse the causes for the failure of Justice Party.
5. Examine the importance of Communal GOs.
6. Analyse the Electoral defeats of Justice Party.
7. Examine the causes for the decline of Justice Party.

Unit - IV

1. Analyse the significance of Vaikkam Satyagraha.
2. Examine the significance of Cherenmahadevi Gurukulam.
3. Analyse the importance of Kanchipuram Conference.
4. Examine the importance of Self-Respect Marriage.
5. Examine the role of Nagammai in the political arena.
6. Assess the role of Periyar in Prohibition.
7. Examine the First Anti-Hindi Agitation.
8. Analyse the role of Fourth Anti-Hindi Agitation in Dravidian movement.
9. Examine the origin of Dravida Kazhagam.
10. Asses the contributions of Dravida Kazhagam.

Unit - V

1. Analyse the genesis of Dravida Munnetra Kazhagam.
2. Examine the ideologies of Dravida Munnetra Kazhagam.

3. Assess the role of C.N. Annadurai in anti-Hindi agitation.
4. Describe the Rajamannar committee.
5. Examine the recommendations of Rajamannar committee.

Section D

Answer in about 400 words each:

Unit - I

1. Estimate the causes for the genesis of the Dravidian Movement.
2. Assess the contributions of the European Scholars to the development of Tamil Literature.
3. Evaluate the legacy of Robert de Nobili.
4. Assess the services of Pavanar and Maraimalai Adigal to Pure Tamil Movement.
5. Estimate the role of Robert de Nobili for the development of Tamil.
6. Discuss the contribution of Robert Caldwell for the growth of Tamil.
7. Evaluate the life and contribution of G.U. Pope for the development of Tamil Literature.

Unit II

1. Evaluate the early attempts made to form a Non-Brahmin Association, in the Madras Presidency.
2. Estimate the causes for the formation of the Justice party.
3. Evaluate the evolution of the Non-Brahmin Movement.
4. Assess the formation of South Indian Liberal Federation in the growth of Justice Party.
5. Assess the contribution of Thiyagaraya Chetty to the growth of Justice Party.

Unit - III

1. Estimate the works of Justice Party Ministries.
2. Evaluate the significance of Communal GOs.
3. Assess the role of electoral defeats of Justice Party.
4. Evaluate the achievements of the Justice Party.
5. Estimate the causes for the failure of the justice Party.

Unit - IV

1. Assess the role of Periyar in the Vaikam satyagraha.
2. Estimate the goal and achievements of the Self-Respect movement.
3. Evaluate the reforms of Self-Respect movement to the awakening of Tamil Society.
4. Estimate the impact of Self-Respect Movement.
5. Assess the role played by Periyar in organising a battle for social justice.
6. Estimate the achievements of Periyar as a social reformer.
7. Assess the role of Anti-Hindi agitations in Dravidian movement.
8. Estimate the role of Periyar in Anti-Hindi agitation.
9. Estimate the role of Periyar in the Congress party.
10. Estimate the circumstances leading to the emergence of Dravida Kazhagam.
11. Evaluate the contribution of the Dravida Kazhagam.

Unit - V

1. Evaluate the circumstances leading to the emergence of D.M.K. party in Tamilnadu.
2. Assess the differences between C.N. Annadurai and EVR.
3. Estimate the political career of C.N. Annadurai.
4. Evaluate the role played by C.N. Annadurai for the growth of Tamil.
5. Estimate the social welfare measures of C.N. Annadurai.

St. Mary's College (Autonomous) Thoothukudi
Question Bank
II M.A History

Core 4 **History of U.S.A. from 1865 to 2020 C.E** **Sub. Code: 21PHIC44**
Semester IV - April 2023
(for those who joined in July 2021 and after)

Time: 3 hours

Max: 100 marks

Section A

Choose the Correct Answer:

Unit I

1. The Emancipation proclamation was introduced by _____.
(a) **Lincoln** (b) Benjamin F. Wade (c) Johnson (d) William Taft
2. 10 % plan was issued by _____.
(a) **Lincoln** (b) Theodore Roosevelt (c) Johnson (d) Oliver Hudson
3. 10% plan was introduced in the year _____.
(a) 1863 (b) **1864** (c) 1964 (d) 1965
4. Thirteenth Amendments was passed by the congress in the year _____.
(a) 1864 (b) **1865** (c) 1964 (d) 1965
5. The Freedmen's Bureau was introduced by _____.
(a) **Lincoln** (b) Theodore Roosevelt (c) Johnson (d) Andrew Carnegie
6. The fifteenth Amendment was introduced in the year _____.
(a) **1870** (b) 1872 (c) 1875 (d) 1876
7. The fourteenth Amendment was introduced in the year _____.
(a) 1867 (b) **1868** (c) 1869 (d) 1870
8. The Congress passed the Force Act in the year _____.
(a) 1869 (b) **1870** (c) 1872 (d) 1876

Unit II

9. Electricity was invented by _____.
(a) Lincoln (b) **Benjamin Franklin** (c) Grahambel (d) Andrew Carnegie
10. Telephone was invented by _____.
(a) **Grahambel** (b) Theodore Roosevelt (c) Johnson (d) Thomas Alva Edison
11. Cable system was invented by _____.
(a) **Cyrel field** (b) Theodore Roosevelt (c) Johnson (d) Andrew Carnegie
12. Crasoline motor was discovered by _____.
(a) Cyrel field (b) Grahambel (c) Thomas Alva Edison (d) **Hendry ford**
13. Who was called as the "Petroleum king"?
(a) Lincoln (b) Theodore Roosevelt (c) **John D Rockfeller** (d) Andrew Carnegie
14. Who formed the Standard Oil Company in Ohio?
(a) **John D Rockfeller** (b) Andrew Carnegie (c) Morgan (d) Grahambel
15. Who was called as the "Emperor of Iron and Steel"?
(a) **Andrew Carnegie** (b) Theodore Roosevelt (c) Johnson (d) John D Rockfeller
16. The first sleeping car was built by _____.
(a) Andrew Carnegie (b) John D Rockfeller (c) **George M Pullman** (d) Oliver Hudson
17. Granger movement was introduced by _____.
(a) Lincoln (b) Theodore Roosevelt (c) Johnson (d) **Oliver Hudson Kelley**

18. Who adopted the policy of Square Deal?
 (a) Lincoln (b) **Theodore Roosevelt** (c) Johnson (d) George M Pullman
19. The foreign policy of Theodore Roosevelt was called as _____.
 (a) New Deal (b) Square Deal (c) **Big Stick policy** (d) Dollar Diplomacy
20. When did Plot Amendment introduced?
 (a) 1900 (b) **1901** (c) 1902 (d) 1903

Unit III

21. _____ became the President of U.S.A in 1913.
 (a) **Woodrow Wilson** (b) Theodore Roosevelt (c) Franklin D. Roosevelt (d) William Taft
22. U.S.A entered in the First World War in
 (a) 1915 (b) 1916 (c) 1918 (d) **1917**
23. Russia withdraw from the first World War by signing the treaty of .
 (a) Paris (b) **Brest Litovsk** (c) Prague (d) London
24. The Federal Reserve Act was passed in .
 (a) **1913** (b) 1914 (c) 1916 (d) 1915
25. Wilson followed a policy of .
 (a) Dollar (b) Big Stick (c) **New freedom** (d) New deal
26. League of Nations was established in .
 (a) 1926 (b) **1920** (c) 1918 (d) 1919
27. Great Economic depression occurred during the presidency of _____.
 (a) **Herbert Hoover** (b) Wilson (c) Taft (d) T.Roosevelt
28. Kellogg-Briand pact was signed in .
 (a) 1930 (b) **1928** (c) 1926 (d) 1924

Unit IV

29. became the president of U.S.A in 1933.
 (a) Theodore Roosevelt (b) **Franklin D. Roosevelt** (c) Taft (d) Wilson
30. Tennessee valley Authority was empowered to build and operate power projects in .
 (a) 1922 (b) **1933** (c) 1944 (d) 1954
31. Franklin D. Roosevelt followed towards Latin American States.
 (a) Dollar (b) **Good Neighbour** (c) Big stick (d) New freedom
32. Russian Revolution took place under the leadership of .
 (a) Stalin (b) Gorbachev (c) **Lenin** (d) Khrushchev
33. Prime minister and President Roosevelt met in a Conference at Argentina in 1941 to sign Atlantic Charter.
 (a) **Winston Churchill** (b) Walpole (c) Wilson (d) William Taft
34. was the liberator of Latin America
 (a) James Blaine (b) **Simon Bolivar** (c) Fredrick (d) Harrison
35. The second Pan American Conference was held at _____.
 (a) **Mexico** (b) Rio de Janeiro (c) Brazil (d) Argentina
36. The headquarters of Pan American Union was at .
 (a) **Washington** (b) New York (c) New Jersey (d) California
37. Mention the amendment of the U S Constitution which restricted the term of president for 2 times?
 (a) 24 (b) **22** (c) 23 (d) 25
38. When did the twenty second Amendment introduce?
 (a) 1954 (b) 1953 (c) 1952 (d) **1951**

39. The internal policy followed by Truman is known as _____.
 (a) **Fair Deal** (b) New Deal (c) New Frontier (d) Forward Policy
40. Taft Hartly Act was passed in _____.
 (a) 1948 (b) **1947** (c) 1945 (d) 1946
41. When did Truman announce his 21 points scheme?
 (a) **1945** (b) 1946 (c) 1947 (d) 1948
42. When was the first hydrogen bomb tested in America?
 (a) 1967 (b) 1954 (c) **1952** (d) 1950
43. In America the first hydrogen bomb was tested at place called _____.
 (a) **Enievetok** (b) Philadelphia (c) New York (d) Canada
44. The Marshall Plan is otherwise known as _____.
 (a) SEATO (b) **European Recovery Programme** (c) CENTO (d) NATO
45. North Atlantic Treaty Organisation was formed in the year _____.
 (a) **1950** (b) 1951 (c) 1952 (d) 1953
46. The McCarren Internal Security Act was passed in _____.
 (a) 1951 (b) 1952 (c) 1953 (d) **1950**
47. Name the Negro, who was included in the ministry for the first time in America?
 (a) **Earnest Wilkins** (b) Stokley Carmichael (c) Rap Brown (d) Gunnur Myndal
48. During whose presidentship the NASA was started in America?
 (a) **Eisenhower** (b) Kennedy (c) Reagan (d) Ford
49. The NASA was started in America in the year _____.
 (a) 1954 (b) 1955 (c) 1956 (d) **1957**

Unit V

50. When was the Eisenhower Doctrine announced?
 (a) 1956 (b) **1957** (c) 1955 (d) 1954
51. The Eisenhower doctrine was announced to establish the American popularity in _____.
 (a) **Middle East** (b) Europe (c) Asia (d) Africa
52. Name the president, who attended the Geneva Conference of 1955?
 (a) **Eisenhower** (b) Kennedy (c) Reagan (d) Ford
53. The U-2 Aircraft incident of 1959 took place during the time of _____.
 (a) F.D. Roosevelt (b) Truman (c) **Eisenhower** (d) Kennedy
54. Landrum Griffin Act was passed in _____.
 (a) 1956 (b) 1957 (c) 1958 (d) **1959**
55. Alaska and Hawai were admitted as states into the American union during the time of _____.
 (a) F.D. Roosevelt (b) Truman (c) **Eisenhower** (d) Kennedy
56. When and where did the SEATO sign?
 (a) **Manila, 1954** (b) Atlanta, 1955 (c) Madrid, 1954 (d) Sydney, 1955
57. Name the internal policy of President Kennedy _____.
 (a) **New Frontier** (b) Forward Policy (c) New Deal (d) Fair Deal
58. The Foreign policy of President Kennedy was called _____.
 (a) **Forward Policy** (b) New Frontier (c) New Deal (d) Fair Deal
59. President Kennedy was assassinated by _____.
 (a) Stokley Carmichael (b) **Lee Marry Oswald** (c) Rap Brown (d) Gunnur Myndal
60. The National Association for the Advancement of Coloured People was formed in the year _____.

- (a)1905 (b)1907(c) 1908 (d) **1909**
61. The CORE was organized in the year _____.
- (a)1945 (b)1947(c)**1943**(d) 1944
62. The 26th Amendment of the American Constitution was passed in _____.
- (a)**1971** (b)1972 (c)1973 (d) 1974
63. When was the Satellite Appollo II launched from Cape Kennedy Station?
- (a)2ndJune1969(b)**2nd July1969** (c)2nd may 1969(d)2nd Sep 1969
64. Neil Armstrong and Alderin walked on the surface of the moon during thepresidentshipof _____.
- (a)**Nixon**(b) Jimmy Carter (c) Ford (d) Reagan
65. In which year _____ a Ping-Pong team from America went to China.
- (a)1974 (b)1973 (c)1972 (d)**1971**
66. _____ was the first President who visited China and Russia.
- (a)Johnson (b)**Nixon**(c) Jimmy Carter (d) Ford
67. When did the President Nixon resign his post due to Watergate Scandal?
- (a)**1974** (b)1973 (c)1972(d) 1971
68. Name the president who became the president of U.S without contesting the election.
- _____.
- (a)**Ford**(b) Nixon (c) Jimmy Carter (d)Johnson
69. The space craft Viking I was sent to space during the presidentship of _____.
- (a)Johnson(b) **Ford**(c) Jimmy Carter (d)Nixon
70. The Vietnam war was ended during the presidentship of _____.
- (a)Jimmy Carter (b) Nixon (c) **Ford** (d)Johnson

Section B

Answer in about 50 words

Unit - I

1. Emancipation act
2. Freedmen's bureau
3. 10% plan
4. John Wilkes Booth
5. Thirteenth Amendment
6. Fourteenth Amendment
7. Fifteenth Amendment
8. Carpet baggers
9. Scalwags
10. Thaddeus Stevens
11. Jim Crow laws
12. Impeachment of Johnson

Unit - II

13. Trust
14. Cornelius Vanderbilt
15. Morgan
16. Interstate commerce Act
17. Knight of Labour
18. Homestead strike
19. Pullman Strike

20. Platt Amendment
21. Square Deal
22. Elkins Act
23. Teller Amendment
24. Open Door Policy
25. Big Stick Policy

Unit - III

26. Lusitania
27. Hoover Huts.
28. New Freedom
29. New Diplomacy
30. Underwood Tariff Act
31. Stock Market Crash

Unit - IV

32. The New Deal
33. The National Recovery Act
34. The Agricultural Adjustment Act
35. The Tennessee Valley Authority
36. Rome – Berlin - Tokyo Axis
37. Pearl Harbour
38. Atlantic Charter
39. Mac Arthur
40. Hiroshima and Nagasaki
41. The Dumbarton Oaks Conference
42. Truman Doctrine
43. Marshall Plan
44. NATO
45. SEATO
46. Berlin Air-lift

Unit - V

47. Eisenhower Doctrine
48. Fidel Castro
49. Viet-cong
50. Martin Luther King
51. Civil Rights Movement
52. Wall street panic
53. Water gate scandal
54. Twin Tower Attack
55. Obama and Osama
56. Donald Trump and his immigration policy.

Section C

Answer in about 200 words choosing either (a) or (b).

Unit - I

1. Examine the significance of the reconstruction.
2. What were the problems of reconstruction?
3. Write short notes on causes for the Spanish American war.

4. What were the chief Characteristics of the Grant Administration?
5. Explain the reconstruction of Abraham Lincoln.
6. Discuss the reconstruction of Johnson
7. Examine the factors which led to the impeachment of Johnson,
8. Give an account of black reconstruction.
9. Examine the chief contributions of Rutherford B Hayes

Unit - II

10. Discuss the impact of the expansion of rail roads on American History
11. Write the significance of the Jim Crow Laws
12. Sketch a note on Black codes
13. Write short notes on John D Rockefeller
14. Give an account of Andrew Carnegie
15. Write short note on Inter-state commerce Act
16. Explain the importance of Sherman Anti-Trust Act
17. Write note on the Granger movement
18. Describe briefly about the Populist movement
19. Explain the factors which gave rise to imperialism in USA
20. Enumerate the course and results of the Spanish American war
21. Write note on Open Door Policy.
22. Comment briefly on the demands of the progressive and muckrakers
23. Describe the administrative measures of Theodore Roosevelt
24. Write a note on Big Stick diplomacy
25. Dollar Diplomacy of Taft.

Unit - III

26. Evaluate the legislative record of Woodrow Wilson
27. Critically evaluate Woodrow Wilson's role in the World War I
28. Write a short note on Lusitania
29. List out the causes of stock market crash
30. Enumerate the causes for the Great Depression
31. Discuss the results of Depression.

Unit - IV

32. Examine the circumstances leading to the United States participation in World War II
33. Describe the impacts of World War II on USA
34. Explain the relief measures adopted by F.D. Roosevelt
35. Explain the Recovery measures adopted by F.D. Roosevelt
36. State about the Good Neighbor Policy of F.D. Roosevelt
37. Explain the Yalta conference
38. Explain the Potsdam conference
39. State about the Pan American movement
40. Describe the domestic policy of Harry S Truman
41. Explain the foreign policy of Harry S. Truman
42. Write a brief note on John Foster Dulles
43. Write a brief note on Berlin Air-lift.
44. Describe the Korean War.
45. Give an account of the Vietnam War.

Unit – V

46. Describe the domestic policy of Eisenhower.
47. Explain the foreign policy of Eisenhower
48. Sketch a note on Martin Luther King
49. Bring out the importance of Civil Rights Movement
50. Describe the domestic policy of Kennedy
51. Explain the foreign policy of Ford
52. Describe the domestic policy of Jimmy Carter
53. Explain the foreign policy of Reagan
54. Describe the domestic policy of George Bush (Sr).
55. Explain the foreign policy of Clinton.
56. Describe the domestic policy of George Bush (Jr).
57. Give an account of Water Gate Scandal.
58. Sketch a note on Twin Tower attack.

Section D

Answer in about 400 words each choosing either (a) or (b).

Unit - I

1. Why was Lincoln been regarded as one of the greatest presidents in the history of the United States?
2. Evaluate the approach towards post-war reconstruction of the South by Abraham Lincoln.
3. Evaluate the presidential reconstruction.
4. Explain the congressional plan of reconstruction.

Unit - II

5. Give an account for the growth of Big business after the civil war.
6. Examine the problems which arose as a result of rail road expansion in the period of 1865-1900.
7. What efforts were made by the federal government to solve these problems?
8. Discuss the factors responsible for the growth of labour movement.
9. Give an account of the Granger movement.
10. Trace the rise and growth of populist movement and account for its decline.
11. Describe the factors responsible for the rise of imperialism in the USA
12. The Spanish-American war is usually considered the beginning of the emergence of the USA as a world power-commend.
13. Discuss the main features of the progressive movement in the USA.
14. Evaluate the foreign policy of Theodore Roosevelt.
15. Discuss the reforms of William Howard Taft.
16. Write the significance of the Dollar Diplomacy.

Unit - III

17. Discuss the programme of the New Freedom of President Wilson
18. Enumerate the factors which were responsible for the entry of the US into World War I
19. Examine the causes and results of Great Economic Depression in U.S.A.

Unit - IV

20. Relief, Recovery and Reforms were the three great aims of the New Deal of F.D. Roosevelt - Examine
21. Examine the foreign policy of United States during the administration of F.D. Roosevelt
22. Examine the circumstances leading to the United States participation in the World War II.

23. Discuss the various peace conferences of United States during and after the World War II
24. Examine the factors which led to the outbreak of cold war between USA and USSR in the year following World War II.
25. Assess the domestic policy of President Harry S.Truman.
26. Describe the foreign policy of President Harry S.Truman

Unit - V

27. Discuss the foreign policy of USA under President Eisenhower.
28. Asses the Domestic and foreign policy of President John F Kennedy.
29. Examine the foreign policy of President Nixon.
30. Bring out the importance of Civil Rights Movement in America.
31. Describe the role of MartinLuther King in Civil Rights movement in USA.
32. Explain the domestic and foreign policy of President Jimmy Carter.
33. Evaluate the role of President Gerald Ford in USA.
34. Elucidate the domestic and foreign policy of President Ronald Reagan.
35. Critically analyse the internal and external policy of President George Bush(Sr)
36. Examine the internal and foreign policy of President Bill Clinton.
37. Estimate the contribution of George Bush (Jr).
38. Analyse the domestic and foreign policy of President Obama.
39. Examine the foreign policy of Donald Trump.

St. Mary's College (Autonomous) Thoothukudi
M.A Economics
Question Bank
2021-2023

Semester- I

Course	Course. Code	Course Title
Core I	21PECC11	Advanced Microeconomic Analysis-I
Core II	21PECC12	Advanced Macroeconomic Analysis-I
Core III	21PECC13	Statistics for Economists- I
Core IV	21PECC14	Labour Economics
Core V	21PECC15	Economics of Farm Business

Semester - II

Course	Course. Code	Course Title
Core V	21PECC21	Advanced Microeconomic Analysis-II
Core VI	21PECC22	Advanced Macroeconomic Analysis-II
Core VII	21PECC23	Statistics for Economists-II
Core VIII	21PECC24	Demography
Core IX	21PECC25	International Business
Core Elective I	21PECE21	Fiscal Economics

Semester - III

Course	Course. Code	Course Title
Core XI	21PECC31	History of Economic Thought
Core XII	21PECC32	Indian Economy
Core XIII	21PECC33	Rural Development
Core XIV	21PECC34	Research Methodology
Core XV	21PECC35	Public Finance
Core Elective II	21PECE31	Human ResourceManagement

Semester- IV

Course	Course. Code	Course Title
Core -XVI	21PECC41	Monetary Economics
Core-XVII	21PECC42	Environmental Economics
Core-XVIII	21PECC43	Financial Institutions and Market
Core -XIX	21PECC44	Digital Economy

Semester-I			
Core I Advanced Microeconomic Analysis-I			
Sub.Code:21PECC11	Hrs/Week:6	Hrs/Semester:90	Credits:4

Unit I: Introduction and Basic Concepts 15Hrs

Basic Economic Problem - Choice and Scarcity - Micro and Macro Analysis -Inductive and Deductive methods of Analysis - Positive vs. Normative Economics - Static and Dynamic Analysis- Partial Vs. General Equilibrium Analysis

Unit II: Demand Analysis 20Hrs

Theories of Demand - Demand and Supply Equilibrium - Elasticity of Demand -Price, Cross and Income Elasticity of Demand-Measurement of Elasticity of Demand

Unit III: Hicksian Analysis and Recent Developments in Demand Analysis 15 Hrs

Indifference Curve(Income and Substitution effects-Hicks Vs Slutsky)-Revealed Preference Theory- Revision of Demand theory by Hicks-Cobweb Theorem

Unit IV: Theory of Production and Costs 20Hrs

Production Function - The Law of Variable Proportions - Returns to Scale -Isoquant-Least Cost Combination and Producer's Equilibrium-Cobb-Douglas and CES production functions-Traditional and Modern theories of Costs-Cost output relation.

Unit V:Price and Output Determination 20Hrs

Marginal analysis - Short - run and Long - run equilibrium of firm and industry -Monopoly - Price discrimination - Monopoly control and regulation - Monopolistic Competition -General Approach and Chamberlin Approach - Selling Costs - Product Differentiation - Oligopoly –Cartels–Kinked demand curve–Price Leadership Models

Text Book:

Ahuja,H.L.(2006):AdvancedEconomicTheory,NewDelhi:Sultan ChandandCo.BooksforReference

1. Koutsoyiannis.A.ModernMicroeconomics(2nded).London:MacmillanPress,1979.
2. Sen.A.MicroEconomicsTheoryandApplications.NewDelhi:OxfordUniversityPress,1999.
3. Stigler.G.TheoryofPrice(4thed).NewDelhi:PrenticeHalofIndia,1996.
4. Varian.H.MicroeconomicAnalysis,NewYork:W.W.Norton,2000.

Semester-I
Core –I Advanced Microeconomic Analysis 21 PECC11

Section – A

Unit – I

1. Which of the following is true regarding the law of scarcity?
 - a. **It states that the wants of a consumer will never be satisfied completely.**
 - b. It indicates that the wants of a consumer will be satisfied in a socialistic system.
 - c. It is only for underdeveloped countries. d. It is not for rich and developed countries.
2. Which of the following does a person need to make a rational decision?
 - a. Choices that don't have trade-offs b. Choices that never change
 - c. **Choices those are consistent with a similar goal every time**
 - d. Logical choices without errors
3. Which of the following is the central problem of an economy?
 - a. **Assigning limited resources in a way that unlimited desires and needs of the society are satisfied**
 - b. Ensuring a minimum income for each citizen c. Assuring that production happens in the most effective way d. Analysing the demand with market economies
4. When does an economy succeed in producing resources efficiently?
 - a. **When goods and services are produced without resources being wasted**
 - b. When the total number of goods manufactured is high
 - c. When the resources employed are the best d. When the resources are employed for highly valued uses
5. Which option is a disadvantage for allocating resources that are utilising a market system?
 - a. Profits will be less b. Impossible to stop the wastage of scarce resources
 - c. Notable unemployment may take place d. **Un-even distribution of income**
6. Which branch of economic theory is associated with the difficulty of resources allocation?
 - a. Econometrics b. **Microeconomic theory** c. Macroeconomic theory d. Statistics
7. The creation of choice is done by _____.
 - a. **Scarcity of resources** b. Less choices c. The urgency of needs d. Abundance of resources
8. A deductive theory is one that:
 - a. Allows theory to emerge out of the data
 - b. **Involves testing an explicitly defined hypothesis**
 - c. Allows for findings to feed back into the stock of knowledge
 - d. Uses qualitative methods whenever possible
9. Which of the following embodies a more widely accepted definition of economics?
 - a. Science of material welfare b. Science of wealth
 - c. A study of mankind in the ordinary business of life d. **Science of making choice.**
10. The fundamental problem faced by an economy is one of:
 - a. Exchange b. Decision making by the government c. Economic welfare d. **Scarcity of resources and multiplicity of wants.**

Unit - II

1. Production possibilities curve does not show:
 - a. What to produce b. How to produce c. For whom to produce
 - d. **Productive potential under conditions of underemployment**
2. State whether Economics is:

- a. A positive science only b. Neither a positive science c. A science but not art
d. **A science or an art depending on who uses Economics and for what purpose.**
3. Who of the following emphasized the normative aspect of Economics as science?
a. The English classical school b. Lionel Robbins c. **The German historical school**
d. Classical School
4. Of the following economists who is considered as master of partial analysis?
a. **Alfred Marshall** b. A.C.Pigou c. J.M.Keynes d. J.S.Mill.
5. Find out the correct statement:
a. **Deductive method descends from general to the particular**
b. Inductive method descends from general to the particular
c. The classical economists stood for inductive method
d. Deductive method depends on experimentation.
6. Which of the following statements has been drawn by inductive method?
a. A consumer will buy from the cheapest market
b. **All businessmen wish to buy at low price and sell at high price**
c. A private firm will try to maximize its profits
d. The larger the stock of money with a person, the lower is the utility that he derives from it.
7. What is true for deductive method?
a. **Abstract** b. Realistic c. Economic conditions assumed to be changing d. Supported by historical school.
8. What is true for inductive method?
a. Hypothetical b. **Empirical** c. Ignores experimentation d. Static
9. Find out the correct statement:
a.. Prediction of economic models cannot be refuted by empirical evidence
b. **Models transform verbal expressions in to more scientific expressions**
c. Models make no assumptions d. Economic models are comprehensive and not partial
10. Micro economic theory studies how a free enterprise economy determines:
a. **The Price of goods** b. The price of services c. The price of resources d. Price of valuables.

Unit - III

1. Which aspect of taxation involves normative economics?
a. The incidence of the tax b. **The fairness of the tax** c. The effect of the tax on incentives to work d. The effect on income level
2. Microeconomics deals primarily with _____
a. Comparative statics, general equilibrium and positive economics
b. Comparative statics, partial equilibrium and normative economics
c. Dynamics, partial equilibrium and positive economics
d. **Comparative statics, partial equilibrium and positive economics.**
3. Which of the following is incorrect?
a. Microeconomics is concerned primarily with the problem of what , how and for whom to produce b. Microeconomics is concerned primarily with the economic behaviour of individual decision making units when at equilibrium
c. **Microeconomics is concerned primarily with the time path and processes by which one equilibrium position evolves into another**
d. Microeconomics is concerned primarily with comparative statics rather than dynamics.
4. Which of the following statements is most closely associated with general Equilibrium analysis?

- a. **Everything depends on everything else** b. The equilibrium price of a factor depends on the balancing of the forces of demand and supply for that factor
- c. The equilibrium price of a good or service depends on the balancing of the forces of demand and supply for that good or service d. The equilibrium for income and demand
- 5. The meaning of the word 'economic' is most closely associated with the word:
 - a. Free b. **Scarce** c. Unlimited d. Unrestricted
- 6. The market equilibrium for a commodity is determined by
 - a. The market demand for the commodity b. The market supply of the commodity
 - c. **The balancing of the forces of demand and supply for the commodity**
 - d. The individual demand
- 7. Microeconomics studies the decision making behavior of:
 - a. Society as a whole b. **An individual or household** c. A group of individuals d. Economy as a whole
- 8. The word micro was first used in Economics by:
 - a. Keynes b. **Ragnar Frisch** c. J.R.Hicks d. Marshall
- 9. A function refers to :
 - a. The demand for a commodity. b. The supply of a commodity c. The demand and supply of a commodity service or resource d. **The relationship between one dependent variable and one or more independent variables.**
- 10. The subject matter of economics is the study of:
 - a. Wealth b. Welfare c. Scarcity d. **Scarcity and Choice**

UNIT II:

- 1. The law of demand states, with increase in price there is
 - a. **decrease in quantity demanded** b. increase in quantity demanded c. decreased demand d. increased demand
- 2. The following would cause a change in the quantity demanded for a product?
 - a. changing prices of related products b. changing consumer tastes
 - c. increasing consumer income d. **decreasing price of product**
- 3. Increase in demand can occur due to:
 - a. **Increase in income of the consumer** b. Decrease in price of the complementary good c. Increase in price of the substitutes d. Static position in demand
- 4. Violation of Law of demand occurs when:
 - a. **Negative income effect is greater than substitution effect** b. Negative income effect is less than substitution effect c. Income effect is negative d. Substitution effect is negative
- 5. Movement along the demand curve illustrates
 - a. shift in quantity demanded b. complement effect c. **change in quantity demanded**
 - d. income effect
- 6. Increase in demand is shown by demand curve when
 - a) **the curve shifts right** b) the curve shifts left c) movement along the curve there is no change d) movement along the curve
- 7. The demand curve is always

- a) level b) Irregular c) upward sloping d) **downward sloping**
8. Which of the following is a complement product to peanut butter?
a. Sugar b. **Jelly** c. Mustard d. Soda
9. The Law of Demand is measured from the perspective of
a. **Consumer** b. Shopkeeper c. Wholesaler d. Manufacturer
10. Goods for which demand goes down when income goes up are called
a. Public Goods b. **Inferior Good** c. Normal Goods d. Private Goods

Unit – III

1. Moving along an indifference curve the _____
a. Consumers prefer some of the consumption points to others.
b. Marginal rate of substitution for a good increase as more of the good is consumed.
c. Marginal rate of substitution is constant. d. **Consumers do not prefer one consumption point to another.**
2. The slope of the indifference curve is equal to which of the following?
a. One b. Marginal utility c. **Marginal rate of substitution** d. Total Utility
3. Why is the indifference curve convex to origin?
a. **Due to continuous decline of marginal rate of substitution**
b. Due to law of diminishing marginal utility
c. Due to monotonic preferences d. law of MRTS
4. Which of the following is not the property of indifference curves?
a. Higher the indifference curves, higher is the level of satisfaction.
b. Indifference curve is downward sloping. c. **Indifference curve is concave to origin.** d. Two indifference curves cannot intersect each other.
5. Hicks and Allen believed that utility _____
a. Can be measured in cardinal numbers b. **Can be measured in ordinal numbers**
c. Cannot be measured d. Cannot be expressed
6. As we move down the indifference curve from left to right, the slope of the indifference curve tends to which of the following?
a. Unity b. Zero c. **Declined.** Rise
7. In the indifference map, a higher IC indicates which of the following?
a. Lower level of satisfaction b. **Higher level of satisfaction**
c. Same level of satisfaction d. Either higher or same level of satisfaction
8. Two indifference curves cannot cut each other because of which of the following?
a. They represent those combinations of two goods that give the same satisfaction.
b. The slope is downwards. c. They are convex to origin.
d. **Each indifference curve represents a different level of satisfaction.**
9. An indifference curve is related to which of the following?
a. **Choices and preferences of consumer** b. Prices of goods X and Y
c. Consumer's income d. Total utility from goods X and Y
10. An Indifference curve slope down towards right since more of one commodity and less of another result in which of the following?
a. Decreasing expenditure b. Maximum satisfaction
c. Greater satisfaction d. **Same satisfaction**

Unit – IV

1. Who organise all inputs are

- a. Land b. Labour c. Capital d. **Organisation**
- 2. The production functions are used the most
 - a. **Cobb- Douglass production function** b. CES production function c. Consumer surplus d. Consumers equilibrium
- 3. In the case of Cobb – Douglas production function, if $\alpha + \beta > 1$, it is
 - a. **Increasing returns to scale** b. Diminishing returns to scale c. constant returns to scale d. zero returns
- 4. The Cobb- Douglas production function assumes that the elasticity of substitution between capital and labour is
 - a. **Equal to one** b. greater than one c. less than one d. equal to zero
- 5. The CES production function was originally developed by
 - a. **T.W. Swan and R.M. Solow** b. Cobb- Douglas c. Stonier and Hauge d. Marshall
- 6. The law of variable proportions is also called as
 - a. **Law of Proportionality** b. Law of returns c. Law of diminishing returns d. Law of demand
- 7. AP declines then TP increases at a ----- rate.
 - a. **Decreasing** b. Increasing c. Constant d. Zero
- 8. TP is ----- when MP is zero
 - a. **Maximum** b. Minimum c. Natural d. Creative
- 9. In MP and AP are equal , AP reaches its -----
 - a. **Maximum** b. Minimum c. Natural d. Creative
- 10. When TP starts declining, MP is ----
 - a. Positive b. **Negative** c. Constant d. Zero

Unit – V

- 1. Which cost increases continuously with the increase in production?
 - a. **Average Cost** b. Marginal Cost c. Variable Cost d. Fixed Cost
- 2. Private cost is also called
 - a. Internal Cost b. Marginal Cost c. Variable Cost d. External Cost
- 3. External cost is born by
 - a. Firm b. **Consumers** c. Producer d. Seller
- 4. Economic cost is the addition of explicit cost and
 - a. Internal Cost b. Social Cost c. Explicit Cost d. **Implicit cost**
- 5. Total cost in the short run is classified into fixed cost and variable costs. Which of the following one of the following is a variable cost?
 - a. **Cost of Raw material** b. Interest payment on past borrowing c. Remains constant d. Remains Zero
- 6. In the short run, when the output of a firm increases, its average fixed cost:
 - a. Increases b. **Decreases** c. Remains constant d. Zero level
- 7. Which of the following is known as planning curve?
 - a. **Long run average cost curve** b. Short run average cost curve c. Fixed cost curve d. Variable cost curve
- 8. Which of the following statement is incorrect?
 - a. When the AC is rising, the MC must also be rising
 - b. When the AC is rising, the MC is falling c. When the AC is falling the MC must be rising d. **When the AC is rising the MC is above the AC**
- 9. Average cost is a
 - a. Horizontal straight line b. Vertical straight line c. **U- Shaped curve** d. V – Shaped curve

10. Incremental revenue curve under perfect competition is
a. dR/dQ b. dQ/dR c. TR/AR d. AR/TR

Section – B

Unit – I

1. What are the basic economic problems?
2. Define Choice in Economic terms:
3. Define Scarcity:
4. Define Micro Economics:
5. Define Macro Economics:
6. What is static analysis?
7. What is dynamic analysis?
8. Define deductive method:
9. Define inductive method:
10. What is Partial equilibrium?
11. What is general equilibrium?

Unit - II

1. Define Demand:
2. Define the Law of Diminishing Marginal Utility:
3. What is income effect?
4. What is Price effect?
5. Explain the difference between Money and real income:
6. What is substitution effect?
7. Give examples for substitution goods and complementary goods:
8. Explain Giffen good's:
9. Define elasticity of demand:
10. Define cross elasticity of demand:
11. Define inelasticity of demand:

Unit – III

1. Define indifference curve:
2. What is indifference map?
3. What is budget line?
4. What is an angel curve?
5. Define revealed preference theory of demand:
6. What is the revision of demand?
7. Define cobweb theorem:
8. What are the properties of indifference curve?
9. State the merits of indifference curve:
10. What is the superiority of the Revealed Preference Theory?
11. What are the defects of Revealed preference theory?
12. What is choice involving risk?

Unit – IV

1. Define production function:
2. What is homogeneous production function:
3. Mention some of the characteristics of production function:
4. Define Isoquant:
5. What is producer's equilibrium?
6. What are the types of returns to scale?
7. Define CES production function:
8. Define Cobb- Douglas production function:

9. What is modern theory of cost?
10. What is traditional theory of cost?

Unit – V

1. Define marginal analysis:
2. Define short run equilibrium:
3. Define long run equilibrium:
4. Define Monopoly:
5. What is price discrimination?
6. Define monopolistic competition:
7. What is selling cost?
8. Define oligopoly:
9. Define Kinked demand curve:
10. What is price leadership?

Section – C

Unit - I

1. Explain the basic economic problems with its examples:
2. What is the difference between choice and scarcity?
3. Differentiate the concept of Micro and Macro analysis with its best examples:
4. Give a detail explanation about the Inductive and deductive method:
5. State and explain the positive and normative economics:
6. Explain the concept of static and dynamic analysis in micro economics:
7. Explain the partial and general equilibrium with the figure:
8. Give a detail explanation for the inductive methods:
9. Why there is scarcity in non renewable resources?
10. Give a definition and explanation for the types of resources?

Unit - II

1. Explain the equilibrium position in supply and demand :
2. State and explain the elasticity of demand and its types:
3. What is the measurement of elasticity of demand?
4. Explain the price and cross elasticity of demand with its figure:
5. Explain the price and income elasticity of demand with its figure:
6. Explain the price and substitution elasticity of demand with its figure:
7. Explain the law of demand with its characters:
8. Explain the types of demand and what are the factors influencing demand:
9. State and explain supply and what are the factors influencing supply:
10. Draw the figure for the types of elasticity of demand and explain:

Unit – III

1. Explain IC schedule and difference curve:
2. Write short notes on MRS:
3. Mention any four properties of indifference curve:
4. Explain the change consumer equilibrium:
5. Explain the consumer equilibrium with the help of figure:
6. What are the uses of indifference curve analysis?
7. Mention any four criticisms levelled against the IC analysis:
8. “Choice reveals preference” explain this statement critically:
9. Bring out the refinements introduced in demand analysis by the theory of revealed preference:

10. Assess the impact of revealed preference on the theory of demand:

Unit – IV

1. State the different types of production function:
2. Explain homogeneous production function:
3. What is meant by production function? Mention its characteristics:
4. Explain C- D production function:
5. Explain CES production function:
6. Explain the relationship between TA, AP and MP:
7. Explain producer's equilibrium:
8. What do you mean by expansion path?
9. Define Iso – quants and Iso – cost lines:
10. What are the properties of Iso – quant and cost line?

Unit – V

1. Define AC and MC : Explain their relationship with the help of a diagram:
2. Explain the short run cost curves:
3. Explain the long run cost curves:
4. Distinguish between private cost and social cost:
5. Analyse the nature of fixed and variable cost:
6. Explain the relationship between AR and MR:
7. State the shape of the revenue curves under perfect and imperfect competitions:
8. State and explain the features of perfect competition:
9. State and explain the features of monopoly:
10. State and explain the features of Monopolistic competition:
11. Explain the different types of Monopoly:
12. Distinguish between the features of perfect competition and monopoly:

Section – D

Unit – I

1. Critically analyse the micro and macro economic analysis:
2. Briefly explain the concepts of the Inductive and deductive method:
3. What are needed problem to be solved in our economy?
4. Give brief explanation for the Positive vs. Normative Economics with examples:
5. Critically analyze the concept of Partial and General Equilibrium Analysis:

Unit – II

1. Describe feature's of demand and supply with its equilibrium level:
2. Explain the law of demand and its reverse of law of demand:
3. Give a detail explanation for the elasticity of demand and with its types and changes influenced in demand:
4. What are the factors which are influencing in demand and supply of the society:
5. How to measure the elasticity of demand and supply in mathematical methods?

Unit – III

1. Explain the characteristics of indifference curves:
2. Explain consumer equilibrium in terms of IC analysis :
3. Explain change in equilibrium of the consumer when price and income changes:
4. What is meant by price effect? Explain how it can be split up into income and substitution effect:

5. What are the limitations of the indifference curve technique as an analytical instrument? How far is the theory of revealed preference an improvement in this respect?
6. The ordinal utility systems break as soon as we introduce the uncertainty of expectations with regard to the consequences of choice. “ Comment on the method suggested by the won Newman and Morgenstern to solve this problem:
7. Discuss critically a modern utility analysis of choose involving risk:
8. A) Discuss the distinguishing features of the revealed preference hypothesis to the theory of consumers behaviour as distinguished as from the Marshallian cardinal utility approach:
 B) Derive the law of demand from it:
 C) Derive an indifference curve from revealed preference :

Unit – IV

1. Explain the law of variable proportions:
2. State and explain the law of diminishing returns:
3. State and explain the law of increasing returns:
4. Explain the laws of increasing returns:
5. Explain the laws of production in terms of costs.

Unit – V

1. Explain the various revenue concepts with the help of diagrams:
2. Explain the different types of cost concept with suitable diagrams:
3. Explain the role of the elements in the determination of value:
4. What is perfect competition? How price is determined under it?
5. What is monopoly? How price is determined under it?
6. Explain how price is determined under monopolistic competition:

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Unit-I:National Income and Accounts **15Hrs**

Circular Flow of Income in two, three and four sector economy - Different forms of national income accounting - Social accounting - Input - Output accounting -Flow of funds accounting and Balance of payments accounting

Unit-II: Classical Model of Employment **15Hrs**

Classical macroeconomics - Say's Law–Classical Model–Criticism

Unit-III: Consumption Function **20Hrs**

Keynes 'Psychological law of consumption-Implications of the law-short-run and long-run consumption function; Empirical evidence on consumption function-Income consumption relationship-Absolute income, relative income, life cycle and permanent income hypotheses

Unit-IV: Investment Function **20Hrs**

Marginal efficiency of investment and level of investment-Marginal efficiency of capital and investment - Long run and short run factors - The accelerator and investment behavior –Influence of policy measures on investment

Unit-V:Neo-Classical and Keynesian Views on Interest **20Hrs**

The IS-LM model; Extension of IS-LM model with government sector - Relative effectiveness of monetary and fiscal policies

Text Book:

Maria John Kennedy.MacroEconomicTheory.NewDelhi:PHILearning,2012.

Books for Reference:

1. GlaheFred.R.MacroEconomics:TheoryandPolicy,NewYork:HarcourtBraceJovanovichInc,1973.
2. Laidler.D.E.W.DemandforMoneyTheoryandEvidence.NewYork:Dum-DonValley,1977.
3. Romer.D.L.AdvancedMacroEconomics.NewYork:McGrawHillCompanyLimited,1996.
4. Shapiro.E.MacroEconomicAnalysis.NewDelhi:GalgotiaPublications,1998.
5. Ackley.G.MacroEconomics:TheoryandPolicy.Newyork:Macmillan,1996

Core – II Advanced Macro Economic Analysis -21PECC12

Semester-I November 2020-2021

Section –A

(1mark)

Unit-I

1.flow from the business sector to the house hold sector in the production market.
a. **Goods** b. Factors c. Wages d. Money
2. Give a example for an injections for house hold sector?
a. Savings b. Investment c. Consumption d. **House Rent**
3. _____ is a leakage from the circular flow in a three sector model.
a. **Taxation** b. Government purchase c. Education d. Export
4. The term social accounting was first introduced into economics by _____
a. **J.R. Hicks** b. Keynes c. Robinson d. Pigou
5. Social accounting also known as _____ accounting
a. National expenditure b. **National income** c. Flow of funds d. Investment.
6.refer to the income earned by the business sector by selling goods and services to the rest of the world.
a. Net import b. **Net export** c. Net national income d. Net consumption
7. Theaccount relates to the out flows and inflows of the government sector.
a. **Government** b. Private c. Social d. Mixed economy
8. The inputs of one industry are the _____ of another industry
a. **Out puts** b. Finished goods c. Final goods d. Effective investment
9. The flow of funds accounts developed by _____
a. J.B. Say b. **Morris Copeland** c. Keynes d. Karl Max
10. Each transaction is entered on the credit and debit side of the _____ Sheet
a. **Balanced** b. Accounts c. transaction d. Balance

Unit-II

1. According to classical theory there is existence of full employment without.....
 - a. **Inflation** b. Depression c. Capital formation d. Recession
2. Wages and prices are.....
 - a. **Fixed** b. Increased c. Flexible d. Varied
3. Say's law of market "Supply creates its own"
 - a. Product b. Income c. **Demand** d. Supply.
4. is co-extensive with production and production is the cause and the sole cause of demand
 - a. **Consumption** b. Production c. Supply d. Investment.
5. $MV=PT$ in this equation 'P' denotes
 - a. **Price level** b. Production c. Producer d. power
6. Who was introduced Liquidity trap?
 - a. Pigou b. **Keynes** c. J.B.Say's d. Marshall.
7. Rate of interest as a factor and to equalise the savings and investment.
 - a. **Determinant** b. Proportionate c. Direct d. Fixed.
8. Laissez faire in fact led to the great.....
 - a. **Inflation** b. Depression c. Unemployment d. Excess money supply.
9. Keynes has given due importance to.....
 - a. Barter system b. **Money** c. Capital goods d. Capital asserts.
10. Who said these words "In the long term we are all dead"?
 - a. **Keynes** b. Pigou c. Marshall d. M.L.Seth.

Unit-III

1. Propensity to consume refers to income and relationship.
 - a. National income b. **Consumption** c. Investment d Saving.
2. Average propensity to consume may be defined as theof consumption and income level.
 - a. Rational b. **Ratio** c. Expectation d. Decrease
3. When income increases consumption is also increases but by amount.
 - a. **Smaller** b. Higher c. Increase d. Reduction.

4. Keynes law assumes the Existence of a Laissez faireEconomy.
 - a. Socialist b. Privatisation c. **Capitalist**d. Mixed Economy.
5. The higher the MPC the higher the value of theand vice versa.
 - a. **Multiplier** b. Accelerator c. Cost of production d. Factors of production.
6. Keynes mention two principal factors which influence the consumption are; subjective and.....
 - a. Deductive b. Subtractive c. **Objective** d. Superlative
7. If the wage rate rises the consumption function shifts.....
 - a. **Upward** b. downward c. To zero d. To negative.
8. Changes in policy in the form of taxation and public expenditure affect the consumption.
 - a. Monetary b. **Fiscal**c. Physical d. Capital
9. In high saving economy consumption function is.....
 - a. High b. **Low** c. Medium d.Negative.
10. A rich person will have a lower APC because he will need a smaller portion of his income to maintain his pattern.
 - a. **Consumption** b. savingc. Investment d. Dis - saving.

Unit-IV

1.means making an addition to the stock of goods in existence.
 - a. Consumption b. Saving c. **Investment** d. Disinvestment
2. Capital and investment are relayed to each other through..... investment.
 - a. Total b. Aggregate c. **Net** d. Marginal.
3. Induced investment is a function of.....
 - a. Income b. **Saving**c. Consumption d. Investment.
4.investment is independent of the level of income.
 - a. Marginal b. **Autonomous** c. Total d. Average.
5. The determines the optimum capital stock in an economy at each level of interest rate.
 - a.**MEC** b. MEI c. SAC d. SFC

6. The higher the MEI the shall be the volume of investment.
 - a. Smaller b. **Larger** c. Upper d. Zero.
7. The MEI curves are because the supply curve of capital is perfectly elastic.
 - a. Vertical b. **Horizontal** c. None d. Negative.
8. The inducement to investment will fall with the lowering oflevels.
 - a. **Income** b. Consumption c. Investment d. Saving.
9. Investment in capital goods industry can be increased on the basis of the..... of the industry.
 - a. **MEI** b. MEC c. consumer demand d. SAC.
10. Inventions and innovations tend to raise the inducement to.....
 - a. Consumption b. Saving c. **Investment** d. Income

Unit-V

1. The rate of investment will have to be raised to reduce the marginal efficiency of capital to equality with the rate of interest.
 - a. Higher b. **Lower** c. Moderate d. Zero.
2. If investment is very sensitive to the rate of interest the IS curve is very.....
 - a. Steep b. **Flat** c. Decline d. Negative slope.
3. The shape of the IS curve also depends upon the size of the.....
 - a. Accelerator b. **Multiplier** c. Divisor d. Supplier.
4. The money market is in equilibrium when the demand and supply of money are.....
 - a. **Equal** b. Double c. Zero d. Single.
5. The LM function shifts to the right with the increase in the money supply given the demand for.....
 - a. Goods b. **Money** c. Investment d. Capital.
6. Falling investment leads to falling..... which in turn reduces saving.
 - a. **Income** b. Consumption c. Government expenditure d. Savings.
7. A decrease in the demand for money means a reduction in the quantity of balances demanded at each level of income and rate.
 - a. Saving b. Interest c. **Investment** d. Consumption.
8. The IS function shifts to the right with the reduction in.....

- a. Saving b. Investment c. **supply of money** d. Supply of Capital.
9. There is a negative relationship between..... and interest rate in the real economy.
a. **Saving** b. Income c. Consumption d. Investment.
10. The IS curve slopes from left to right because as the interest rate falls, investment increases and so does income.
a. **Upward** b. Horizontal c. Downward d. Negative.

Section-B

(2marks)

Unit-I

1. Define the circular flow of income and expenditure:
2. Draw a flow chart for the two sector model:-
3. What are all the leakages and injections in three sector model:-
4. Explain three sector model in a closed economy:-
5. Give two importance of the circular flow of income:-
6. Who was introduced the terms “Social Accounting” and define the concept:-
7. Explain about the production account:-
8. Give a definite explanation for the capital account:-
9. State some importance of social accounting?
10. Explain the transactions matrix?
11. Define the balance of payment.

Unit-II

1. List out any two assumptions of classical theory of employment?
2. What do you mean by barter system?

3. What mechanism brings about equality between savings and investment in say's law of market?
4. What is Laissez faire policy?
5. State Say's law of market:-
6. What do you mean by full employment?
7. Explain the concepts in this equation of $MV=PT$:-
8. State the difference between money and real wage:-
9. What is Liquidity trap?
10. State two criticisms of Say's law.

Unit-III

1. What is consumption function?
2. Define 'Permanent Income':-
3. What do you mean by Propensity to consume?
4. What is APC?
5. Mention the subjective factors that influence Consumption function?
6. List out two Keynes psychological law of consumption?
7. What is income redistribution?
8. What is absolute income Hypothesis:-
9. Define the relative income hypothesis?
10. What is life cycle hypothesis?

Unit-IV

1. Define Autonomous Investment?
2. Explain the marginal efficiency of capital?
3. What is marginal efficiency of Investment?
4. Discuss the determinants of inducement to invest?
5. What do you mean by induced investment?
6. What are the reasons for the instability of this function?

Unit-V

1. Explain the principle of Acceleration?
2. What is IS curve:-

3. Specify the meaning of liquidity trap?
4. Define product market equilibrium?
5. State the slope of the IS curve?
6. When the money market is in equilibrium?
7. Define fiscal policy?
8. Define monetary policy?
9. Explain Keynesian range in a brief manner?
10. What is monetarist range?

Section-C

(6marks)

Unit-I

1. Define and draw the circular flow of income in two sector model:-
2. Explain with a diagram of the circular flow of income with saving and investment added:-
3. Give a brief explanation about the circular flow in a three sector model:-
4. Draw the flow chart and explain the four sector model open economy:-
5. State the importance of circular flow of income?
6. Define and classify the social accounting?
7. Explain the input and output accounting?
8. Explain some importance and difficulties of social accounting?
9. State some importance and limitation of input output accounting?
10. Explain the structure and classification of balance of payments accounts?

Unit-II

1. What are the assumptions of Classical theory of employment?
2. What are the implications of Say's law of market?
3. Explain the criticisms of Say's law of market:-
4. How is the divergence between savings and investment rectified?
5. Give the views of A.C. Pigou on wage cut policy:-

6. Explain Keynes criticism of classical theory?

Unit-III

7. Explain the life cycle hypothesis of consumption?

8. Indicate the subjective factors influencing consumption function?

9. Explain in detail about consumption function?

10. Differentiate between APC and MPC?

11. Explain Absolute income Hypothesis:-

12. Critically examine the Relative Income Hypothesis?

Unit-IV

1. Outline the factors influencing marginal efficiency of capital?

2. Analyse the influence of policy measures on investment?

3. Explain the different types of investment?

4. Explain the determinants of Investment?

5. Explain the relationship between MEC and MEI?

6. Write a short note on Marginal Efficiency of Investment?

Unit-V

1. How can you derive IS function from the real market?

2. Explain the factors that determine the slope of the IS and LM curves:-

3. How to derive the product market equilibrium with the help of IS curve?

4. What is the slope of IS curve and state about the shifts in the IS curve?

5. How to derive the money market equilibrium?

6. Discuss the monetary policy with the shift in the LM curve alone:-

7. Discuss the fiscal policy with the shift in the IS curve alone:-

8. Explain the Keynesian range and classical range with the help of monetary policy?

9. State and explain the effects of IS curve on Monetary and Fiscal policies:-

Section-D

(12marks)

Unit-I

1. Explain the process of circular flow of income and product in a three sector closed model?

2. Explain the concepts of the circular flow of income. In what ways do international transactions affect this flow within a closed economy?
3. State the essential features of a social accounting model and point out the main pit falls which have to be avoided in its use?
4. Give the essentials of social accounting and show its use in the study of national income flows?
5. What do you understand by social accounting? How are social accounts arrived? Discuss the importance of social account in economic analysis?
6. Explain and illustrate social accounting and indicate its usefulness as a tool of economic policy?
7. Explain the input and output transactions analysis of national income accounting?
8. Discuss the need and importance of flow of funds accounts?
9. Explain fully balance of payments accounts. How are they related to national income accounts?
10. Explain the process of circular flow of income and production in four sector model?

Unit-II

1. Explain in detail about the Classical theory of employment with its criticisms:-
2. Critically examine Say's law of market?
3. What are the Keynesian objections against the classical theory of employment:-
4. General over production and general unemployment are impossible –Discuss?

Unit-III

1. Discuss the relative income hypothesis of consumption?
2. State and explain Keynes psychological law of consumption?
3. Critically examine the Friedman's Permanent Income Hypothesis?
4. Examine critically the Life Cycle Composition Hypothesis?

Unit-IV

1. Explain the factors other than the interest rate affecting Inducement to Invest?
2. What are the criticisms levelled against the MEC of Keynes?

3. Describe the exogenous and endogenous factors that bring about a shift in investment function?
4. Relationship between the MEC and MEI:-

Unit-V

1. Use IS-LM frame work to explain the joined determination of the rate of interest and the level of income:-
2. Discuss the relative effectiveness of monetary and fiscal policies?

Semester-I			
Core III		Statistics For Economists-I	
Sub.Code:21PECC13	Hours/Week:6	Hrs/Semester:90	Credits:4

Unit I: Measures of Averages and Dispersion

15Hrs

Measures of central tendency–Mean, Median, Mode Measures of Dispersion–M.D., Q.D. and S.D and relative measures of dispersion application of averages and dispersion

Unit II: Correlation and Regression

20Hrs

Meaning, assumptions and limitations of simple correlation and regression analysis –Pearson’s product moment and Spearman’s rank correlation coefficient – Concept of least squares and the regression lines

Unit III: Analysis of Time Series

15Hrs

Uses – Components – Measurement – Methods of Moving Average – Semi Average –Method of least squares- Seasonal Variations and its Measurements

Unit IV: Probability

20Hrs

Various types of events – Classical and empirical definitions of probability, Laws of addition and multiplication, conditional probability and concept of interdependence, Baye’s theorem and its applications- Probability Distribution- Binomial, Poisson and Normal distribution

Unit V: Theory of Estimation and Testing of Hypothesis

20Hrs

Properties of a good estimator, formulation of statistical hypotheses–Null and alternative, Goodness of fit, confidence intervals and level of significance-Type I and Type II errors-Hypothesis testing Z, t , χ^2 (chi-square)and F-test

Text Book:

Gupta,S.P.,*Statistical Methods*(Edition)(NewDelhi:S.Chand&SonsLtd2001

Books for Reference

1. Gupta,S.C.,*Fundamentals of Applied Statistics*(NewDelhi:S.Chand&SonsLtd1993)
2. Speigal.M.R.,*Theory and Problems and Statistics*(London:McGrawHillBook Co.1992)
3. R.S.N.Pillai&Bagavathi,(2006)*Statistics*–S.Chand&CompanyLtd,NewDelhi,

St. Mary’s College (Autonomous) – Thoothukudi

Question Bank

I MA Economics

Core III – Statistics for Economist

Sub.Code:21PECC13

Section – A

(1 Marks)

Choose the Correct Answer:

Unit – I

- Which average is affected most by extreme observations?
(a) Mode (b) Median (c) **Geometric Mean** (d) Arithmetic Mean
- Which of the following is the most unstable average?
(a) **Mode** (b) Median (c) Geometric Mean (d) Harmonic Mean
- For dealing with qualitative data the best average is
(a) Arithmetic Mean (b) Geometric Mean (c) Harmonic Mean
(d) **Median**
- The sum of deviations taken from arithmetic mean is
(a) Minimum (b) **Zero** (c) Maximum (d) equal
- The sum of squares of deviations from arithmetic mean is
(a) Zero (b) Maximum (c) **Minimum** (d) equal
- When calculating the average growth of economy, the correct mean to use is?
(a) weighted mean (b) **Geometric mean** (c) Arithmetic mean
(d) Harmonic Mean
- When an observation in the data is zero, the geometric mean is?
(a) Negative (b) **Zero** (c) Positive (d) Cannot be calculated
- The best measure of central tendency is
(a) **Arithmetic Mean** (b) Geometric Mean (c) Harmonic Mean
(d) Weighted Mean
- The quartile deviation includes the
(a) first 50% (b) last 50% (c) **central 50%** (d) central 100%
- The sum of squares of deviation is least when measured from
(a) Median (b) 0 (c) **Mean** (d) Mode

Unit – II

- The coefficient of correlation
(a) has no limits (b) can be less than 1 (c) can be more than 1
(d) **Varies between ± 1**
- The value of r^2 for a particular situation is 0.81 what is coefficient correlation
(a) 0.81 (b) **0.9** (c) 0.09 (d) 0.10
- Which of the following is the highest range of r ?
(a) 0 and -1 (b) -1 and 0 (c) **-1 and 1** (d) 0 and -1
- The coefficient of correlation is independent of
(a) change of scale only (b) change of origin only
(c) **both change of scale and origin** (d) change of range
- The coefficient of correlation
(a) cannot be positive (b) cannot be negative
(c) **can be either positive or negative** (d) cannot be equal
- The greater the value of r
(a) **The better are estimates, obtain through regression analysis**
(b) The worst are the estimates (c) Really makes no difference
(d) Make many differences
- The farther the two regression lines cut each other.
(a) Greater will be the degree of correlation

- (b) **The lesser will be the degree of correlation**
 (c) Does not matter (d) Equal will be degree of correlation
8. The regression lines cut each other at the point of
 (a) **Average of x and y** (b) Average of x only
 (c) Average of y only (d) Average of y and x
9. When the two regression lines coincide, then r is
 (a) 0 (b) -1 (c) **1** (d) 0.5
10. The regression analysis measure _____ between x and y
 (a) **Dependence** (b) Independence (c) Equal (d) Unity

Unit – III

1. A time series of annual data can contain
 (a) Secular trend (b) **Seasonal variations** (c) Cyclical variation
 (d) long term variations
2. Secular trend represents
 (a) **long term variations** (b) seasonal variations (c) cyclical variations
 (d) short-term variations
3. Seasonal variations repeat during a period of
 (a) 1 year (b) **5 years** (c) 7 years (d) 10 years
4. In the least square linear trend equations $y = a + bx$, if 'b' is positive it indicates
 (a) declining trend (b) **rising trend** (c) no trend at all (d) falling trend
5. Trend can be measured by using
 (a) **Graphic method** (b) Moving average method
 (b) least square method (d) semi average method
6. An overall tendency of rise or fall in a time series is called the
 (a) **Secular Trend** (b) rising trend (c) declining trend (d) falling trend
7. A time series consists of data arranged
 (a) seasonal (b) **chronologically** (c) least square (d) secular trend
8. The most important factors causing seasonal variations are
 (a) Growth of population (b) **weather and social customs**
 (c) Depression in business (d) Strikes and Lockouts
9. The most widely used method of measuring seasonal variations is
 (a) **ratio-to-moving average method** (b) ratio-to trend method
 (c) link relatives method (d) secular trend
10. The line obtained by method of least squares is known as the line of
 (a) **Best fit** (b) Slow fit (c) bad fit (d) low fit

Unit – IV

1. If the outcome of one event does not influence another event, then the two events are
 (a) Mutually exclusive (b) Dependent (c) **Independent**
 (d) Interdependent
2. Assuming that a box contains in all ten balls of which 6 are green and 4 are red, what is the probability of drawing a red ball?
 (a) 0.1 (b) 0.5 (c) 1.0 (d) **0.4**
3. What is the probability of getting an even number when a die is tossed?
 (a) 1/3 (b) **1/2** (c) 1/6 (d) 1/4
4. What is the probability of getting more than 2 when a die is tossed?
 (a) 1/3 (b) 1/2 (c) **2/3** (d) 1/4
5. The probability of drawing a spade from a pack of cards is
 (a) 1/52 (b) 1/13 (c) 4/13 (d) **1/4**

6. In the simultaneous of two perfect dice, the probability of obtaining 4 as the sum of the resultant faces is
 (a) 4/12 (b) 1/12 (c) 3/12 **(d) 2/12**
7. A normal curve is completely defined by the mean and
 (a) Binomial distribution **(b) Standard deviation**
 (c) Poisson distribution (d) Normal distribution
8. A normal curve is bell-shaped and has a
(a) Single peak (b) double peak (c) triple peak (d) flat
9. In a Poisson distribution as n increases, the distribution shifts
(a) to the right (b) to the left (c) to the back (d) to the front
10. If the binomial distribution mean is 10 and S.D is 2, q will be
 (a) 1 (b) 0.4 **(c) 0.8** (d) 0.2

Unit – V

1. Type I error is committed when the hypothesis is true but our test _____ it
(a) rejects (b) accepts (c) select (d) helps
2. Student's t distribution was discovered by
 (a) Karl Pearson (b) Laplace (c) Fisher **(d) Gosset**
3. When a null hypothesis is rejected, then it is possible that
 (a) A Type I error has been made (b) A Type II error has been made
(b) A correct decision has been made (d) A wrong decision has been made
4. For a two tail test when n is large, the value of z of 0.05 level of significant is
 (a) 1.645 (b) 2.58 **(c) 1.96** (d) 2.88
5. for testing $P_1 = P_2$ in a large sample, the proper test is
 (a) t – test **(b) z – test** (c) f – test (d) x – test
6. The calculated value of X^2 is
(a) Always positive (b) Always negative
 (b) Either positive or negative (d) Equals
7. The degrees of freedom for contingency table are on the basis of
 (a) n – 1 **(b) r – 1** (c) c – 1 (d) d – 1
8. The χ^2 -test was devised by
 (a) Fisher (b) Gauss (c) Laplace **(d) Karl Pearson**
9. The number of degrees of freedom in a 3x3 contingency table is
 (a) 8 **(b) 4** (c) 3 (d) 2
10. The χ^2 test is a _____ test
(a) non – parametric (b) parametric (c) d – test (d) z – test

Section – B

(2 marks)

Unit – I

1. Define central tendency
2. Define mean
3. What are the merits of mean
4. Define mode
5. What is meant by Q.D.?
6. What is meant by S.D.?
7. What do you mean by Harmonic mean?
8. Find the range of weight of 10 students from the following

41	11	14	65	73	64	53	35	71	55
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9. Define Graphic Location of Median
10. Write any 4 characteristics of a Typical Average

11. What are the features of Average

Unit – II

1. State the regression equations?
2. Define correlation?
3. Distinguish between positive and negative correlation
4. Mention any 2 differences between correlation and regression analysis.
5. Define least squares.

Unit – III

1. What are the components of time series?
2. What are the two components to be satisfied under the method of least squares?
3. What do you mean by time – series analysis?
4. How do you calculate the trend by moving average method?
5. Define seasonal variations and its measurement

Unit – IV

1. What is the probability of picking a card that to be red or black?
2. State the multiplication theorem?
3. Define the additional conditions of probability?
4. Define probability Distribution?
5. State Binomial Distribution?
6. State Normal Distribution?
7. Define Poisson distribution?
8. What is sample?
9. What are the conditions of Binomial Distribution?
10. One card is drawn from a standard pack of 52, what is the chance that it is either a king or a queen?

Unit – V

1. Write any 2 properties of good estimator
2. Define null hypothesis
3. What are the properties of F – test
4. Define E – Distribution
5. What is type II error
6. Explain the term “critical region”.

Section – C

(6 marks)

Unit – I

1. Calculate quartile deviation from the following data

X	10	20	30	40	50	60
F	4	7	15	8	7	2

2. Calculate the median for the following frequency distribution

X	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50
F	7	15	24	31	42	30	26	15	10

3. Calculate Mean from the following data:

Midpoints	1	2	3	4	5	6	7	8	9
Frequency	2	60	101	152	205	155	79	40	1

4. 50 students took up a test. The result of those who passed the test is given below

Marks	4	5	6	7	8	9
No of Students	8	10	9	6	4	3

If the average marks of all the 50 students were 5.16, Find out the average marks of the students who failed.

5. Calculate Median:

X	10	20	30	40	50	60
F	4	7	15	8	7	2

6. Explain the relationship between different averages.

7. From the following data compute Q.D.

Size	4 – 7	8 – 10	11 – 13	14 – 16	17 – 19
Frequency	14	24	38	20	4

8. Calculate the S.D. for the data

X	50	60	70	80	90	100	110	120
F	14	40	54	46	26	12	6	2

9. Explain the measures of central tendency and its types.

10. Explain the kinds of averages.

11. Explain the Mathematical properties of G.M and H.M.

12. Give the comment on Relationship among mean median and mode.

Unit – II

1. Find correlation co – efficient for the following data.

X ₁	10	6	9	10	12	13	11	9
X ₂	9	4	6	9	11	13	8	4

2. From the following data obtain the regression equation of Y on X.

X	3	2	5	6	7	2
F	4	3	4	3	5	1

3. Calculate regression equation from the following data

X	52	63	45	36	72	65	47	25
Y	62	53	51	25	79	43	60	33

Obtain the regression equation of Y on X and find the expected value when $x = 49$.

4. Distinguish between correlation and regression
5. Explain the various components of time series
6. Calculate trend by 5 yearly moving average

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
No. of Students	332	317	357	392	402	405	410	427	405	438

7. Illustrate Lorenz curve and how to measure the Dispersion
8. Calculate Rank Co – efficient of correlation for 12 students in two different subject

Sub. I	8	7	10	1	4	5	3	6	9	11	12	2
Sub. II	2	4	9	3	12	11	8	1	7	6	5	2

Unit – III

1. Draw a trend line by the method of semi average

Year	1991	1992	1993	1994	1995	1996	1997	1998
Sales	40	35	45	45	50	49	45	52

2. What is meant by ‘trend’, state the various methods of measuring trend
3. Explain the various components of times series.
4. Calculate trend by 5 yearly moving average

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
No. of Students	332	317	357	392	402	405	410	427	405	438

5. Find the centered 4 year moving averages from the following time series

Year	2000	2001	2002	2003	2004	2005	2006	2007
Value	30.1	45.4	39.3	41.4	42.2	46.4	46.6	49.2

6. Explain the semi average method.
7. Explain time series

Unit – IV

1. State and explain the additional theorem of probability with examples.

- A bag contains 17 counters marked with the numbers 1 to 17 marked. A counter is drawn and replaced, a second drawing than made, what is the probability that the 1st number drawn is even and the second odd.
- State and prove Bay's Theorem.
- 5 coins are tossed 3200 times, find the frequencies of the Binomial distribution of heads and tails.
- What is the probability of getting a spade or diamond or heart if a card is drawn at random from a well shuffled pack of 52 cards?
- What is the chance that a leap year, selected at random will contain 53 Sundays?

Unit – V

- Explain the procedure of level of significance.
- Write a note on Goodness of fit.
- Explain Type I and Type II errors.
- A die is thrown B2 times with the following results.

No termed up x	1	2	3	4	5	6
Frequency	16	20	25	14	29	28

Test the hypothesis that the die is unbiased.

- Examine whether the nature of area is related to voting preference in the election for which the data are tabulated below.

Area	Group		Total
	A	B	
Rural	620	480	1100
Urban	380	520	900
Total	1000	1000	2000

- A random sample of size 100 drawn from a normal population has a mean 48 test the hypothesis that the population mean is 50, its variants being given to the 4 also find 95% and 99% confident interval for the population mean.
(Value at z at 1% level of Significance = 2.58 and value of z at 5% of Significance = 1.96)
- What are the properties of t – distribution?
- In a sample of 8 observations, the sum of squared deviations of items from the mean was 84.4. In another sample of 10 observations, the value was found to be 102.6. Test whether the difference is significant at 5% level.
(for $r_1 = 7$ & $r_2 = 9$, $F_{0.05} = 3.29$; $r_1 = 8$ & $r_2 = 10$, $F_{0.05} = 3.07$)

Sec – D

(12 Marks)

Unit – I

- calculate standard deviation of following frequency distribution of marks :

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
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No of Students	5	12	30	45	50	37	21
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2. Calculate mean and mode to the following data.

C.I	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
F	12	18	27	20	17	6

3. What are the mathematical properties of S.10?

4. From the following data compute Q.D.

Size	4 – 7	8 – 10	11 – 13	14 – 16	17 – 19
Frequency	14	24	38	20	4

5. Find the mean and median of the following distribution.

Size of farm acres	0 – 50	50 – 100	100 – 150	150 – 200	200 – 250	250 – 300
No of occupiers	57	256	132	25	10	12

6. What do you understand by “Central Tendency”? What are the merits and demerits of the arithmetic mean?

Unit – II

7. Explain the three important types of correlation and its methods of calculation.
8. Calculate Karlpearson’s coefficient of correlation for the following data relating to the weekly income and expenses of 50 families in a town.

Weekly Income Rs	Weekly Expenses Rs.						Total
	100-120	120-140	140-160	160-180	180-200	200-220	
125-150	2	2	3	3	1	1	12
150-175	-	4	4	1	-	-	9
175-200	2	2	-	2	2	3	11
200-225	-	1	2	2	3	-	8
225-250	1	-	3	2	-	4	10
Total	5	9	12	10	6	8	50

9. Find the co-efficient of correlation between the Marks obtained by 60 candidates at an examination in two subject economic and statistics

Marks in	Weekly Expenses Rs.
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Statistics	5-15	15-25	25-35	35-45	Total
0-10	2	2	3	3	12
10-20	-	4	4	1	9
20-30	2	2	-	2	11
30-40	-	1	2	2	8
40-50	1	-	3	2	10
Total	5	9	12	10	50

10. Calculate regression equations for the data given below:

X	6	2	10	4	8
Y	9	11	5	8	7

11. Find out rank correlation between x and y.

X	25	30	45	45	50	60	40
Y	40	50	60	50	55	45	35

Unit – III

1. Fit a straight line trend by the method of least squares to the following data.

Year	2001	2002	2003	2004	2005	2006	2007
Production	60	72	75	65	80	85	95

2. Calculate the three yearly moving averages of the production figures given below and draw the trend.

Year	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
Production	15	21	30	36	42	46	50	56	63	70	74	82	90	95	102

3. Discuss the various methods for measuring the trend values.

4. Fit a straight line trend for the following series. Estimates the value for 2012.

Year	2001	2002	2003	2004	2005	2006	2007
Prod. Of steel (m) tones	60	72	75	65	80	85	95

5. Give a note one the methods of least squares.

Unit – IV

1. A bag contains 30 balls numbered from one to thirty. One ball is drawn at random. What is the probability that the selected ball is a multiple of (i) 5 or 7 (ii) 3 or 7
2. Give $\mu = 50$ and $\sigma = 10$, find the percentage of students who obtain marks between 40 and 70.
3. Explain the properties of Normal distribution and its importance.
4. Fit a Poisson distribution to the following data and calculate the theoretical frequency. (given $e^{-5.05} = 0.6065$)

X	0	1	2	3	4
Y	122	60	15	2	1

5. In the accounting department of a bank 100 accounts are selected at random and examined for errors. Suppose the following results have been obtained.

No of errors	0	1	2	3	4	5	6
No of accounts	35	40	19	2	0	2	2

On the basis of this information can it be concluded that the errors are distributed according to the Poisson probability law?

Unit V

1. Find out together a following 2 samples have come from the same population by applying t-test and f-test.
 Sample – 1 – 18,27,18,25,27,29,27,23,17
 Sample – 2 – 16,16,20,16,20,17,15,21.

2. 4 coins were tossed 160 times and the following results were found.

No of heads	0	1	2	3	4
Frequency	17	52	54	31	6

Under the assumptions that coins are balance and test the goodness of fit. (for 4d.f chi – square 0.05 = 9.488)

3. From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment.

Treatment	No of Patients		
	Favorable	Not Favorable	Total
New Conventional	140	30	170
	60	20	80
Total	200	50	250

(Given for degree of Freedom = 1, chi – square 5 Percent = 3.84)

4. Two Types of drugs were used on 5 and 7 Patients, for reducing their weight. Drug A was imported and drug B indigenous. The decrease in the weight after using the drugs for six months was as follows.

Drug A	10	12	13	11	14		
Drug B	8	9	12	14	15	10	9

If there a significant difference in the efficacy of the two drugs?
(For $r = 10$, to $.05 = 2.228$)

5. From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment.
(For $r = 1 \times 2 \times 0.05 = 3.84$)

Treatment	No of Patients		
	Favorable	Not Favorable	Total
New Conventional	140	30	170
	60	20	80
Total	200	50	250

6. Explain the properties of a good estimator.

Semester-I			
Core IV Labour Economics			
Sub.Code:21PECC14	Hours/Week:6	Hrs/Semester:90	Credits:4

UNIT I: LABOUR MARKETS

20Hrs

Nature and characteristics of labour markets in developing countries like India; Paradigms of labour market analysis —Classical, neo-classical and dualistic economy; Demand for labour in relation to size and pattern of investment: Supply of labour in relation to growth of labour force

UNIT II: EMPLOYMENT

15Hrs

Employment and development relationship—Poverty and unemployment in developing countries; Unemployment — Concept, Types, and Measurement, particularly in India; Impact of rationalization, technological change and modernization on employment in organized private industry, Public sector and employment in agricultural sector

UNIT III: WAGE DETERMINATION

20Hrs

Classical, neo- classical and bargaining theories of wage determination; Concepts of minimum wage, living wage and fair wage in theory and practice; Discrimination in labour markets; Wage determination in various sectors —rural, urban, organized, unorganized and in informal sectors.

UNIT IV: INDUSTRIAL RELATIONS

15Hrs

Theories of labour movement Growth, pattern and structure of labour unions in India, Achievements of labour unions; Causes of industrial disputes and their settlement and prevention mechanism; Role of tripartism; Current trends in collective bargaining; Role of judicial activism.

UNITV: STATE AND LABOUR

20Hrs

State and social security of labour — Concept of social security and its evolution; Social assistance and social insurance; Review and appraisal of states policies with respect to social security and labour welfare in India; Special problems of labour: Child labour, female labour Discrimination and gender bias in treatment of labour

Text Book

1.Industrial and Labour Economics, MUKUND Mahajan, SD Geet, Nirali Prakashan publishers

Books for Reference:

- 1.Datt,G.(1996),BargainingPower,WagesandEmployment:AnAnalysisofAgriculturalLabourMarketsin India,SagePublications,NewDelhi.
- 2.Hajela,P.D.(1998),LabourRestructuringinIndia:ACritiqueoftheNewEconomicPolicies,CommonwealthPublishers,NewDelhi.
- 3.Jhabvala,R.andR.K.Subrahmanya(Eds.)(2000),TheUnOrganisedSector:WorkSecurityandSocialProtection,SagePublications, NewDelhi.

**QUESTION BANK
I M.A. ECONOMICS
SEMESTER-I**

Core IV

Labour Economics

Sub.Code:21PECC14

Section-A (1 Mark)

UNIT - I

1. The individuals from which the selection can be done after applying all the recruitment strategies are classified as _____
a) **Labor force population** b) Applicant population c) Applicant pool d) Labor market
2. In an organization, the process of qualified individuals' pool generation for specific job is classified as _____
a) **Staffing** b) Recruiting c) Analyzing d) Leading
3. The subset population of the total labor force population is classified as _____
a) **Applicant group** b) Affirmative market c) Applicant population d) Labor force population
4. If a person is ready to work at the prevailing wage rate in the market, but he is unable to find the work, then what type of unemployment would it is called?
a) **Voluntary Unemployment** b) Involuntary Unemployment
c) Structural Unemployment d) Frictional Unemployment
5. If new computers are being installed in a company and some employees are fired from the job due to lack of computer knowledge then what kind of unemployment would it is called?
a) **Frictional Unemployment** b) Structural Unemployment
c) Disguised Unemployment d) Hidden Unemployment
6. Indian Labor market is _____
a) **Not casual** b) Causal c) Not Migratory d) Easy Migratory
7. Employees' Provident Fund Act and Miscellaneous Provisions act was passed in _____
a) **1942** b) 1952 c) 1962 d) 1972
8. As per the Sexual Harassment of Women at Workplace Act which of the following act is not termed as Sexual Harassment?
a) **A demand or request for a sexual favor** b) Sexually colored remarks
c) Bad Physical Contact d) Meeting in the cabinet of the office
9. When was Sexual Harassment of Women employees at the Workplace Act passed?
a) **2011** b) 2012 c) 2013 d) 2015
10. Which article of the Indian Constitution gives freedom to form a trade Union?
a) **Article 23** b) Article 19 (1)(C) c) Article 25 d) Article 1

UNIT II

1. Peasants are _____
a) **Rural Politicians** b) Rural Cultivators c) Rural Religious group d) Rural Industrialist
2. Poverty is a
a) **Social Problem** b) Economic Problem c) Political Problem d) Religious Problem
3. Cyclical and frictional unemployment are found in,
a) **Less developed and developing countries** b) Developing countries
c) Developed countries d) less developed countries
4. The concept of disguised unemployment is developed by
a) **J.M Keynes** b) Amartya Sen c) John Robinson d) Alfred Marshall
5. "Real wages" and "Money wages" are

a) **The former is a wider concept than the latter** b) The latter is a wider concept than the former c) The latter is a less concept than the wider d) The former is less concept than the latter

6. The concept of Quasi-rent mean

a) **The rent to the workers** b) The rent shared by the Landlord and workers c) The interest paid to the entrepreneur d) The return to a factor of production which is fixed in supply in the short period

7. The “iron law of wages” is

a) **The wage-fund theory** b) The marginal productivity theory of wages c) Collective bargaining d) The subsistence theory of wages

8. In classical theory the level of employment is a function of:

a) **Price level** b) Money wage rate C) Quantity of money D) Real wage rate

9. Primarily responsible for enforcing child labor laws in India is,

a) **Individual states** b) India’s Parliament

c) India’s Prime Minister d) International Organization like the UN

10. As per the act, a child should not be permitted to work between

a) **8 PM; 7 AM** b) 7 PM; 8 AM c) 6 PM; 7 AM d) 5 PM; 9 AM

.Unit – III

1. A decline in fertility reduces the number of children at home, which lowers the value of adults' time at home. As a result, the -----

a) **Demand for labor increases** b) Supply of labor increases c) Demand for labor decreases d) Supply of labor decreases

2. Which of the following features causes the labor surplus of a binding minimum wage to exceed the dis-employment effect of the minimum wage?

a) **downward-sloping labor demands** b) a monopsony employer c) upward-sloping labor supply d) inelastic supply of labor

3. If Rich's hourly wage falls from \$15 to \$7.50 his budget line -----

a) **Shifts up without changing its slope** b) gets flatter, pivoting through his endowment point c) gets flatter, pivoting through the vertical intercept d) gets steeper but continues to cut through his endowment point

4. In the context of consumption and leisure time, which of the following is a property of indifference curves?

a) **Indifference curves slope up** b) Indifference curves cross at the intersection of demand and supply c) There's an indifference curve through each pair of leisure and consumption d) Indifference curves bow out from the origin

5. To derive Cassie's weekly labor supply curve, we vary Cassie's _____ and check what happens to her choice of hours to work.

a) **Non- labor income for the week** b) weekly endowment of time c) hourly wage d) weekly wage

6. Which year the Minimum Wages Act enacted?

a) **1948** b) 1949 c) 1950 d) 1951

7. For a typical firm in the short run, labor is a _____ input, and capital is a _____ input.

a) **variable; variable** b) variable; fixed c) fixed; variable d) fixed; fixed

8. The ----- board is required to fix wages in accordance with the principles of wage fixation.
 a) **Wage** b) National c) International d) Domestic
9. If the value of the marginal product of labor exceeds the wage, then employing another worker -----
 a) **Increases profit** b) Increases the marginal product of labor
 c) Increases the value of the marginal product of labor d) Cuts costs
10. In the job shopping model, the quality of Ingmar's job match tends to be highest -----
 a) **at the start of his career** b) toward the end of his career c) in the middle of his career d) at every point in his career

UNIT IV

1. Wages and purchasing theories derived from human -----
 a) **Labour** b) Behaviour c) Kind d) Dignity
2. Who published the book of "The wealth of Nations"?
 a) **Adam Smith** b) Alfred Marshall c) Keynes d) Schumpeter
3. A steeper wage-risk curve generates _____ estimate of the market value of human life.
 a) **a higher** b) a lower c) the same d) Zero
4. Which year the bargain theory of wages proposed?
 a) **1898** b) 1998 c) 1899 d) 1990
5. Prof. Joan Robinson belongs to which country?
 a) **England** b) Philippines c) German d) Greek
6. Expand MPC:
 a) **Marginal Propensity to Consume** b) Marginal Productivity to Consume
 c) Marginal Propensity to Construct d) Marginal Productivity to Construct
7. The wage rate is established in the market through the -----.
 a) **Demand** b) Supply c) Equilibrium d) Money level
8. The Marginal – productivity theory was once prevailing theory of -----
 a) **Production** b) Wages c) Profits d) Labour

Unit V

1. Social insurance is an institution jointly operated by industrialists, workers and -----
 - a) **Government** b) Private c) Teachers d) Lowers
2. The adoption of Social Security Convention in the year ----- embodying the universally accepted basic principles
 a) **1952** b) 1954 c) 1950 d) 1951
3. The tuition rate jumps from \$0 to \$8,000 per grade. As a result,
 a) **The quantity demanded of schooling falls as a movement up the schooling demand curve**
 b) the demand for schooling falls c) wages grow with schooling at a slower rate
 d) people stay in school longer
4. Life expectancy tends to be low in undeveloped countries. The short life - span in undeveloped countries _____ their demand for schooling.
 a) **Increases** b) Decreases c) Doesn't influence d) Negative
5. Which of the following types of education best fits the signaling model of schooling?
 a) **Medical school** b) Elementary education in reading, writing, and arithmetic
 c) Undergraduate education in engineering d) Liberal arts education in literature and philosophy

6. With general training, the net productivity profile slope up because _____ over the worker's career.
- a) **Training costs fall** b) Productivity raises
 c) Training costs fall and productivity rises d) Labor exploitation falls
7. If an employer back-loads pay along a competitive wage profile, then _____
- a) **it attracts workers who are bad matches** b) it promotes workers too quickly
 c) it dismisses workers before it's time to overpay them
 d) workers quit before the firm tries to underpay them
8. With general training and employment at will, wages _____ at a _____ rate over a worker's career.
- a) **Increase; increasing** b) increase; decreasing c) decrease; decreasing d) decrease; increasing

Section - B

UNIT I

(2 Marks)

1. Define labour market.
2. What are the characteristic of labour markets?
3. What is the nature of labour market?
4. Define Paradigm.
5. Define dual labour market.
6. What is demand for equal labour?
7. What are the factors influence the demand for labour?
8. Define demand and Supply of labour
9. State the supply of Labour.

UNIT II

1. Define the impact of economic growth on employment.
2. How does employment contribute to economic development?
3. Define the increase in employment opportunities.
4. What is the factor creates the employment?
5. What is the factors impact on poverty reduction in economic growth?
6. What is the type's measures unemployment in India?
7. Define unemployment
8. What are the different types of unemployment?
9. What is the cause of unemployment?
10. What is employment in agriculture sector?

UNIT III

1. What is the determination of wage?
2. What are the 5 types of wage?
3. What are the principles of Wage determination?
4. What is India's Minimum wage in the year 2020?
5. State the national minimum wage and national living wage rates.
6. Define living wage and fair wage.
7. What are the three type's wages?
8. What are the benefits of living wage?
9. What is the meaning of informal sector?
10. Define urban informal sector.

UNIT IV

1. Define labour movement?

2. What are caused the labour movement?
3. What is labour union growth?
3. What was the reason for the growth on trade union?
4. Define structure of a labour union?
5. What is the Growth pattern in India?
6. What are the methods of settlement of industrial disputes?
7. What are the causes of industrial disputes?
8. What is the principle of tripartism?
9. What is tripartism in industrial relation?
10. What is the purpose of Judicial Activism?

UNIT V

1. Define social security of labour
2. How has social security evolved?
3. What is the concept social security?
4. What are some of the achievement of union?
5. What are the types of trade union?
6. What are the problems faced by the worker
7. What is wrong with child labour?
8. Why is child labour a violation of human rights?
9. What are the causes of child labour?
10. What are the factors that cause gender gaps in the labour market?

Section – C

UNIT I

(6 Marks)

1. What are the characteristics of Indian labour market?
2. What is the labour market in India?
3. What is the role of developing countries?
4. Nature and problem of developing countries?
5. What is function of labour market?
6. What is classical theory of labour market?
7. What are the three indicators about the labour market?
8. What is its critique of the neoclassical labour theory?
9. How trade unions help to improve the labor's life?
10. Classify the types of labour market.

UNIT II

1. How does employment affect community development?
2. What are the relationship between economic growth and unemployment?
3. What is factor increase in employment opportunities?
4. What is the decline in economic growth and employment?
5. What are the cause and effect of employment?
6. What are the factors is main reason for poverty?
7. How does agriculture affect employment?
8. Summarize the relationship between poverty and unemployment?
9. What is urban informal sector in India?
10. Explain the types of informal sector employment in India?

UNIT- III

1. Explain the classical theory of employment?
2. What is David Ricardo's theory on wage?
3. What's meant by bargaining theory of wage determination?
4. Explain Neo classical theory of wage determination?

5. Explain the subsistence theory of wage?
6. What is the purpose of the minimum wage?
7. What is the concept of wage?
8. What was the purpose of the minimum wage?
9. How does discrimination occur in labour market?
10. What are the four types of labour market discrimination?
11. Explain the Labour market discrimination essay?

UNIT IV

1. Explain the division of labour theories?
2. List out the importance of labour movement?
3. What was the chief cause of labour movement?
4. How many types of labour union are found in India?
5. How many levels are there in the structure trade union in India?
6. What are some of the achievement of union?
7. What are 5 roles of trade union?
8. Explain Trade union in HRM.
9. What is the main cause of industrial dispute in India?
10. Explain the methods of settling industrial disputes?

UNIT V

1. What is social security in employee relation?
2. What is the different social security measure for labour?
3. What is the importance of social security?
4. What is the concept of social security and explain its step and growth?
5. Explain the concept and evolution of social security in India?
6. What is the relationship between social insurance and social security?
7. What are the Social assistance and social insurance in India?
8. What are the social security and labour welfare measure in India?
9. List out the social security schemes in India.
10. Explain Problem of social security in India.

Section - D

UNIT I

(12 Marks)

1. Critically explain the role of labour in developing countries.
2. Enumerate the nature of labour problems in developing countries.
3. State and explain the function and characteristics of labour market?
4. Critically explain the neo- classical labour market theory.
5. What are the Advantages and disadvantages of neoclassical economy theory?
6. Which factors influence the demand for and supply of labour?
7. State and list out the 5 factors affecting the demand for labour?

UNIT- II

1. Critically analyze the Employment through Economic Development.
2. What are the types of unemployment is found in developing countries?
3. State and explain the relation between poverty and unemployment.
4. Give a detail explanation of the measurement system is used in India?
5. How is rationalization affecting our society?
6. State the Principal of rationalization and negative consequence of rationalization.

UNIT- III

1. Critically explain the bargaining theory of wage.
2. Analyze the theory of wage in classical economics.
3. How will you decide minimum wage fair wage and living wage for your employees?

4. Which of the following is used to measure discrimination in labour market?
5. What are the 4 types of labour market discrimination?
6. How is the wage determined in the unorganized sector?

UNIT -IV

1. Critically analyze the theories of labour movement growth?
2. Explain the current status of trade unionism in India in a detail manner?
3. Analyze the trade unionism and its growth?
4. Explain the structure and pattern of trade unionism in India.
5. Analyze the structure and function of trade union movement in India.
6. Critically enumerate the current status of trade unionism in India
7. Discuss the role of trade union in India.

UNIT - V

1. Give a detail explanation for the social security and its growth in India
2. Enumerate the evolution of social security.
3. Critically analyze the integrating social insurance and social Assistance programs.
4. State and explain the Labour market issues and problem faced by the workers.
5. Explain the emergence and need for social security in labour in India.

Semester-I			
Core V		ECONOMICS OF FARM BUSINESS	
Sub.Code:21PECC15	Hrs/Week:6	Hrs/Semester:90	Credits:4

UNIT: I Principles of Farm Management 20Hrs

Meaning and Scope of Farm Management –Importance of the Subject of Farm Management In India. Principles Involved In Farm Management Decisions: Principle of Variable Proportion - Cost Principle - Principles of Factor Substitution - Law of Equi marginal Return –Opportunity Cost Principle-Principle of Combining Enterprises

UNIT: II Farm Resources 15Hrs

Green Revolution - Agriculture Inputs: Fertilizers and Plant Protection, Irrigation and Farm Mechanization - Concept of Agricultural Labourer – Growth, Causes of Growth – Conditions and Problems of Agricultural Laborers and Measures Taken.

UNIT:III Capital and Credit 15Hrs

Role of Capital in Agriculture – Sources of Capital – Need for Agricultural Credit Classification of Agricultural Credit- Source of Agricultural Credit: Non-institutional and Institutional – Crop Insurance Capital Formation In Agriculture Sector.

UNIT: IV Marketing 20Hrs

Functions of Marketing - Characteristics of Agricultural Produce – Defecting In Marketing of Agricultural Produce In India – Measures Taken By Government – Regulated Markets Co-Operative Marketing–Marketed and Market able Surplus, Marketing Costs and Margin.

UNIT:V Price Policy and Public Distribution 20Hrs

Need For and Objectives of Agricultural Price Policy-Instruments of Agricultural Price Policy in India: Support, Procurement And Issue Prices - Public Distribution – Buffer Stock –Agricultural Trade and Balance of Payment With Special Reference To Agricultural Commodities.

Text Book:

S.S.Johl and Kapur– Fundamentals of Farm Business Management, Kalyani Publishers.

REFERENCES:

1. A.N.Sharma and V.K.Sharma:-Elements of Farm Management, Prentice-Hall of India Pvt.Ltd
2. Sadhu and Singh- Fundamentals of Agriculture Economics, Himalaya Publishing House, Bombay.
3. Earl.O. Heady Economics of Agricultural Production & resources use, Prentice Hall, New Delhi.
4. Rudder Datt and KPM Sundaram-Indian Economy ,S.Chand & Company Ltd.

ST.MARY'S COLLEGE (Autonomous) –THOOTHUKUDI
QUESTION BANK
I-MA Economics
Core – V Economics of Farm Business Sub.code:21PECC15

Unit –I **Section - A** **(1 Mark)**

1. Farm management comprises of_____ words.
a. **two** b. five c. one d. three
2. Farm means a piece of _____
a. **land** b. labour c. Agriculture d. Capital
3. Management means the ____or art managing.
a. **Act** b. Cart c. law d. commitment
4. Farm management comes under _____economics.
a. **Micro** b. Macro c. Social d. Labour
5. The farm management subject covers the aspects such as research, _____and extension.
a. Teaching b. Evaluation c. **practice** d. Exercise
6. Farm has to earn profits during the short term and the _____term.
a. **Long** b. Middle c. prolonged d. extended
7. Rent will vary based on _____and crop prices throughout the year.
a. **Yields** b. bend c. flex d. defer
8. Common capital improvements cover drainage, erosion, and_____.
a. Access b. burst c. leakage d. spots
9. Property taxes are paid each year, due on specific dates that vary by_____.
a. **State** b. Central c. local d. International
10. Cultivator has limited capital and his main objective is to _____net profit.
a. **Maximize** b. Minimize c. Zero d. negative

Unit-II

1. Green revolution, great increase in production of _____
a. **food grains** b. cereal c. rice d. millet
2. The Green Revolution was a period when agriculture in India was converted into an _____system.
a. Industrial b. Service c. power d. **irrigation**

3. When the British left India in_____, India continued to be haunted by memories of the Bengal Famine.
 - a. **1947** b.1985 c. 1966 d. 1955
4. Double cropping was a primary feature of the_____.
 - a. **Green Revolution** b. blue Revolution c. yellow Revolution d. pink Revolution
5. _____for the second phase now came from huge irrigation projects.
 - a. **Water** b. power c. fertilizer d. feticides
6. The Green Revolution resulted in a record grain output of _____million tonnes in 1978/79.
 - a. 131 b. **148** c. 156 d. 328
7. India's agricultural output sometimes falls short of _____even today.
 - a. **Demand** b. Supply c. bestow d. endow
8. _____is technically defined as ripened ovule containing embryo.
 - a. **Seed** b. pit c. nut d. egg
9. Irrigation is the artificial application of _____to crops.
 - a. Water b. power c. **drizzle** d. liquid
10. The _____and mahajans often advance loans with the purpose of grabbing the land of small farmers.
 - a. **Money lenders** b. broker c. dealer d. financier

Unit-III

1. Capital and labour are the two important factors of_____.
 - a. **Production** b. Construction c. input d. output
2. The capital formation thus facilitates to expand agricultural market as these benefits result in more marketable _____.
 - a. **Surplus** b.unused c. Leftover d. surfeit
3. Capital formation into_____ categories.
 - a. Two b. **three** c. six d. four
4. _____and private investment in agriculture is both complementary as well as substitutive.
 - a. Public b. government c. common d. social
5. Public investment can also be considered as a substitute of private investment in _____.
 - a. **Agriculture** b. industry c. service d. public sector
6. Farmers need a large amount of capital to farm their_____.
 - a. Lands b. **money lender** c. work d. bank
7. _____management is one of the most important aspects of any business.

- a. Financial b. farm c. marketing d. skill
8. The local department of agriculture may be the best source of advice on who or where to _____.
- a. **borrow money** b. buying c. get d. obtain
9. Investing funds received in a good year can help to prepare for any subsequent _____ on the farm.
- a. **poor years** b. annual c. current d. leap year
10. The money market is the process of _____ and selling money.
- a. **Buying** b. hunting c. procuring d. obtaining

Unit-IV

1. Marketing is the process of planning and _____
- a. **Executing** b. controlling c. making d. directorial
2. The company should then chalk out a timeline that is essential for achieving the _____
- a. Objectives b. **goals** c. aim d. target
3. Grading helps in making the customer know about the _____ of the product offered.
- a. **Quality** b. grade c. Standard d. condition
4. The first impressions of a product are its _____ and the label attached to it.
- a. **Packaging** b. parcel c. box d. collection
5. _____ is referred to as the process of identifying the name of the producer with the product.
- a. **Branding** b. distort c. contort d. mislead
6. Promotion is the process of making the customers aware of the _____
- a. **Product** b. labour c. outputs d. power
7. _____ refers to the movement of consumer goods to the point of consumption.
- a. **Distribution** b. Collection c. Disarrange d. mix up
8. _____ of products create time utility.
- a. **Warehousing** b. stock c. repository d. depot
9. The agricultural products are considered as a _____
- a. **raw material** b. inputs c. basic material d. stock
10. The agricultural products are much more _____ than any other goods.
- a. **Perishable** b. non- Perishable c. decayable d. fleeting

Unit-V

1. The main objectives of agricultural policy are to _____ the major problems of agricultural sector.
- a. **Remove** b. pull out c. take out d. take off

2. _____system is carried on through the network of fair price shops.
 - a. **Public distribution**
 - b. general distribution
 - c. common distribution
 - d. distribution
3. Buffer stock operations refer to buying and selling of food stocks by _____.
 - a. **government**
 - b. private
 - c. public
 - d. common people
4. The minimum support _____is the foremost instrument in the nature of a long-term guarantee to producers.
 - a. **price**
 - b. wage
 - c. income
 - d. power
5. _____also aims at to stabilize prices on the part of the consumers especially in the case of food grains
 - a. **Price policy**
 - b. monetary
 - c. Fiscal
 - d. income
6. Public distribution is another major instrument of _____policy.
 - a. **price**
 - b. Monetary
 - c. Fiscal
 - d. income
7. Minimum Support Price is the price at which government purchases _____for the farmers.
 - a. **crops**
 - b. rood
 - c. half-breed
 - d. hybrid
8. _____is an important resource in nearly all commercial farm businesses.
 - a. **Credit**
 - b. debit
 - c. merit
 - d. tribute
9. The transfer of an on-going _____from one proprietor to another involves large quantities of capital.
 - a. **farm business**
 - b. agribusiness
 - c. industry
 - d. service
10. Weather, disease and price are all uncertainties in the _____business.
 - a. **farm**
 - b. cotton
 - c. Mill
 - d. Non-agricultural

Section - B

Unit –I

(2 Marks)

1. Define Farm Management.
2. Define Farm mechanization.
3. What is Farm planning?
4. What is Farm management education?
5. Define Cash Rent Lease.
6. Define diminishing returns.
7. What is Opportunity cost?
8. Define Iso-revenue Curve.
9. What is Joint Product?
10. What are Property taxes?

Unit-II

1. Define Green Revolution.
2. What are the benefits of green revolution?
3. Define crops.
4. Define Seed.
5. What is Farm Power?
6. Define Irrigation.
7. What is plant protection in agriculture?
8. What do you mean by farm mechanization?
9. Define Agriculture laborer.
10. Define Minimum Wages Act.

Unit-III

1. Define Fixed Capital
2. Define Working Capital
3. What is financial management?
4. Define financial institutions.
5. Define Money market.
6. What is stock exchange?
7. What is financial planning?
8. Define Agricultural Credit.
9. What is Production credit?
10. Define Crop Insurance

Unit – IV

1. Definition marketing.
2. What is Product Development?
3. Define Branding.
4. What is Promotion?
5. What is Warehousing?

6. What are perishable goods?
7. Define Land reforms.
8. Define National Food Security Act.
9. Define Public Distribution System?
10. What is regulated market?

Unit –V

1. Define Agricultural price policy.
2. Define minimum support prices.
3. What are Buffer stock operations?
4. What is MSP and issue price?
5. Define Procurement Prices.
6. What is Food Corporation of India?
7. Define Retail prices.
8. Write any two agricultural policies.
9. Define Public Distribution.
10. Define Minimum Price.

Section-C

Unit- I

(6 Marks)

1. Explain the Scope of Farm Management.
2. Discuss the farm management research.
3. Explain the Importance of Farm Management.
4. Explain the types of leasing.
5. Write a short note on Fertility.
6. Explain the diminishing returns.
7. Discuss the Law of Equi-marginal Return.
8. Write a short note on complementary Productions.

Unit-II

1. Write a short note on Green Revolution.
2. Explain the three basic elements in the method of the Green Revolution.
3. Write a sot note on agricultural inputs.
4. Explain the sources of capital.
5. Discuss the Non- institutional

6. Give a brief notes on crop insurance.

Unit-III

1. Explain the functions of Marketing.
2. Discuss the agricultural produce.
3. Explain the regulated markets.
4. Describe the agricultural credit.
5. Critically examine the sources of agricultural credit.
6. Explain the Public Capital and Private Capital.
7. Discuss about the Financial management
8. Explain the Financial Institutions.
9. Discuss the money markets and its importance.

Unit-IV

1. Explain the functions of marketing.
2. Discuss the Bulky and perishable goods.
3. Explain the National Food Security Act 2013.
4. Discuss the Public distribution system.
5. Give specific objectives of regulated markets.
6. Explain functions of co operative marketing.
7. Discuss the Marketed and Marketable surplus.
8. Write a short note on Marketing costs and Margin.

Unit-V

1. Explain the Agricultural price policy.
2. Discuss the Minimum support prices.
3. Explain the Buffer stock operations.
4. Write a short note on MSP and issue price.
5. Give a brief explanation about Procurement price.
6. Discuss the role of Public Distribution System.
7. Explain the Objectives of Agricultural Price policy.

Section-D

Unit –I

(12Marks)

1. Explain the Importance of the Subject of Farm Management in India.
2. Explain the Principles involved in farm management decisions.

3. Discuss the Principle of Variable Proportion.
4. Critically examine the Principle of variable proportions or laws of returns.
5. Discuss the Principle of Combining Enterprise.

Unit-II

1. Give a brief history about Green Revolution.
2. Explain the farm mechanization in agriculture.
3. Drip Irrigation: Water to the roots-Discuss.
4. Explain the agricultural labourers and their types.
5. Explain Causes of Growth in the Number of Agricultural Labourers.
6. Discuss the conditions and problems of agricultural labourers and measures taken.

Unit-III

1. Explain the role of capital in Agricultural.
2. Discuss the complementarity between public and private capital.
3. Discuss the need for agricultural credit.
4. Explain the classification of agricultural credit.
5. Critically examine the Source of Agricultural Credit.
6. Explain the Non-Institutional source of agriculture finance.
7. Discuss the National Bank for Agriculture and Rural Development.

Unit-IV

1. Explain the characteristics of agricultural produce.
2. Discuss the Defecting in agricultural produce in India.
3. Evaluate the Measures taken by Government in agricultural produce.
4. Important features of regulated markets-Discuss.
5. Explain the Cooperative Marketing and their functions.

Unit-V

1. Explain the need for and objectives of agricultural price policy.
2. Discuss the Price Policies of the Government.
3. Evaluate the Instruments of price policy.
4. Explain the role of credit in the farm business.
5. Critically examine the agricultural trade and balance of payments.

Semester- II			
Core I Advanced Micro Economic Analysis- II			
Sub. Code: 21PECC21	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

Unit – I Alternative Theories of the Firm:

15 Hrs

Baumol's sales revenue maximization model; Williamson's model of managerial discretion Marris model of managerial enterprise; Full cost pricing - Bain's limit pricing theory and Sylo's Labini model of limit pricing - Behaviouristic model of Cyert and March

Unit – II Theories of Distribution:

15 Hrs

Marginal Productivity Theory; Euler's product exhaustion theorem – Theories of distribution: Ricardian, Marxian, Kalecki and Kaldor's theories of distribution

Unit – III Welfare Economics:

15 Hrs

Nature – Pigouvian Welfare Economics – Pareto optimality condition – Kaldor – Hicks compensation criteria – Scitovsky Paradox - Social welfare function, Bergson and Samuelson - Arrow's theory of social choice

Unit – IV Theory of Games:

15 Hrs

The Zero – Sum, Two - Person Game – No constant- sum Games -Maximin and Minimax strategies – Equilibrium points (Saddle)

Unit – V Economics of Risk and Uncertainty:

15Hrs

Individual Behavior towards risk, expected utility and certainty - Risk and Risk aversion competitive firms under uncertainty – Factor demand under-price uncertainty - Economics of information – Search for New Market Models.

Text Book:

Kennedy, Maria John M., (1999)Advanced Micro Economic Theory (Second Edition) New Delhi: Himalayas Publishing House

Books for Reference:

1. Da Costa., G.C., 1980, Production, Prices and Distribution (New Delhi: Tata McGraw Hill.
2. Hirshleifer, J and A. Glazer., 1997, Price Theory and Applications New Delhi: Prentice Hall of India.
3. Stigler.G1996, Theory of Price (Fourth Edition) New Delhi: Prentice Hall of India.

St. Mary's College (Autonomous) – Thoothukudi
Question Bank
I M.A ECONOMICS
Core I Advanced Microeconomic Analysis – II Sub. Code: 21PECC21

Section A

Choose the Correct Answer:

Unit – I

1. The ----- industry-demand curve shows the expected sales at different prices maintained over long periods.
a) **Long run** b) Short run c) Market Period d) Very Short Period
2. There is effective collusion among the established -----
a) **Oligopolist** b) Monopoly c) Duopoly d) Monopolist
3. Bain's model is not incompatible with profit is -----.
a) Minimum b) Zero c) **Maximum** d) One
4. The ----- price will be chosen in favour of monopoly price if the former yields maximum long-run profits.
a) Limit b) **Lowest** c) Highest d) Less
5. ----- developed a model of limit-pricing based on scale-barriers to entry.
a) Sylos-Labinib) Marris c) **Williamson's** d) Bains
6. The product is ----- and will be sold at a unique equilibrium price.
a) Homogeneous b) Heterogeneous c) **Perfect** d) Imperfect
7. The established firms and the entrant behave according to what ----- called the 'Sylos's Postulate'.
a) **Modigliani** b) Marris c) Williamson's d) Bains
8. There is -----relationship between the absolute size of the market and the limit price.
a) Negative b) **Positive** c) No d) Zero
9. According to Marris, the rate of growth of ----- is subject to the constraint set by the decision making capacity of the managerial team.
a) Capital b) Labour c) **Land** d) Investment
10. Less liquidity ratio increases the risk of ----- and bankruptcy.
a) Insolvency b) Solvency c) Loss d) Threat

UNIT – II

1. Under Marginal productivity Theory, reward for labour is determined by
a) Owner b) Labour c) **Government** d) Marginal Product
2. The economist Ricardo argued that prices were _____ because land rents were _____
a) High, High b) Low, Low c) **Low, High** d) High, Low
3. As for the cost of production of an individual farmer, the rent paid by him
a) **Enters into the price of his product** b) None of these c) Does not enter into price of his product d) Is unjustified
4. He presented a theory of rent
a) **Malthus** b) Prof. Knight c) Ricardo d) Marshall
5. The following affect rent EXCEPT
a) **Better location** b) Fertility of land c) Cleverness of landlords d) Scarcity of land
6. These are kinds of rent EXCEPT
a) Differential rent b) Scarcity rent c) **Mobility rent** d) Location rent
7. which of the following is capital:
a) Money b) Forests c) Machinery d) **Trademarks**
8. According to Keynes interest is a payment for
a) **Consumer's preference** b) Producer's preference c) Liquidity preference d) State Bank's preference
9. Every factor of production gets reward equal to its:
a) Cost b) **Marginal product** c) Price d) Increasing return
10. According to Keynes, interest is a payment for:
a) Use of durable goods b) **Use of capital** c) Use of money d) Use of land

UNIT – III

1. -----defined individual welfare and social welfare and the scope of economic welfare.
a) **Pigou** b) Keynes c) William d) Domar
2. ----- welfare is the sum of satisfaction obtained by an individual from the use of goods and services.
a) Individual b) **Social** c) personal d) Demography
3. ----- welfare is the summation of the welfare of all the individuals in the society.
a) Individual b) Social c) personal d) Demography

4. Economic welfare is that part of social welfare that can be brought directly or indirectly into relation with the measuring rod of-----
a) Money b) **Interest** c) Gold d) Diamond
5. Nicholas Kaldor was the first economist to give a welfare criterion based on -----
-- payments.
a) Compensating b) **Control** c) Check d) Demand
6. Prof. Hicks proposed a test which is the -----of Kaldor test.
a) **Reverse** b) Direct c) Simplest d) Hardest
7. Arrow's main concern is to consider if a ----- choice can be satisfactorily derived from individual decisions.
a) Social b) **Individual** c) Consumer d) Producer
8. Prof. Arrow, in his monumental work, Social Choice and Individual Values, published in -----
--
a) 1951 b) **1950** c) 1952 d) 1953
9. Arrow has proved a general theorem about the impossibility of constructing an ordering for society as a-----
a) Whole b) Part c) Division d) **District**
10. -----condition states that a definite social ordering is derivable from a reasonably wide range of individual orderings.
a) Universality b) **Individual** c) Society d) Country

UNIT- 1V

1. A ----- game is a situation where one person's loss in a transaction is equivalent to another person's gain.
a) **Zero-sum** b) Two – Sum c) Rule d) Document
2. Zero-sum game can only allow for the ----- of the initial amount of resources.
a) Redistribution b) **Distribution** c) connection d) Disconnect
3. A decision rule in decision theory, game theory, and other related fields that is used to minimize the most ----- loss or maximize the least possible gain.
a) Potential b) Given c) **Fixed** d) Variable
4. ----- in a zero-sum game is defined as a situation where the total of the individual payoffs for each outcome equals zero.
a) **Uncertainty** b) Certainty c) Game d) Rule
5. ----- strategy is defined as the approach of reducing one's own maximum loss.
a) Minimax b) Maximin c) Maximum d) Minimum
6. ----- approach is defined as maximizing one's own minimal gain to the greatest extent possible.
a) **Minimax** b) Maximin c) Maximum d) Minimum
7. The min-max criteria are a decision-making criterion that was first proposed by Leonard Savage in 1954.
a) 1954 b) 1955 c) **1956** d) 1957
8. In a ----- strategy, players adopt a strategy that provides the best payoffs.
a) Pure b) **Straight** c) Line d) Smart
9. In the game theory, different ----- adopt different types of strategies on the basis of the outcome, which is obtained by adopting the strategy.
a) Players b) Games c) **Types of market** d) Strategies
10. A ----- strategy is the one that is best for an organization and is not influenced by the strategies of other organizations.
a) **Dominant** b) Predominant c) Important d) Developed

UNIT – V

1. Most individuals generally prefer the ----- risky situation.
a) **Less** b) More c) Zero d) Negative

2. Most individuals seek to minimise risk and are called risk ----- or risk averse.
 - a) Averter b) **less** c) getter d) demander
3. A risk seeker, on the other hand, is not simply the person who hopes to maximize the value of retirement investments by investing the ----- market.
 - a) Stock b) **Share** c) Home d) Internal
4. Risk ----- individuals will not pay extra to have the risk transferred to someone else, nor will they pay to engage in a risky endeavor.
 - a) Neutral b) Free c) competition d) Expected
5. Financial theories and research pay attention to the nature of the behavior of firms in their pursuit to ----- value.
 - a) Maximize b) **Minimize** c) Price d) State
6. The expected utility theory then says persons shall choose an option that maximizes their expected utility rather than the ----- wealth.
 - a) Expected b) Total c) **Marginal** d) Declare
7. -----competition is one of the market models found in a free market environment.
 - a) Pure b) Perfect c) **Imperfect** d) Free
8. A ----- firm is identified as a seller who is able to provide a significantly large number of products into the market enabling it to control the entire market.
 - a) Monopoly b) Duopoly c) **Perfect** d) Oligopoly
9. ----- refers to a market structure that is characterized by the existence of few but relatively large firms who dominate the market controlling the prices.
 - a) Oligopoly b) Monopoly b) **Duopoly** c) Perfect
10. -----competition market structures are the best market conditions to have as they allow for fair competition and efficiency of the markets.
 - a) Pure b) **Perfect** c) Imperfect d) Free

Section – B

(2 Marks)

UNIT- 1

1. Define Baumol's sales revenue maximization model.
2. What is full cost pricing?
3. Define managerial discretion.
4. What are the assumptions of Bain's limit pricing theory.
5. Explain the level at which the limit price will be set.
6. What is sales maximization?
7. Define profit maximization.
8. What are the three major possibilities exist from the firm?
9. What is price determination?
10. What are the two constraints in managerial team?

UNIT – II

1. Define Marginal Productivity Theory.
2. What is Euler's product Exhaustion theorem?
3. What is distribution?
4. Define Ricardo's theory of distribution.
5. Define Marxian's theory of distribution.
6. Define Kalecki's theory of distribution.
7. Define Kaldor's theory of distribution.
8. What is the rent?
9. What is Profit in classical view?
10. What is subsistence wage?

Unit – III

1. Define welfare in Economics:
2. What is Pigovian welfare economics?
3. Define Pareto optimal condition in welfare.
4. What is Kaldor welfare economics?
5. What is Hicksian analysis of welfare economics?
6. Define Social welfare in economics.
7. Define Individual Welfare in economics.
8. Define the concept of welfare by Bergson and Samuelson.
9. What is social choice?
10. Define the Arrow's theory of social choice.

Unit – IV

1. Define Zero sum game theory:
2. What is two person's game theory?
3. Define the No constant sum games:
4. What is Maximin strategy in game theory?
5. What is Minimax strategy in game theory?
6. Define saddle point.
7. What are the saddle points in game theory?

Unit – V

1. Define risk:
2. What is risk aversion?
3. What is uncertainty?
4. Define utility.
5. What is expected utility?
6. What are the types of risks?
7. What is factor demand?
8. Define market:
9. What is under price uncertainty?
10. Give an example for risk and uncertainty:

Section – C

(6 Marks)

UNIT- 1

1. Explain the Baumol's sales revenue maximization model with its assumptions and figure.
2. Explain the concept of full cost pricing in managerial enterprise.
3. Differentiate between the Williamson's and Marris model of managerial enterprise.
4. Explain the Bain's limit pricing theory with its major assumptions.
5. Explain Sylo's Labini model of limit pricing theory with its major assumptions.
6. Discuss the main features of behavioristic model of Cyert and March:
7. List out the criticisms of the Baumol's sales revenue maximization model.
8. Explain the job security constraint.
9. Explain the managerial utility functions in Williamson's theory.
10. State and explain the Williamson's Managerial Discretionary Model.

Unit – II

1. Explain the Marginal Productivity Theory:
2. List out the assumptions with its diagrammatic explanation of Euler's theorem:
3. Explain Ricardo's theory of distribution with its assumptions.
4. Explain Marxian's theory of distribution with its critical views.
5. Explain Kalecki's theory of distribution with its assumptions.
6. Explain Kaldor's theory of distribution with its critical views.

Unit – III

1. Explain the nature of welfare economics by the classical economist:
2. List out the conditions for attaining the social welfare by the Pareto optimality conditions.
3. Explain the compensation theory of Kaldor and Hicks in welfare economics:
4. Explain the Scitovsky Paradox in welfare economics:
5. Explain the social welfare function with its main objectives:
6. Discuss the social welfare through their concepts namely Bergson and Samuelson:
7. Explain the Arrow's theory of social choice:
8. Distinguish between Pigovian and Pareto welfare economics:

Unit – IV

1. Explain the Zero sum theory with its major assumptions:
2. Explain the difference between the Zero sum and Two person game theory:
3. Explain the Two person game theory in a brief manner:
4. Discuss the No constant games theory:
5. Explain the Maximin and Minimax strategies theory games:
6. Explain the Equilibrium points theory of games:

Unit – V

1. Distinguish between the risk and uncertainty:
2. Explain the individual behavior towards risk:
3. Explain the expected utility and uncertainty in economic behavior:
4. List out the factors which evolve the demand for under - price uncertainty:
5. Explain the economics of information towards the risk and uncertainty:
6. Explain the new markets models regarding the aversion of risk and uncertainty:
7. Explain the conditions of firms under risk and risk aversion:
8. Explain the firms under uncertainty in the case of its production level:

Section – D

(12 Marks)

Unit – I

1. Critically analyse Baumol's sales revenue maximization model.
2. Give a detail report on full cost pricing and its adaptability in managerial function.
3. Critically analyse the Williamson's model of managerial discretion.
4. Evaluate the Marris model of managerial enterprise.
5. State and explain Bain's limit pricing theory with its critical issues.
6. Evaluate the Sylo's Labini model of limit pricing.
7. Critically analyse the Behavioristic model of Cyert and March.

Unit – II

1. Critically explain the Marginal Productivity Theory from the view of Neo- Classical Economist:
2. Critically explain the Euler's product exhaustion theorem theory:
3. Discuss the view of Ricardo's theory of distribution with its critical views.
4. Critically evaluate the Marxian's theory of distribution.
5. Give a detail explanation for Kalecki's theory of distribution with its assumptions and critical views.
6. Discuss the view of Kaldor's theory of distribution with its critical views.

Unit – III

1. Critically explain the Pigovian concept of welfare economics:
2. Discuss the condition of Pareto optimality regarding the social welfare in economics.
3. Give a detail explanation for Kaldor and Hicks compensation criteria:
4. Critically evaluate Scitovsky Paradox social welfare function.
5. Discuss the assumptions of Bergson and Samuelson Social welfare function:
6. Critically evaluate the Arrow's theory of social choice:

Unit – IV

1. Critically evaluate the concept of the Zero sum theory with its major assumptions:
2. Give a detail explanation for the difference between the Zero sum and Two person game theory:
3. Critically explain the Two person game theory in a brief manner:
4. Discuss the No constant games theory with its scope and limitations of it:
5. Critically evaluate the Maximin and Minimax strategies theory games:
6. Give a detail explanation for the Equilibrium points theory of games:

Unit – V

1. Give a detail explanation for the individual behavior towards risk.
2. Critically evaluate the expected utility and uncertainty in economic behaviour.
3. Discuss the factors which evolve the demand for under - price uncertainty in a detail manner.
4. Critically evaluate the economics of information towards the risk and uncertainty.
5. Give a brief explanation for the new markets models regarding the aversion of risk and uncertainty.
6. Explain the conditions of firms under risk and risk aversion and critically explain the firms under uncertainty in the case of its production level.

Semester- II			
Core II Advanced Macroeconomic Analysis - II			
Sub. Code: 21PECC22	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

UNIT-I: Demand for Money and Supply of Money **15Hrs**

Demand for Money: Classical, Keynesian and Post-Keynesian; Patinkin's - Real Balance Effect; Approaches of Baumol, Tobin and Friedman - Meaning of Money supply – Money Multiplier – Determinants of Money supply

UNIT-II: Theories of Inflation **15Hrs**

Classical, Keynesian and Monetarist approaches to inflation; Structuralist theory of inflation; Philips curve analysis-Short run and Long run Philips curve -Tobin's modified Philips curve; Policies to control inflation

UNIT-III: Business Cycles **15Hrs**

Theories of Schumpeter, Kaldor, Samuelson and Hicks, Control of business cycles- Relative efficacy of monetary and fiscal policies

UNIT-IV: Recent Developments in Macroeconomics **15Hrs**

Monetarism Vs Keynesianism – Supply side Economics – New Classical Macro Economics – Rational Expectation

UNIT-V: Macro Economic Policy **15Hrs**

Monetary policy – Fiscal policy – Incomes policy – Objectives – Instruments and Applications to Developing Economy

Text Book:

Maria John Kennedy. *Macro Economic Theory*. New Delhi: PHIL 2nd edition 2012

Reference Books

Glahe, Fred, R *Macroeconomics Theory and Policy*. New York : Harcourt BraceJovanovich, Inc,1973

Laidler, D.E.W. *Demand for Money: Theory and Evidence*. New York: Dum-DonValley, 1977

Romer, D.L. *Advanced Macroeconomics*. New York: McGraw Hill Company Ltd.,1996

Ackley, G. *Macroeconomics: Theory and Policy*. New York : MacmillanPublications Pvt.Ltd, 1978

Branson, W.A. *Macroeconomic Theory and Policy*. New York : Harper and Row,3rd edition 1989

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Question Bank
I M.A ECONOMICS
Core II Advanced Macroeconomic Analysis – II Sub. Code: 21PECC22

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Unit - I

Choose the Correct Answer:

1. _____ acts as a medium of exchange
 - a. **Money**
 - b. Goods
 - c. Store of value
 - d. Gold
2. The demand for money is directly related to the _____ level
 - a. **Income**
 - b. saving
 - c. Supply of money
 - d. Investment
3. In Fisher's "Equation of Exchange" , _____
 - a. **MV=PT**
 - b. PT=MV
 - c. MD=MS
 - d. MK=SM
4. Keynes in his General Theory used a new term _____ for the demand for money.
 - a. **Liquidity preference**
 - b. transaction
 - c. precautionary
 - d. speculative
5. If income increases fourfold, optimal transactions balances only _____
 - a. fourfold
 - b. tribal
 - c. five
 - d. **double**
6. Real balances mean the purchasing power of the stock of _____ holding of the people.
 - a. **cash**
 - b. money
 - c. income
 - d. bounds
7. The Pigou effect, also known as the _____
 - a. **Wealth effect**
 - b. Income effect
 - c. Savings effect
 - d. money effect
8. The real balance effect is a modified version of the pigou effect given by _____
 - a. Patinkin
 - b. Pigou
 - c. Friedman
 - d. Keynes
9. The _____ of money at any moment is the total amount of money in the economy
 - a. supply
 - b. demand
 - c. savings
 - d. Interest
10. The required reserve ratio or _____
 - a. **minimum cash reserve ratio**
 - b. bank reserve
 - c. hold currency
 - d. high powered money

Unit-II

1. Full employment in the economy which resulted in _____ inflation with increases in the quantity of money.
a. **Hyper** b. semi c. bottleneck d. true
2. When prices rise moderately and the annual inflation rate is a single digit is called _____.
a. **Walking inflation** b. creeping inflation c. Running inflation d. hyper inflation
3. The inflationary gap is a _____ analysis.
a. **Static** b. dynamic c. Price d. none of the above
4. There may be more than one source of demand consumers want more goods and services for _____ purposes.
a. **Consumption** b. savings c. demand d. future
5. When savings increases consumption _____.
a. decreases b. increases c. Nil d. **Stable**
6. The Philips curve examines the relationship between the rate of unemployment and Rate of _____.
a. Money wages b. **income wages** c. real wages d. Nil
7. Tobin's Philips curve is _____ shaped.
a. **Kinked** b. round c. triangle d. square
8. The rate of increase in money wage rates is higher than the growth rate of _____ product.
a. **Labour** b. factor c. Labour and factor d. land
9. In the long run, the Phillips curve is a _____ line at the natural rate of unemployment.
a. **vertical** b. horizontal c. individual d. slope
10. Demand pull inflation or _____ inflation
a. **Excess demand** b. Running c. creeping d. walking

Unit -III

1. The innovation theory is given by _____.
a. Schumpeter b. J.S.Mil c. pigou d. samuelson
2. This new equilibrium will be at a higher level of income than the initial equilibrium because of the innovation which _____ the cycle.
a. Stared b. end c. middle d. cycle less
3. The Samuelsson model is _____.
a. $Y_t = G_t + C_t + I_t$ 2. $Y_t = G_t + C_t + P_t$ 3. $Y_t = G_t + E_t + I_t$ 4. $Y_t = G_t + S_t + I_t$
4. Cycle less path because it is based only on the _____ effect.
a. multiplier b. accelerator c. money supply d. money accelerator
5. _____ investment is an independent change in the level of output.
a. **Autonomous** b. induced c. cost d. None
6. Thus the full employment ceiling acts as a _____ restraint on the upward movement of

the economy.

- a. **direct** b. Indirect c. sessional d. unemployment
7. Kaldor built a model of the trade cycle based on the Keynesian terminology of _____
- a. **savings and investment** b. Investment c. savings d. rate of interest
8. Thus the central bank adopts a _____ money policy.
- a. **Dear** b. Cheap c. Running d. walking
9. During a depression the government _____ public expenditure.
- a. **Increasing** b. decreasing c. none d. progressive
10. The government influences investment, employment, output and income through _____ policy
- a. **monetary** b. fiscal c. income d. money supply

Unit –IV

1. Who told that Monetarism refers to “only money matters” _____
- a. **Friedman** b. Keynes c. Adam smith d. Marshall
2. Changes in the money supply cause changes in _____
- a. **National income** b. GDP c. GST d. supply of money
3. The demand for money is the transactions demand for money which is determined by the level of _____
- a. **Income** b. employment c. savings d. supply of money
4. The economy is in a state of continuous equilibrium both _____
- a. **Short run & long run** b. long run c. short run d. full employment
5. Price and _____ are fairly flexible.
- a. Wages b. interest c. income d. savings
6. The voluntarily unemployment means _____
- a. **Not work** b. not interest c. work less d. low production
7. One of the most important principles of new macroeconomic is the _____
- a. **Rational expectations** b. market clear c. Aggregate supply d. labour market
8. According to J.B. Say “Supply create own _____”.
- a. **demand** b. unemployment c. maximum profit d. higher profit
9. Real output or _____
- a. **GDP** b. GST c. GSST d. GNP
10. The laffer curve debits the relation between tax rate and _____
- a. **Tax revenue** b. Tax c. sales tax d. increasing tax

Unit – V

1. The instruments of monetary policy are of _____ types.
a. **two** b. three c. five d. seven
2. Open market operations refer to _____ of securities in the money market.
a. **Sale & purchases** b. sale c. purchases d. price
3. Monetary policy in an underdeveloped country plays an important role in _____
a. Increasing growth rate b. increasing money supply c. employment d. GDP
4. When prices are raising, the central bank raises the _____
a. **Reserve ratio** b. RRR c. Interest rate d. money supply
5. Monetary policy is an important instrument for achieving _____ stability.
a. **price** b. money supply c. demand d. inflation
6. public borrowing is essential in such countries in order to finance development programmes and to control the _____
a. Money supply b. demand for money c. monetary policy d. bank rate
7. Fiscal policy is a _____ instruments of stabilization.
a. Powerful b. valuable c. principal d. Dynamic
8. Fiscal policy we refer to _____ affect the receipts and expenditure.
a. **Government actions** b. Government role c. static role d. village actions
9. The _____ is the principal instruments of fiscal policy.
a. budget b. budgetary policy c. budget deficit d. none
11. Fiscal policy increases _____
a. **National income** b. inflation c. economic stability d. employment opportunity

Section – B (2 Marks)

Unit – I

1. What are the functions of demand for money?
2. What are the three motives of demand for money?
3. What is a speculative motive?
4. What is meant by Liquidity trap?
5. What do you mean by real balance?
6. What is meant by pigou effect?
7. Who reformulate the quantity theory of money?
8. What is meant by supply of money?
9. What is money multiplier?
10. Define –Required Reserve Ratio.

Unit - II

1. What do you mean by true inflation?
2. Define - Inflation
3. Define – Creeping inflation
4. Define – Inflationary gap
5. Give the formula for Fisher’s Equation of exchange.
6. Define – Phillips curve
7. What is meant by trade-off?
8. What is the shape of Tobin’s Phillips curve?
9. Define- Cheap monetary policy
10. What are the two principal theories of demand – pull inflation?

Unit – III

1. Define – Innovation theory
2. What is meant by Multiplier?
3. Define - Accelerator
4. Define - MPC
5. Give the difference between Autonomous investment and Induced investment
6. What is meant by “Leverage effect”?
7. What do you mean by Economic fluctuations?
8. What are the measures to control of business cycles?
9. How monetary changes affect the business cycle?

Unit-IV

1. Define - Monetarism
2. What are the main difference between the monetarists and Keynesians?
3. Expansion the $MV=PQ$
4. What are the principles of new classical macroeconomics?
5. Define- Ration hypothesis
6. Define- Voluntary unemployment
7. What are the main objectives of supply side economics?
8. Define – GDP
9. Define- stagflation
10. Define - Inflation

Unit – V

1. What are the instruments of monetary policy?
2. Define - Bank rate policy
3. Define – Monetary policy
4. Define – Fiscal policy
5. Define – Income policy
6. What are the main objectives of macroeconomic policy?
7. What is meant by cheap money policy?
8. Define - Dear money policy.
9. Expand – BOP Deficit

Part – C (6 marks)

Unit – I

1. Explain the classical approach of demand for money?
2. Evaluate the transaction demand for money?
3. Explain the Keynes liquidity preference approach?
4. What are the difference between the pigou effect and the real balance effect?
5. Explain the contribution of Milton Friedman to the quantity theory of money?
6. Write a note on the money multiplier.
7. Explain the determinants of high powered money.
8. Write a short note on supply of money.

Unit –II

1. Define inflation and what are others name of inflation?
2. State and explain the importance of inflationary gap?
3. Discuss the theory of inflation.
4. How does the Phillips curve explain the tradeoff between unemployment and inflation?
5. Evaluate the long run Phillips curve.
6. Discuss the Tobin's view.
7. Explain the structural inflation.
8. How the policy to control the inflation?

Unit-III

1. Explain the meaning and nature of business cycle.
2. Discuss critically Samuelson's model of trade cycle.
3. Critically discuss the Hicksian theory of the trade cycle.

4. What do you mean by multiplier and accelerator?
5. Explain the various phases of business cycle.
6. Explain the monetary –fiscal mix to achieve and maintain full employment.
7. Explain the IS and LM model

Unit-IV

1. Explain the views of monetarists.
2. Write a short note on Keynesian view of monetary policy
3. Analyze the main features of supply side economics.
4. Explain critically the Laffer curve.
5. Give the introduction of new classical Macroeconomics
6. Analyze the Aggregate supply hypothesis.
7. What are the principals of new classical macroeconomics
8. What is the rational expectations hypothesis?

Unit – V

1. What do you mean by fiscal policy?
2. Explain the principal instruments of monetary policy?
3. Distinguish between cheap and dear monetary policy.
4. Give the limitations of monetary policy?
5. Explain the policy targets and instruments of macroeconomic policy?
6. Write a short note on macroeconomic policy.

Part – D

(12 marks)

Unit-I

1. Evaluate the classical approach of demand for money.
2. Explain the Tobin's Portfolio selection model.
3. Explain the Real Balance Effect.
4. Explain the contribution of Milton Friedman to the quantity theory of money.
5. Discuss the determinants of the money supply.
6. Evaluate the money multiplier.

Unit-II

1. What is inflation? Explain the other names of inflation?
2. Explain the Keynes's theory of demand –Pull inflation.
3. Analyze the theory of the Philips curve.
4. Discuss the theory of structural inflation.
5. Discuss the causes of inflation.

Unit-III

1. Explain the Schumpeter's theory of trade cycle.
2. Discuss critically Samuelson's model of trade cycle.
3. Discuss the Hicksian theory of the trade cycle.
4. What are the measures to control the business cycles.
5. Explain the relative efficacy of monetary and fiscal policy

Unit – IV

1. Discuss the views of monetarists and Keynesians on monetary policy.
2. Explain the main tenets of the new classical macroeconomics.
3. Explain the main features of Supply-side Economics.
4. State the basic propositions of the rational expectations hypothesis.

Unit-V

1. Explain the effects of lags in economic policy.
2. Outline a fiscal policy for a developing country.
3. Explain the objectives of macroeconomic policy.
4. Analyze the role of monetary policy in a developing economy.
5. Discuss about the income policy.
6. Explain the principal instruments of monetary policy.

Semester- II			
Core III Statistics For Economist - II			
Sub. Code: 21PECC23	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

Unit – I Industrial Statistics:

15 Hrs

Process and product control - general theory of control charts - different types of control charts for variables and attributes – Concept of Reliability – failure rate and reliability functions – reliability of series and Parallel systems and other simple configurations – renewal density and functions.

Unit – II Optimization Techniques:

15 Hrs

Different types of models in Operations Research – their construction and general methods of solution – simulation and Monte – Carlo methods formulation of Linear Programming problem – Simple LP model and its graphical solution, the simplex procedure, the two phase method and the M technique with artificial variables.

Unit - III Quantitative Economics:

15Hrs

Determination of trend – Seasonal and Cyclical components – Box-Jenkins method – Tests for stationary series – ARIMA models and determination of orders of autoregressive and moving average components – fore-casting.

Unit – IV Index Number:

15 Hrs

Commonly used Index number – Laspeyre’s, Paasche’s and Fisher’s Ideal Index numbers – Cham-base Index number, Uses and Limitations of Index numbers, Index number of Wholesale prices- Consumer price – Agricultural production and Industrial production test for index numbers – Proportionality, Time- reversal and circular.

Unit –V Linear Model:

15 Hrs

Ordinary least square and generalised least squares methods of estimation – problem of multi-collinearity – consequences and solutions of multi- collinearity, consequences and solutions of multi- collinearity – auto correlation and its consequences – heteroscedasticity of disturbances and its testing.

Text Book:

Gupta, S.P., Statistical Methods (Edition) (New Delhi: S.Chand& Sons Ltd 2001

Books forReference

1. Gupta, S.C., Fundamentals of Applied Statistics (New Delhi: S.Chand& Sons Ltd 1993)
2. Speigal. M.R., Theory and Problems and Statistics (London: McGraw Hill Book Co.1992

St. Mary's College (Autonomous) – Thoothukudi
Question Bank
I M.A ECONOMICS
Core III Statistics For Economist II Sub. Code: 21PECC23

Section – A

(1 Mark)

Choose the Correct Answer:

UNIT- 1

1. ----- is typically defined as a method of using statistical analysis to control and measure quality, thereby improving the manufacturing process.
a) **SPC** b) APC c) MPC d) TPC
2. In -----, Doctor William Shewart of Bell Laboratories researched methods of improving manufacturing quality and lowering costs.
a) 1924 b) **1934** c) 1944 d) 1954
3. Doctor William Shewart published a book, “Statistical Method from the Viewpoint of Quality Control,” in -----
a) 1939 b) **1936** c) 1963 d) 1966
4. Reducing ----- in infrastructure because process improvements make existing infrastructure more efficient.
a) **Investments** b) Stocks c) Shares d) Capital
5. ----- are simple, prepared forms used to illustrate collected data and analyze it.
a) Check sheets b) Problem Sheets c) Control Sheets d) **Data Sheets**
6. ----- are the oldest and most popular SPC tool.
a) Control charts b) Problem Sheets c) Control Sheets d) Data Sheets
7. Cause-and-effect Diagrams also called an Ishikawa diagram or ----- diagram.
a) **Fish Bone** b) Animal Bone c) Cat Bone d) Tiger Bone
8. ----- refers to the consistency and reproducibility of data produced by a given method, technique, or experiment.
a) **Reliability** b) Progress c) Viability d) Randomization
9. A product is considered safe if the ----- associated with the product are assessed to be acceptable.
a) **Risks** b) Price c) Technique d) Experiment
10. ----- flow charts are pictures of a process's steps, displayed in sequential order.
a) **Process** b) Defect Maps c) Event Logs d) Progress

UNIT- II

1. ----- Models are scaled version of the actual object.
a) Iconic b) Analogue c) Symbolic d) **Mathematical**
2. ----- Model in this model one set of properties are used to represent another set of properties.
a) **Analogue** b) Iconic c) Symbolic d) Mathematical
3. The ----- model simply explains certain aspects of the problem or situation or a system
a) **Descriptive** b) Iconic c) Symbolic d) Mathematical

4. ----- models basing on the data collected, can predict the approximate results of the situation under question.
a) Predictive b) **Descriptive** b) Iconic c) Symbolic
5. ----- method is based on random sampling of variable's values from a distribution of the variable.
a) **Monte-Carlo** b) Cyert c) March d) Domar
6. ----- Programming is the simplest way of optimizing a problem.
a) Linear b) Simple c) **Complex** d) Difficult
7. ----- problem are generally easy to understand and have fewer variables.
a) **Diet** b) Mark c) Health d) Defective
8. Monte Carlo techniques can reduce complex models to a set of ----- events and interactions.
a) **Basic** b) Best c) Complete d) Default
9. Simulation models can be generally classified into one of ----- major types.
a) Three b) **Four** c) Five d) Six
10. Simulation is used to evaluate the effect of process changes, new procedures and capital ----- in equipment.
a) Investment b) **Dis Investment** c) Zero d) Negative

UNIT – III

1. ----- analysis is a statistical procedure performed to evaluate hypothesized linear and nonlinear relationships between two quantitative variables.
a) Trend b) secular c) **Time** d) General
2. A time series depicts the relationship between ----- variables.
a) Two b) Three c) **Four** d) Five
3. Time is one of those variables and the second is any -----variable.
a) Quantitative b) **Qualitative** c) Restrictive d) Control
4. A trend is a smooth, general, long-term, ----- tendency.
a) **Average** b) Central c) Time interval d) General
5. The ----- in a time series which operate themselves over a span of more than one year are the cyclic variations.
a) Variations b) **fluctuations** c) control d) deemed
6. ----- trend refers to the general tendency of data to increase or decrease or stagnate over a long period of time.
a) Trend b) secular c) **Time** d) Cyclical
7. ----- variations are due to the ups and downs recurring after a period from time to time.
a) Trend b) secular c) Time d) **Cyclical**
8. The Box-Jenkins Model can analyze several different types of ----- series data for forecasting purposes.
a) Trend b) **secular** c) Time d) Cyclical
9. ----- is a method for forecasting or predicting future outcomes based on a historical time series.
a) **ARIMA** b) ATIMA c) ACIMA d) ABIMA
10. ARIMA combines ----- features with those of moving averages.
a) **Autoregressive** b) Correlation c) Regression d) Regressive

UNIT – IV

1. Index numbers are meant to study ----- in the effects of factors which cannot be measured directly.

- a) **Changes** b) Importance c) Scope d) Limitations
2. According to----- "Index numbers are used to measure the changes in some quantity which we cannot observe directly".
a) Bowley b) **Baumol** c) Bain d) Simson
3. A collection of index numbers for different years, locations, etc., is sometimes called an index -----
a) **Series** b) List c) Copy d) Demand
4. A simple index number is a number that measures a relative change in a ----- variable with respect to a base.
a) Single b) **Multiple** c) Double d) constant
5. A ----- index number is a number that measures an average relative changes in a group of relative variables with respect to a base.
a) Composite b) **Price** c) Simple d) Production
6. ----- index numbers measure the relative changes in the price of a commodity between two periods.
a) Price b) **Composite** c) Simple d) Dual
7. CPI measures changes in the cost of living due to changes in the retail prices of a basket of goods over a period of time. In CPI what is "C" measures
a) Consumption b) **Commodity** c) Controller d) Continuous
8. Inflation is a ----- rise in the general price level.
a) Persistent b) Irregular c) Lower d) Higher
9. According to _____, the index numbers are devices for measuring differences in the magnitude of a group of related variables.
a) **Croxtan and Cowden** b) Baumol c) Bain d) Simson
10. Index numbers measure a net or relative change in a variable or a group of variables.
a) Absolute b) **Relative** c) Non relative c) Constant

UNIT –V

1. In a simple linear regression model the slope coefficient measures -----
a) the elasticity of Y with respect to X b) the change in Y which the model predicts for a unit change in X c) **the change in X which the model predicts for a unit change in Y** d) the ratio Y/X
2. Changing the units of measurement of the Y variable will affect all but which one of the following?
a) the estimated intercept parameter b) the estimated slope parameter
c) the Total Sum of Squares for the regression d) **R squared for the regression**
3. A fitted regression equation is given by $\hat{Y} = 20 + 0.75X$. What is the value of the residual at the point $X=100, Y=90$?
a) 5 b) **-5** c) 0 d) 15
4. What is the number of degrees of freedom for a simple bivariate linear regression with 20 observations?
a) 20 b) 25 c) 18 d) 22
5. What is the meaning of the term "heteroscedasticity"?
a) The variance of the errors is not constant b) The variance of the dependent variable is not constant c) **The errors are not linearly independent of one another** d) The errors have non-zero mean
6. Near multicollinearity occurs when
a) Two or more explanatory variables are perfectly correlated with one another
b) The explanatory variables are highly correlated with the error term
c) **The explanatory variables are highly correlated with the dependent variable**
d) Two or more explanatory variables are highly correlated with one another
7. Negative residual autocorrelation is indicated by which one of the following
a) A cyclical pattern in the residual
b) An alternating pattern in the residuals

- c) A complete randomness in the residuals
d) Residuals is that are all close to zero
8. Including relevant lagged values of the dependent variable on the right hand side of a regression equation could lead to which one of the following?
 a) Biased but consistent coefficient estimate b) **Biased and inconsistent coefficient estimate** c) Unbiased but inconsistent coefficient estimate d) Unbiased and consistent but inefficient coefficient estimate
9. Which one of the following is NOT a plausible remedy for near multicollinearity?
 a) Use principal components analysis
 b) Drop one of the collinear variables
 c) **Use a longer run of data**
 d) Take logarithms of each of the variables
10. What will be the properties of the OLS estimator in the presence of multicollinearity?
 a) It will be consistent unbiased and efficient
 b) It will be consistent and unbiased but not efficient
 c) It will be consistent but not unbiased
 d) **It will not be consistent**

Section – B

(2 Marks)

UNIT- 1

1. Define Process control.
2. Define product control.
3. What is Cause-and-effect Diagrams and check sheets?
4. What is control and Pareto Charts?
5. Define Histograms and scatter diagrams.
6. What is stratification?
7. What are the Types of Control Charts?
8. What are the features of control charts?
9. Define the concept of reliability.
10. What is quantifying reliability?

UNIT- II

1. What are the Different types of models in Operations Research?
2. What are the advantages and disadvantages of Operations research?
3. Explain the classification by utility?
4. What Is a Monte Carlo Simulation?
5. What is simulation in statistics?
6. What do you mean by simulation method?
7. What are the advantages and disadvantages of Monte Carlo simulation?
8. Are Monte Carlo simulations accurate?
9. What are the types of simulation in statistics?
10. When was simulation first used?

UNIT- III

1. What is Quantitative Economics?
2. Define time series.
3. State the uses of time series.
4. What are the Components for Time Series Analysis?
5. What is trend?
6. What are seasonal variations?
7. What are cyclical variations?
8. What Is the Box-Jenkins Model?
9. What is auto regression?
10. Expand ARIMA:

11. Define ARIMA.

UNIT – IV

1. Define Index number.
2. What is base year?
3. How do you calculate base year?
4. What is simple index number?
5. What is complex index number?
6. Define Price Index number.
7. Define Quantity Index Numbers.
8. List out the uses of index number:
9. What are relative measures in index number?
10. Expand and define CPI:

UNIT – V

1. Define OLS.
2. What is error?
3. What is sum of squared errors?
4. Define Multi Collinearity:
5. What are the types of square method?
6. Define Homoscedasity.
7. Define Hetroscedasity.
8. Define auto correlation.
9. What are the testing methods in least square method?
10. List out solutions of auto correlation:

Section – C

(6 Marks)

UNIT- 1

1. Explain the Process and product control.
2. Discuss the general theory of control charts.
3. What are the objectives of SPC?
4. What are the different types of control charts for variables and attributes?
5. Define and explain the Concept of Reliability.
6. Explain the failure rate and reliability functions.
7. Explain the reliability of series and Parallel systems.
8. What are the simple configurations?
9. Discuss the renewal density and functions.
10. Define and explain the Risk assessment, reliability and safety.
11. Distinguish reliability and availability:

UNIT- II

1. Discuss the types of operation research models with its merits and demerits.
2. Explain the classification by utility and nature of environment.
3. Discuss the advantages of operation research good models.
4. Explain the basic characteristics of operation models and solving methods.
5. Enumerate the Monte Carlo Simulation method.
6. Explain the theorems of Linear programming problem.
7. Explain the Graphical Solution of a Linear Programming Problems.
8. Solve the given linear programming problems graphically:
Maximize: $Z = 8x + y$ and the constraints are:
 $x + y \leq 40,$
 $2x + y \leq 60,$
 $x \geq 0, y \geq 0$
9. Discuss the Iso-cost method with its steps.

10. Solve the given linear programming problems graphically:

Minimize: $Z = 20x + 10y$ and the constraints are:

$$x + 2y \leq 40,$$

$$3x + y \geq 30,$$

$$4x + 3y \geq 60,$$

$$x \geq 0, y \geq 0$$

UNIT- III

1. Explain the determination of trend analysis.
2. Discuss the types of components in trend analysis:
3. Explain the Box-Jenkins method:
4. Discuss the Tests for stationary series:
5. Explain the ARIMA model in trend analysis:
6. Give a brief note on the forecasting procedure in trend analysis:

UNIT- IV

1. Explain the important characteristics of index numbers.
2. Explain the advantages of index numbers.
3. Briefly discuss the problems involved in the construction of index numbers.
4. Discuss about the consumer price index number? Give the uses of the consumer price index number.
5. State and explain the uses of consumer price index number.
6. Give the meaning of wholesale price index numbers. What is the utility of wholesale price index numbers?
7. Discuss the major limitations of index numbers?
8. State and explain the features and importance of index number.
9. Discuss the types of Index Number.
10. Explain the methods of index number

UNIT- V

1. Explain the Ordinary least square method.
2. Explain the least squares methods of estimation with its best example:
3. Explain the problem of multi- collinearity.
4. Discuss about the consequences and solutions of multi- collinearity:
5. Explain the heteroscedasticity of disturbances and its testing.

Section – D

(12 Marks)

Unit – I

1. Define and explain the quality Statistical Process Control and its types.
2. Discuss the Quality control tools and supplemental tools.
3. Explain the types of control charts and concept of reliability.
4. Discuss the interpretation quality control charts for variables and attributes.
5. Give a detail explanation for the reliability of series and Parallel systems and other simple configurations.
6. Critically explain the renewal density and functions.

UNIT- II

1. Critically explain the different types of models in Operations Research:
2. Give a detail explanation for the their construction and general methods of solution:
3. Discuss the ideas and concepts related in simulation and Monte – Carlo methods formulation of Linear Programming problem
4. Give a critical explanation for the Simple LP model and its graphical solution:

5. Evaluate the two phase method and the M technique with artificial variables.

UNIT- III

1. Give a detail explanation for the determination of trend analysis.
2. Discuss the types of components in trend analysis with its effects and defects in economy:
3. Critically analyze the Box-Jenkins method:
4. Discuss the various tests for stationary series:
5. Explain the ARIMA model in trend analysis with its assumptions and criticisms:
6. Give a brief note on the determination of orders of autoregressive and moving average components:

UNIT- IV

1. Give a detail explanation for the important characteristics and advantages of index numbers.
2. Briefly discuss the problems involved in the construction of index numbers.
3. Discuss about the consumer price index number? Give the uses of the consumer price index number.
4. Give the meaning of wholesale price index numbers. What is the utility of wholesale price index numbers? Discuss the major limitations of index numbers?
5. State and explain the features and importance of index number. Discuss the types of Index Number.

UNIT- V

1. Give a detail explanation for the Ordinary least square method with its limitations.
2. Critically explain the least squares methods of estimation with its best example:
3. Discuss about the multi- collinearity, list out the consequences and solutions of multi-collinearity:
4. Give a detail explanation for the heteroscedasticity of disturbances and its testing.

Semester – II			
Core X	INTERNATIONAL BUSINESS		
Course Code: 21PECC25	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

UNIT-I: General Concepts **15 Hrs**

Special features of international business – reasons for IB – Difference in endowments, cultures, currencies, technologies, wages, tastes, language – understanding world map – location of countries, their capital, currencies.

UNIT-II: Concepts and Institutions **15 Hrs**

Free trade versus protection – arguments for and against Laissez faire – Terms of trade – tariffs –quotas – non-tariff barriers – Phyto-sanitary measures – dumping – exchange rate –foreign exchange reserves – IMF –WB –GATT-WTO – UNCTAD – SAARC – SAAPTA – ASSFTA – NAFTA – ASEAN – MNCs – BOP – BOT – FDI.

UNIT-III: Foreign Trade Documents **15 Hrs**

Need rationale and type of documents – export & import licenses – processing of export order – pre-shipment inspection and quality control – foreign exchange formalities – excise and customs clearance – port procedures

UNIT-IV: Foreign Trade Procedure

1

5 Hrs Claiming duty drawbacks and other benefits – determination of freight – containerization – booking of cargo space – packing and marking for exports – forwarding and clearing agents andtheir operations – cargo insurance

UNIT-V: Exports **15 Hrs**

Role of export – selection of export products – selection of export markets – role of exporthouses – appointment of agents – payment of agency commission - promotion abroad – participation in trade fairs – export contracts – arbitration and dispute settlements – pre-shipment and post-shipment finance – letters of credit – EXIM bank – international capital markets foreignexchange rates.

Text Book:

T.A.S. Balgopal.*Export Management*.New Delhi: Sultan Chand and Co,2nd edition 2006

References for Book:

1. V K Bhalla and S Shiva Ramu. *International Business*.New Delhi: Anmol Publications PrivateLtd,12th revised and enlarged edition 2009
- 2.Arun Kumar Jain.*International Business Competing in the Global Marketplace*.New Delhi:TheTata McGraw Hill publishing Company Ltd.6thedition 2008
3. Sanjyot P Dunung. *International Business*.New Delhi: Mason A Carpenter, University ofWisconsin at MadisonGlobal2011

ST.MARY'S COLLEGE (AUTONOMUS) THOOTHUKUDI
Question Bank
I M.A. Economics
Core - V International Business Sub. Code: 21PECC25

Section – A

(I Mark)

Unit - I

Choose the best answer:

1. IBRD stands for _____.
a) **International Board for Research and Development** b) International Bank for Reconstruction and Development c) International Bank for Research Development d) International Barrier For Reconstruction and Development
2. IBRD also known as _____.
a) Exim Bank b) World Bank c) **International Monetary fund** d) International Bank
3. The first phase of globalization started around 1870 and ended with _____.
a) World War I b) World War II c) **The Establishment of GATT** d) In 1913 when GDP was high
4. Which is the right sequence of stages of Internationalization?
a) **Domestic, Transnational, Global, International, Multinational**
b) Domestic, International, Multinational, Global, Transnational
c) Domestic, Multinational, International, Transnational, Global
d) Domestic, International, Transnational, Multinational, Global
5. Ultimately _____ was replaced by the _____ on 1st Jan 1995.
a) GATS, WTO b) **WTO, GATT** c) GATT, WTO d) IMF, GATT
6. _____ is the application of knowledge which redefines the boundaries of global business.
a) Cultural Values b) **Society** c) Technology d) Economy
7. Subsidiaries consider the regional environment for policy or Strategy formulation is known as _____.
a) Polycentric Approach b) Regio-centric Approach c) **Ethnocentric Approach**
d) Geocentric Approach
8. According to _____ the holdings of a country's treasure primarily in the form of gold constituted its wealth.
a) **Gold Theory** b) Ricardo Theory c) Mercantilism Theory d) Hecksher Theory
9. Globalization refers to _____.
a) Lower incomes worldwide b) Less foreign trade and investment c) Global warming and their effect d) **A more integrated and interdependent world**
10. IPR stands for _____.
a) Intellectual property rights b) International property rights c) Internal promotion rights d) Interior promotional rights

UNIT – II

1. Trade between two countries can be useful if cost ratios of goods are:
a) Undetermined b) **Decreasing** c) Equal d) Different
2. The term Euro Currency market refers to -----
a) The international foreign exchange market b) The market where the borrowing and lending of currencies take place outside the country of issue c) The countries which have

adopted Euro as their currency d) **The market in which Euro is exchanged for other currencies**

3. Which of the following theories suggests that firms seek to penetrate new markets over time?

a) Imperfect Market Theory b) **Product cycle theory** c) Theory of Comparative Advantage d) Demand Theory

4. Dumping refers to:

a) Reducing tariffs b) **Sale of goods abroad at a lower price, below their cost and price in their home market** c) Buying goods at low prices abroad and selling at higher prices locally d) Expensive goods selling for low prices

5. International trade and domestic trade differ because of:

a) Different government policies b) Immobility of factors c) Trade restrictions
d) Different government policies, Immobility of factors and trade restrictions

6. The margin for a currency future should be maintained with the clearing house by

a) The seller b) The buyer c) Either the buyer or the seller as per the agreement between them d) Both the buyer and the seller

7. The following statement with respect to currency option is wrong

a) Foreign currency- Rupee option is available in India b) An American option can be executed on any day during its currency c) Put option gives the buyer the right to sell the foreign currency d) Call option will be used by exporters

8. Govt. policy about exports and imports is called:

a) Commercial policy b) Fiscal policy c) Monetary policy d) Finance policy

9. Which of the following is international trade?

a) Trade between countries b) Trade between regions c) Trade between provinces
d) Trade between the world's continents

10. Market in which currencies buy and sell and their prices settle on is called the

a) International bond market b) International capital market c) Foreign exchange market
d) Eurocurrency market

UNIT –III

1. An import tariff is a tax or duty levied on _____ commodities.

a) **Imported** b) Exported c) Transported d) Import and Export

2. An _____ is a tax or duty levied on exported commodities.

a) Import Tariff b) **Export Tariff** c) Transport Tariff d) Free Trade Tariff (FTT)

3. _____ refers to purchase of goods from a foreign country.

a) Foreign Trade b) Export Trade c) Import Trade d) EXIM Trade

4. _____ is a fixed percentage on the value of the traded commodity.

a) Anti dumping duty b) **Specific tariff** c) Ad Valorem tariff d) A compound tariff

5. In most countries, foreign trade represents a significant share of _____.
a) **EXIM** b) FDI c) Income Per Capita d) GDP
6. Cash grants, loans at low rate and tax holidays are examples of _____.
a) Quotas b) Tariffs c) **Subsidies** d) Discounts
7. _____ refers to the sale of goods to a foreign country.
a) Foreign Trade b) **Export Trade** c) Import Trade d) EXIM Trade
8. _____ is a combination of an ad valorem and specific tariff.
a) Anti dumping tariff b) **Specific tariff** c) Ad Valorem tariff d) A compound tariff
9. Foreign trade is an exchange of capital, goods, and services across _____ borders or territories
a) Intranational b) National c) **International** d) National and International
10. _____ refers to goods imported from one country and are exported to another country.
a) Third Party Trade b) **Entrepot trade** c) Export Trade d) EXIM Trade

UNIT – IV

1. Which of the following is a part of capital account?
a) **Private capital** b) Banking capital c) Official capital d) Investment
2. The investment in productive assets and participation in management as stake holders in business enterprises is
a) FDI b) FII c) Balance of payment d) **SDR**
3. The portfolio investment by foreign institutional investors is called
a) FDI b) FII c) **Balance of payment** d) SDR
4. Which one of the following percentages is the share of the Indian Export in the International Trade?
a) Less than 1% b) **More than 1, but less than 3%**, c) More than 3 but less than 5%,
d) More than 5, but less than 7%
5. Foreign exchange and foreign currency in India are governed by
a) SCRA Act b) **FEMA Act** c) Banking Regulation Act d) SEBI Act
6. The currency used to buy imported goods is
a) The buyer's home currency b) the seller's home currency c) the currency of a third country d) **special drawing rights**
7. A letter of credit means
a) A bank agreeing to accept and pay on due date b) A letter containing conditions of credit purchase or sale c) **A letter sent by exporter to importer sanctioning credit deal** d) A letter sent by importer to exporter sanctioning credit deal
8. Which country has the highest inflation rate in the world?
a) **South Sada** b) Venezulea c) Argentina d) Iran
9. Tax on imports can be treated as
a) Collateral b) Trade Barriers c) Foreign Trade d) Terms of trade
10. Which organisations strain on the liberalisation of foreign investment and foreign trade?
a) IMF b) WHO c) **WTO** d) International Labour Organisation

UNIT – V

1. Incoterms cover _____
a) **trade in intangibles** b) ownership and transfer rights c) contracts of carriage.
d) rights and obligations of parties to contract of sales
2. Which of the following term cannot be used for transportation of goods by sea?
a) CFR b) DDP c) **DES** d) DEQ.
3. The incoterm providing least responsibility to seller is _____
a) EXW b) DDP c) **FOB** d) CIF.
4. The group of incoterms under which the seller's responsibility is to obtain freight paid transport document for the main carriage is _____
a) E terms b) C terms c) **D terms** d) F terms.
5. The incoterm should indicate the place of shipment in case of _____
a) **F terms** b) E terms c) C terms d) D terms.

6. Incoterm is specific about the responsibility for marine insurance in case of _____
a) FOB and EXW b) **FOB and CIF** c) CIF and CIP d) CPT and DDP.
7. The group of terms arranged in order of increasing responsibility of exporter is.
a) C,D,E and F terms b) **D,E,F and C terms** c) E,F,C and D terms d) F,C,E and D terms.
8. The price quoted by the seller for the product _____
a) will vary depending upon the incoterm chosen b) irrespective of the incoterm c) will be the base price; the effect of incoterm to be added later d) **will include only cost.**
9. Adoption of incoterm is _____
a) compulsory for all international contracts b) compulsory for all letter of credit transactions c) **optional for the parties to the contract** d) mandatory for transactions with Europe.
10. Which of the following term cannot be used for transportation of goods by Road or Air?
a) FAS b) DDP c) **EXW** d) CIP

Section – B

(2 Marks)

Unit -1

1. What is international Business?
2. Abbreviations of IB
3. What is an endowment?
4. What is wage?
5. Define technologies.
6. What is currency?
7. Write a shot on world map?
8. Define capital
9. Write any three types of currencies.

Unit -II

1. Define free trade
2. Define Laizefaire policy
3. What are terms of trade?
4. What is tariff?
5. What is non- tariff barriers?
6. Define dumping
7. What is exchange rate?
8. Expand UNCTD and SAARC
9. What are foreign exchange reserves?
10. Where is the head office for WTO and IMF?

Unit –III

1. Define documentation for trade
2. What is export?
3. Define Import
4. What is export and import license?
5. What are the processes to follow the export order?
6. What is pre-shipment?
7. Define foreign exchange
8. What is custom clearance?
9. What are the types of documents?
10. What is the need for documents in trade procedures?

Unit –IV

1. Define duty drawbacks
2. What are the other benefits of foreign trade procedure?
3. What is determination of freight?

4. What is containerization?
5. Define cargo space
6. Define cargo insurance
7. What is packing and marketing for exports?
8. When foreign trade act was established?
9. What is export duty?
10. What is import duty?

Unit –V

1. What are the objectives of export promotion measures?
2. List out the functions of Indian Trade Promotion Organization:
3. What are the services included in the public sector undertaking?
4. What is the structural weakness?
5. Define the unused and substitution unused merchandise.
6. Define the export incentives
7. What is the income tax concession
8. Define the market development
9. What is the infrastructural weakness?
10. What are the problems in recognition and action lags?

SECTION – C

(6 Marks)

Unit – I

1. What are the differences between Internal and International trade?
2. Explain the features of international trade.
3. List out the advantages of international trade.
4. Explain the disadvantages of international trade.
5. State any five importance of international marketing.
6. What are the barriers to international trade?
7. What are the factors influencing international trade?
8. What are the advantages of giving protection?
9. List out some of the disadvantages of giving protection.
10. Explain the methods of protection.

Unit – II

1. List out the components of balance of payment.
2. What are the various forms of balance of payments?
3. Distinguish between balance of trade and balance of payment:-
4. What is the usefulness of balance of payment?
5. What are the measures to correct disequilibrium in balance of payments?
6. What is the importance of exchange control?
7. What are the factors which are influencing exchange control?
8. What are the objectives of exchange control?
9. What are the methods of exchange control?
10. List out few advantages and disadvantages of exchange control.

Unit – III

1. Explain the types of exports with the advantages and disadvantages.
2. What are the principal export documents to be sent to the importer?
3. What are the regulatory documents associated with pre shipment stage?
4. Mention the export documents related to goods.
5. What are the certificates related to shipment?
6. What are the documents related to payments?
7. What are the features of letter of credit?
8. State any six features of letter of credit.
9. Who were the five important parties to a bill of exchange?

10. What are the types of bills of exchange?

Unit- IV

1. List out any three categories of facility of import.
2. What the steps involved in applying the applications?
3. Explain the procedures for customs clearance.
4. Give the meaning and features of customs duties.
5. What are the objectives of customs duties?
6. List out three types of customs duties?
7. What are the factors liable for the levy of custom duties?
8. Explain the mode of levy of duty.
9. Explain the export processing zones/EOUs:
10. Explain the export oriented units.

Unit- V

1. Explain the meanings and objectives of the export promotion.
2. Explain the autonomous body in the export promotions.
3. Explain ITPO and advisory body council on trade.
4. Explain the public sector undertakings with the attached subordinate offices.
5. Explain the incentives with the duty exemptions, income tax concession and awards.
6. What are the schemes and facilities assist the export marketing?
7. Explain the import facilities for exporters.
8. Explain the export promotion councils.
9. What are the major problems of India's export sector?
10. What is the duty drawbacks involved in customs duties?

Section – D

(12 Marks)

Unit – I

1. Give out the detail explanation about the advantages and disadvantages of international trade.
2. Enumerate the arguments in favour of and against protection.
3. What are the various methods of protection?
4. What are the barriers to international trade and factors influencing the international trade?
5. List out the features and importance of international trade.

Unit- II

1. What are the various causes for disequilibrium in balance of payment? Suggest the suitable measures to correct disequilibrium.
2. What are the objectives of exchange control?
3. Explain the merits and demerits of exchange control.
4. What is the usefulness of balance of payment?
5. List out the components and forms of balance of payment.

Unit – III

1. Explain the preliminary steps involved in the export procedures.
2. Discuss the two different types of exports with the advantages and disadvantages.
3. Explain commercial and regulatory documents.
4. Explain documents related to goods and shipment.
5. Give a detail explanation for the payment and letter of credits and its kind.

Unit – IV

1. Give a detail explanation for the import procedures and their facility of import.
2. State and explain the procedure for customs clearance in detail manner.
3. Give a detail explanation for customs duties with their features, objectives and their kinds.
4. Explain the levy of customs duty with their mode of levy.
5. What are the kinds of customs duties?

Unit – V

1. Give a detail explanation for the export promotions with their organisational setup.
2. Give a detail report on incentives for export promotion.
3. Explain the marketing assistance in the export promotions.
4. What are import facilities avail for exporters and the export promotion councils?
5. Give a detail explanation for the problems faced by India in the export promotion.

Semester – II			
CORE ELECTIVE I FISCAL ECONOMICS			
Course Code: 21PECE21	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

UNIT-I: Introduction

15 Hrs

Nature and scope of Public Finance – Public and Private Finance – increase in the role of the modern Government – Principle of Maximum social Advantages.

UNIT- II: Public Expenditure

15 Hrs

Public Expenditure – Public Expenditure and Private Expenditure – causes for the growth of Public Expenditure – Classification – Principles – Effects – Public Expenditure in India since 1951.

UNIT-III: Public Revenue:

15 Hrs

Sources of Public Revenue – Tax Revenue and Non-Tax Revenue – Deficit Finance – Direct and Indirect Taxes – Income Tax and VAT, Custom and Excise duties & Goods and service Tax

UNIT-IV: Public Debt

15 Hrs

Public Debt – Meaning – classification – sources – causes for borrowing – effects – methods of debt redemption. Budget – meaning – type importance – effects of surplus and deficits budget of the Economy-Special features of current union budget

UNIT-V: Fiscal Policies

15 Hrs

Fiscal Federalism in India – Centre – State Financial relationship in India – Role of Finance Commissions of India – Recommendations of the recent Finance Commission – Local Finance – Problems and perspectives Fiscal Policy of India.

Text Book:

1. P. Tyagi. *Public Finance*. Meerut: Jai Prakash Nath & Co. 2nd edition 2000

Books for Reference:

1. K.P.M. Sundaram. *Fiscal Economics*. New Delhi: Sultan Chand and Co. 1st edition 1999
2. Cauvery, Sudha Nayak, Girija, Kriparani & Meenakshi. *Public Finance*. New Delhi: S. Chand & Company Ltd. 2nd edition 2000
3. R.C. Saxena & P.C. Mathur. *Public Finance*. Meerut: K. Nath & Co., 2nd edition 2006
4. Dr. S. Sankaran. *Fiscal Economics*. Chennai: Margham Publications, 6th edition 2013

ST.MARY'S COLLEGE (AUTONOMOUS) THOOTHUKUDI
Question Bank
I M.A. Economics
Core Elective –II Fiscal Economics Sub. Code: 21PECE21

Section – A

(1 Mark)

Unit – I

1. The role of information is central to _____.
a. **Public Economics** b. Public Finance c. Public sector d. Private sector
2. The _____ sector comprises of business which is owned and managed and controlled by Individuals.
a. Unorganized b. Public c. Organized d. **Private**
3. Some of the public sector organizations are set up by a special act of _____.
a. Parliament b. **Lock Saba** c. MD=MS d. MK=SM
4. Keynes in his General Theory used a new term _____ for the demand for money.
a. speculative b. transaction c. precautionary d. **Liquidity preference**
5. _____ sector providing the goods and services to the general public.
a. Public b. private c. **organized** d. unorganized
6. The government whether it is central government and _____ government.
a. general b. local c. village d. **State**
7. The segment of a national economy that is owned, controlled and managed by _____.
a. Private b. **Public** c. Service d. welfare
8. The enterprises are established with _____ motive.
a. people welfare b. wealth c. **profit** d. Service

9. Merits goods means _____

- a. **Free goods** b. Public goods c. Rare goods d. White goods

10. Which one the main objectives of Private sector _____

- a. **Profit** b. People Welfare c. Minimum profit d. social development

Unit-II

1. The income of the government through all sources is known as _____

- a. **Public revenue** b. Public debt c. Public finance d. Public expenditure

2. The revenue obtained through various taxes is known as _____

a. Tax revenue b. Public revenue c. Non tax revenue d. tax base

3. When income received from administration, commercial enterprises, gifts is _____

- a. Non tax revenue b. **Tax revenue** c. Tax base d. Public revenue

4. _____ is a compulsory contribution from a person to the government.

- a. **Tax** b. Fees c. Fine d. gifts

5. _____ are charged by the government to meet the cost of administrative services rendered.

- a. License fee b. Fees c. Special Assessment d. Penalties

6. _____ from one government to another area of greater importance

- a. Grants b. **Gifts** c. Escheat d. Fines

7. _____ is the main objective of government

- a. Profit b. Non tax c. **Welfare of the people** d. Tax

8. _____ refers to the process by which tax is passed from one person to another.

- a. **Shifting** b. Impact c. Incidence d. Tax

9. _____ refers to the ultimate burden of the tax.

- a. **Impact** b. Shifting c. Tax d. Incidence

10. _____ is the immediate burden of tax.

- a. Impact b. **Shifting** c. Tax d. Incidence

Unit – III

1. _____ refers to the expenditure incurred by the central, state and local governments.

- a. Public expenditure b. **Public debt** c. Public finance d. Public revenue

2. The classical believed in _____ state.

- a. **social welfare** b. welfare c. people welfare d. Police

3. Private expenditure is determined by income and public expenditure determines _____

a. Income 2. **Revenue** 3. Tax 4. Expenditure

4. Regarding the scope of public expenditure one could study two schools of thought viz.,

The classical and the _____

- a. latest b. **Old** c. Current d. Modern

5. Who wrote the “The wealth of Nation” _____

- a. **Adams smith** b. Pigou c. Ricardo d. J.S.Mil

6. In modern times all the countries of the world have witnessed an enormous increase in_____
- a. Public expenditure b. Public revenue c. Public debt d. Tax
7. _____ believed that a functional cause-effect relationship prevailed between economic growth and growth in public expenditure.
- a. Wagner b. Wiseman c. Peacock d. Colin Clark
8. The _____ activities were increasing in their coverage.
- a. State b. Village c. Government d. World
9. The movement from the older level of expenditure and taxation to a new and higher Level is called the _____
- a. Displacement effect b. Inspection effect c. concentration effect d. Tax effect
10. _____ is an important instrument of financial administration.
- a. Budget b. Monetary c. Fiscal d. Income

Unit – IV

1. Public borrowing or _____
- a. **Public debt** b. Public expenditure c. Public economics d. Public finance
2. The instruments of Public borrowing are in the form of various types of government Bonds and _____
- a. **Securities** b. Bills c. Certificate d. Receipt
3. Public debt is a debt or _____
- a. **Loan** b. Receive c. Credit d. Lease
4. The government may borrow money to step up the rate of _____ in the country.
- a. **Economic growth** b. Development c. Increasing growth d. full employment
5. Public debts are also taken by the _____
- a. Government b. **Public** c. Single Person d. Bank
6. _____ debt is the debt which is paid without any legal enforcement.
- a. Voluntary b. Compulsory c. Funded d. **Internal**
7. It is a kind of long term or _____ debt.
- a. Definite b. unfunded c. External d. **Productive**
8. An Internal debt may be voluntary or _____
- a. **Compulsory** b. Forced c. Requisite d. Obligatory
9. Every government has _____ major sources of borrowing.
- a. **Two** b. Three c. Five d. Seven
10. Redemption is a way of _____ from the burden of a Public debt.
- a. Escape b. **Ducking** c. Out d. Release

Unit – V

1. The income raised by elected _____ government.
- a. Local b. **State** c. Central d. None
2. Local governments set the overall direction for their municipalities through _____ planning
- a. **Long term** b. small term c. Medium term d. None
3. The laws made by local governments are called _____

- a. Local laws b. State laws c. Central laws d. World laws
4. The finance commission was established by the President of India in ____
 - a. **1951** b. 1953 c. 1941 d. 1943
5. As per the constitution, the commission is appointed every ____ years.
 - a. **Five** b. Ten c. Three d. Four
6. In India the election taken in every ____ years.
 - a. Five b. Two c. Six d. Ten
7. Who is head of 14th Finance commission
 - a. Y.V. Reddy b. Singh c. **Thiru. Ranga Rajan** d. Thiru. Challaiah
8. The distribution of the proceeds of taxes between the union and the ____
 - a. States b. Local c. Rural d. Central
9. The Constitution of India, adopted in ____
 - a. 1950 b. 1960 c. **1930** d. 1940
10. The finance commission was to consist of a chairman and four members to be appointed by the ____
 - a. **President** b. Commissioner c. Local government d. Chief Minister

Section – B

(2 Marks)

Unit – I

1. Define organized society.
2. Write a short note on Public sector
3. Define Private sector
4. What are the services to providing the people in public sector?
5. What is the aim of private sector?
6. Define – Public Economics
7. What is Economic Planning?
8. What is meant by Private Goods?
9. Define – Public Goods.
10. Define – Social wants.

Unit – II

1. What do you mean by Public revenue?
2. Define - Tax
3. What are the sources of Public revenue?
4. What is meant by Non- tax revenue?
5. Define- cannon of taxation.
6. Define –Direct tax
7. What is meant by Indirect tax?
8. Give the meaning of Incidence.
9. Define- Shifting
10. What is the main objective of tax?

Unit – III

1. Define – Public Expenditure
2. Give the scope of public expenditure.
3. Define – Private expenditure
4. Define – Wagner’s law
5. Which one the second thesis of the growth of public expenditure?
6. What is meant by “Displacement effect”?
7. What do you mean by public investment criteria?

8. Define – cost benefit analysis.
9. Define- Budget
10. Define Zero based budgeting

Unit-IV

1. Define – Public debt
2. What are the main features of public debt?
3. What is the main aim of public debt?
4. What are the principles of new classical macroeconomics?
5. What do you mean by burden of public debt?
6. Define- Indirect money burden
7. What are the principles of public debt management?
8. Define – Public debt management
9. Define- Public loans
10. What are the types of public debt?

Unit – V

1. Define- Fiscal federalism
2. What do you mean by federal government?
3. Define – vertical imbalance
4. Define – Horizontal imbalance
5. Define – Local finance
6. What is meant by village Panchayat?
7. What are the sources of revenue for Panchayat?
8. What is the other name of local finance?
9. What is a constitutional provision?
10. Who is the head of 14th finance commission?

SECTION – C

(6 marks)

Unit – I

1. Distinguish between Public Sector and Private Sector.
2. “Government is an agent for economic planning and development”- Discuss.
3. What is the role of government in organized society?
4. What is the main role public sector?
5. What are the characteristics of Public goods?
6. Explain the difference between social wants and merit wants.
7. What are characteristics of Private goods?
8. Write a short note on Economic Planning.

Unit –II

1. Explain the sources of Public revenue.
2. Discuss the characteristics of tax.
3. Describe the characteristics of good tax system.
4. Explain the Principles of tax incidence.
5. Explain the merits of direct tax.
6. Write a short note on Impact of tax.
7. Discuss the demerits of Indirect tax.

Unit-III

1. Discuss the scope of Public Expenditure.
2. Explain the Budgeting Procedures.

3. Critically discuss the criteria for Public investment.
4. What are the Principles of budgeting?
5. Critically evaluate the objectives of budgeting.

Unit-IV

1. What is the main aim of Public debt?
2. Explain the objectives of Miscellaneous
3. What are the differences between Public and Private Debts?
4. Discuss the objectives of Public debt management.
5. Explain the burden of internal Public debt.
6. Analyze the Aggregate supply

Unit – V

1. Discuss about the major recommendations of 13th Finance commission.
2. Elucidate the functions of Local Government.
3. Discuss the imbalances in federal finance.
4. Explain the vertical imbalance.
5. Explain the devolution of resources and grants.
6. Write a short on Indian constitution.

SECTION – D

(12 marks)

Unit-I

1. Analyze the role of government in organized society.
2. Discuss the difference between Private goods and Public goods.
3. Explain the economic planning and development.
4. Discuss the nature and scope of Public Finance
5. Explain the role of Modern government.
6. Discuss the principle of maximum Social advantages

Unit-II

1. Explain the causes for the growth of Public Expenditure
2. Explain the causes of Public expenditure.
3. Briefly explain the effects Public expenditure.
4. Explain the classification of Public revenue.
5. Public Expenditure in India – Over view
6. Examine the classification of Public expenditure.

Unit-III

1. Critically evaluate the objectives of taxation
2. Briefly discuss about the types of taxation
3. Discuss custom and excise duties.
4. Discuss the structure of Public Expenditure.
5. Explain the goods and service tax.
6. Explain the Principles of taxation.
7. Discuss the effects of taxation.
8. Discuss the deficit finance in India

Unit – IV

1. Explain the objectives of Public debt.
2. Explain the sources of Public borrowing.

3. Discuss the different types of Public debt.
4. Discuss the Principles of Public debt management.
5. Public debt in India- Discuss
6. Discuss the various methods of Public debt redemption.
7. Explain the Zero Base Budgets
8. Explain the types and importance of Public debt.

Unit-V

1. Analyze the centre – state financial relationship in India.
2. Discuss the Principles of Federal Finance.
3. Explain the fiscal federalism in India.
4. Explain the Present constitutional Provisions.
5. Discuss the major Recommendations of latest Finance commission.

Semester – III			
Core XI		HISTORY OF ECONOMIC THOUGHT	
Course Code: 21PECC 31	Hrs / Week: 6	Hrs / Semester: 90	Credits : 4

UNIT-I: Economic Thought: Basic Concepts

20 Hrs

Labour – Productive Forces and Production Relations: Social Formation – Social Classes: Commodity; Labour Power – Market, Value and Price: Capital, Social Revolution. Exploitation – State – Competition – Monopoly - Imperialism

UNIT-II: Nature and importance of Economic Laws

20 Hrs

Political Economy Definition: Origin of political Economy: Physiocrats, Adam Smith and David Ricardo, Karl Marx and Frederick Engels, V.M. Lenin, Alfred Marshall, Lionell Robbins and Joseph Schumpeter, J.M. Keynes, Gunnar Myrdal, D. P. Mukerji

UNIT-III: Economic Role of the State

15 Hrs

Marxist Theory of State: State Intervention – Political Intervention – Economic Intervention: Planning and Controls- State as Entrepreneur – State in Developing Countries- State in Socialist Society

UNIT-IV: Classical Theory of Development:

15 Hrs

Division of Labour – Free Enterprise – Competition – Value and Surplus – Theory of Distribution – Over – Production / Under- Consumption – Stationary State – Relevance of Classical Theory

UNIT-V: Neo Classical Theory of Development:

20 Hrs

Neo- Classical School of Economics – Modern Theories of Growth: Harrod- Domar Model- Kaldor's Model- Joan Robinson's Model.

Text Book:

Lokanathan.A *History of Economic Thought*.New Delhi: S.Chand& Company Ltd, 2nd edition 2010,

Books for Reference:

1. RomeshDutt. *The Economic History of India – Under Early British Rule*.Great Britain: Cambridge University Press, 2ndedition 2000
2. DadabhaiNaoroji.*Poverty and Un-British Rule in India*.NewDelhi:MinistryofInformation and Broadcasting, Govt. of India, 2nd edition 1966.
3. Bhattacharyya, Dhires.*A Concise History of Indian Economy*.New Delhi: Prentice Hall ofIndia Ltd. (PHI), 2nd edition 1989

St. Mary's College (Autonomous) Thoothukudi

Core – I History of Economic Thought Sub.code: 21Pecc31

Question Bank

Section – A

Choose the Best Answer:

Unit – I

1. The concepts are arranged in a logical sequence, it becomes a -----
a) **Theory** b) Format c) Class d) Details
2. Labour constitutes the prime condition of human life and its -----
a) **Development** b) Improvement c) commitment d) determinacy
3. -----is thus the source of all that is achieved by man.
a) **Labour** b) Employer c) Capitalist d) Demography
4. In the process of labour included ----- elements
a) **Three** b) Four c) Five d) Six
5. Means of production remain sterile unless human labour sets them into -----

- a) **Motion** b) Effect c) Clear d) Definite
6. In the process of production, people enter into ----- relations of production.
a) **Definite** b) Indefinite c) clear d) Simple
7. A Social formation is composed of a basic structure and a ----- structure.
a) **Super** b) Fine c) Definite d) Indefinite
8. The concept of social formation helps us to consider a given society not as a ----- sum total.
a) **Heterogeneous** b) homogeneous c) Concludes d) Totaling
9. Labour power is the physical and mental energy expended by a worker in producing ----

a) **Commodities** b) Valuables c) Dress d) Cash Crops
10. ----- does not refer to a particular place, but to an institution through which goods and services are exchanged.
a) **Market** b) School c) College d) House

Unit – II

1. ----- is a study of the laws governing production, exchange and distribution of the material means of living.
a) **Political Economy** b) Socialism c) Capitalism d) Imperialism
2. ----- laws are both general and specific
a) **Economic** b) State c) Central d) Criminal
3. Laws are objective because they reflect ----- processes.
a) **Real** b) Reel c) Critical d) Democratic
4. Laws enable us to predict future events and -----
a) **Trends** b) Traditions c) Scenes d) Dreams
5. Marx and Engels carried forward the ----- political economy to new heights.
a) **Classical** b) Neo- Classical c) Modern d) Historical
6. One of the most important features of finance capital was the export of -----
a) **Capital** b) Labour c) Cloth d) Agriculture products
7. Economics was considered as positive and -----
a) **Neutral** b) Negative c) Zero d) Integer
8. The change from political economy to the so called positive economies is due to the class interests of the ----- class.
a) Ruling b) **Middle** c) Centre d) Least
9. Who defined “Economics as the science which studies human behavior as a relationship between ends and scarce means which have alternative uses?”
a) **Robbins** b) Schumpeter c) Alfred Marshall d) Lenin
10. ----- substituted to labour-time expended in producing a commodity as the determinant of value.
a) **Utility** b) Worker c) Land d) Capital

Unit – III

1. Who is the view that potential for personal development is crushed in advanced industrial societies?
a) Marcuse b) **Marx** c) Weber d) Durkheim
2. According to whom, communist society will be at the last stage of the history of man?
a) **Karl Marx** b) John Staurt Mil c) John Locke d) Niccolo Machiavelli
3. According to Marxism, which class will end the capitalist system?
a) White Collar Class b) **Proletarait class** c) Elite Class d) Royal Class
4. In Marxist theory, _____ is the belief that the arrangement of the bourgeoisie owning the means of production and the proletariat working for the interests of the bourgeoisie is legitimate.
a) **False consciousness** b) left realism c) postmodern criminology d) false realism
5. _____ focuses on how racial issues have determined the quality of justice that has been available to people of color in North America.
a) Left realism b) Critical race theory c) Feminist criminology d) Racial criminology
6. _____ begin to engage in antisocial behavior at an early age and continue to commit acts that harm others throughout their lives.
a) Adolescent-limited offenders b) **Life-course persistent offenders** c) Juvenile delinquents
d) Serial killers
7. Left realism contends that the idealism of _____ criminology sacrifices the interests of impoverished people for the interests of lower-class offenders.
a) **Marxist** b)integratedc)feministd)peacemaking
8. Which is a level in the peacemaking pyramid?
a) opaque means b) exclusion c) occluded criteria d) **nonviolence**
9. Thornberry's _____ draws on social control and social learning theories.
a) peacemaking perspective b) strain theory c) social control theory d) **interactional perspective**
10. In life-course criminological theory, _____ are youths who engage in antisocial and deviant behavior for only a short period of time and only in certain situations.
a) adult-limited offenders b) **adolescent-limited offenders** c) juvenile offenders d) life-course persistent offenders

Unit- IV

1. Which of the following is an advantage of division of labour?
a) Less Job Satisfaction b) Delays in work c) Increased speed of work d) **Breaking down of work into smaller units**
2. Which is not true about division of labour?

a) Large scale production b) **Requires less training** c) Highly repetitive work d) requires more training

3. Which of the following requires division of labour?

a) **Tailoring** b) Typing c) Teaching d) Driving

4. Define Free Enterprise:

a) **A business taking a risk to make a profit** b) A program administered by the Government

c) People in business trying to make a profit d) A business adventure or undertaking

5. Capital is:

a) **Money available to invest** b) Prohibitive cost of entry

c) A guarantee that a company will be successful d) Increased amount of Investment

6. The following are included in a business plan

a) Financial information, production plans, personnel policies b) Goals of the business and how they will be achieved c) **A step by step plan for the success of your business** d) Final plan of the industries

7. Quality Control is defined as:

a) Controlling the cost of the product b) Controlling the number of pieces produced

c) **Producing & monitoring products so they are acceptable to the consumer**

d) Producing & monitoring products so they are acceptable to the workers

8. Making a purchase you had not planned is called:

a) Consumer shopping b) A warranty c) **Impulse buying** d) Comparison shopping.

9. Product planning tells you:

a) Where you will produce your product b) **Cost to produce your product**

c) Your Net profit d) Total revenues

10. Cost per serving means:

a) How much it will cost to produce one recipe b) How much it will cost to produce what you sell in one day c) **How much it will cost to make "One"** d) How much it will cost to make one batch.

Unit – V

1. Which of the following could not be considered a major economic system?

a) Capitalism b) Socialism c) Communism d) **Physical quality of index**

2. Economic development refers to _____

a) Economic growth b) Economic Development c) Improvement in the well-being d) **Sustainable increases in Gross National product**

3. OPEC means is _____

- a) Organization of Petroleum Exporting country b) Organization of Pre – European Commission c) Oil Producing Economic Caucus d) Organization of Problematic Economies Committee

4. The value of goods and services produced by residents of a country and the value of their property is called _____

- a) Gross domestic product b) Net domestic product c) **Gross national income** d) Net national income

5. Gross domestic product of a country is the total of its net domestic product and _____

- a) Informal economy b) Earnings on foreign exchange in the domestic country c) Subsidies on the consumption of goods and services d) **Consumption of capital in the production process**

6. Which of the following ministries is responsible for the report on India's national and per capita income?

- a) Ministry of Home Affairs b) Ministry of Planning c) **Ministry of Statistics and Programme Implementation** d) Ministry of Human Resource Development

7. Which of the following agencies is responsible for computing the National Income Statistics in India?

- a) Reserve Bank of India b) Central Statistical Office c) **Ministry of Finance** d) Planning Commission

8. Disguised unemployment exists primarily in the _____ sector in our country.

- a) Defence b) **Agriculture** c) Manufacturing d) Service

9. When a large number of workers get unemployed due to automation of industrial processes, this phenomenon is called _____

- a) Cyclical unemployment b) Disguised unemployment c) **Structural unemployment**
d) Seasonal unemployment

10. The meaning of disguised unemployment is _____

- a) **Zero marginal productivity of labour** b) Zero total productivity of labour c) Zero average productivity of labour d) Zero increment of income

Section – B

Unit – I

1. Define Labour
2. What is means of production?
3. What are productive forces?
4. What is social formation?
5. Define Social classes

6. Define commodity
7. What are the difference between the labour power and labour
8. Define market
9. Distinguish between the value and price:
10. Define Capital

Unit – II

1. Define Political economy
2. Define Natural laws and Economic Laws
3. Who is physiocrat?
4. Who is the founder of classical political economy and explains his views?
5. Describe the Karl Marx and Frederick Engels views about the political economy
6. State and explain the view of V.I.Lenin of capitalism
7. How the term political economy was transformed to Economics?
8. Explain the view of Lionel Robbins and Schumpeter

Unit –III

1. Define Marxist theory of state
2. Explain the class struggle
3. Define free enterprise
4. Explain the state intervention
5. Define capitalism
6. Explain political intervention
7. Explain economic intervention
8. Define entrepreneur
9. Define inferior goods
10. Define Giffen paradox

Unit- IV

1. Define division of labour
2. Explain free enterprise
3. Define monopoly
4. Explain the value and surplus
5. Explain the theory of rent
6. Define overproduction

7. Explain the law of diminishing returns
8. Define mixed economy
9. Define Effective demand
10. Define Marginal propensity to consume

Unit- V

1. Name the neo classical economists in chronological order
2. List out the assumptions of neo classical economist
3. Define complementary goods
4. Define the Value according to Jevons
5. Explain the Walrasian concept of entrepreneur
6. Explain the concept of Modern theories of growth
7. State the Kaldors model regarding growth
8. Explain the Joan Robinson's model of growth
9. Give the equation for the relationship of national income and its distributions
10. discuss the assumptions of Kaldor regarding national income

Section – C

Unit – I

1. Explain the basic concepts of Labour, Capital and profit:
2. Describe about the productive forces and production relations:
3. Write about the social formation in the society with its basic structure?
4. Discuss about the concepts like commodity, labour power and market:
5. Describe the value of social classes:
6. Explain the social revolution and exploitation:
7. Discuss various types of competition in a brief manner:
8. State and explain the difference between the development and developing:

Unit – II

1. Describe the difference between the natural laws and economic laws
2. Discuss the Adam Smith and David Ricardo with their objectives of political economy
3. Discuss the changes from political economy to economic policies
4. Give a brief explanation for the J.M. Keynes viewpoints of economics

5. Describe the subject matter and method of study

Unit – III

1. Enumerate the importance of Marxist theory
2. Discuss the state intervention at three levels
3. Describe the Planning and controls
4. Discuss the developed capitalist entrepreneur
5. Describe the state in developing countries
6. Discuss about the state in socialist society

Unit – IV

1. Explain the Concept of division of labour with the examples
2. Discuss the idea of free enterprise
3. Examine and compare the different types of competitions
4. Explain the value and surplus
5. Describe the theory of Distribution
6. Explain the concept of overproduction
7. Differentiate between the under and over consumption
8. Examine the relevance of classical theory

Unit – V

1. Explain the Neo – Classical school of Economics
2. Discuss the ideas of Modern theories of growth
3. Enumerate the Harrod - Domar model with its diagram
4. Examine the Kaldor's model with its diagram
5. Examine the Joan Robinson's model with its diagram
6. Explain the difference between the Classical Economist and Neo-Classical Economist ideas on economic growth

Section – D

Unit – I

1. Discriminate the subsistence wage level and the wage according to the wage laws with its benefits and constraints:
2. Explain the relationship between the productive forces and production relations with their examples
3. Give a brief note on social formation and its characteristics feature and their importance.

4. Critically evaluate the concepts of Market, Value and Price with their social structures.
5. Give an explanation for exploitation of state, competition, monopoly and imperialism.

Unit – II

1. Enumerate the views of Physiocrats, Adam Smith and David Ricardo
2. Discuss the viewpoints of Karl Marx and Frederick Engels, V.M. Lenin, Alfred Marshall
3. Explain the Robbins and Joseph Schumpeter, J.M. Keynes, Gunnar Myrdal, D. P. Mukerji

Unit – III

1. Critically evaluate the Marxist theory of state with its assumptions
2. Discuss the theory of state and political interventions with its original views and ideas
3. Give a brief note on Economic intervention and their planning efficiency and control
4. Critically evaluate the entrepreneur importance regarding the growth of an Economy
5. Critically explain the relevance of Classical Theory

Unit – IV

1. Discuss the classical theory of development for the division of labour
2. Argue the theory of distribution in over production and under consumption
3. Discriminate the relevance of classical theory
4. Critically evaluate the concept of value and surplus
5. Describe the concepts in a critical way of explaining for division of labour, over production under consumption

Unit – V

1. Argue the statement to support the theory of Neo-classical School of Economics
2. Enumerate the concepts for the modern theories of growth of an economy
3. Critically evaluate the Harrod – Domar theory of Growth
4. Describe the theory of Kaldor’s model with its assumptions and critical evaluations
5. Critically evaluate the theory of Joan Robertson’s growth model

Semester– III			
Core XII INDIAN ECONOMY			
Course Code: 21PECC32	Hrs/Week: 6	Hrs/ Semester: 90	Credits: 4

UNIT-I:Structure of Indian Economy

20Hrs

Natural resources – Land, Water, Forest - Demography – Features, size, sex

Composition and Growth rates; Infrastructure – Transport, Communication, Energy.
National Income: Trend, Growth rate and Sectoral contribution

UNIT-II: Agricultural Sector: 20Hrs

Institutional structure – Land reforms in India: Technological change in agriculture – Pricing of agricultural inputs and output; Agricultural Finance Policy; Agricultural Marketing and Warehousing- Issues of food security – Policies for sustainable agriculture.

UNIT-III: Industrial Sector 15Hrs

New Industrial policy of India 2020- Salient features of New Industrial Policy – Three major industries in India today- Sources of Industrial Finance- Internal and External Sources-Industrial Finance Corporation of India (IFCI) - Outcomes of New Industrial Policies- Limitations of Industrial Policies in India

UNIT-IV: Financial Sector 15Hrs

Monetary policy of RBI-Money and Capital markets-Growth and problem- Role of commercial banks in India-Banking sector reforms since 1991

UNIT-V: Globalization and India 20Hrs

Rationale of internal and external reforms-globalization of Indian economy- WTO & its impact on different sectors of the economy-need for and issues in good governance.

Text Book:

RuddarDatt& K.P.M. Sundaram.*Indian Economy*. New Delhi: R.Chand& Co.2008

Books for Reference:

1. Kindleberger.C.P.*Economic Development*.New York: McGraw Hill, 3rd edition 2008
2. M.L Jhingan. *The Economics of Development and Planning*.New Delhi: VikasPublishing House PVT Ltd, 2nd edition 2000
3. Mishra, S.K. and V.K.Puri.*Indian Economy*.Dhingra: Himalaya Publishing House, 16thedition 2005

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II M.A. Economics

Core- III

INDIAN ECONOMY

Sub. Code: 21PECC32

Semester – III

SECTION - A

UNIT – I

1 mark

Choose the correct answer:

1. A socialistic economy is _____
 - a. **equalitarian economy**
 - b. planned economy
 - c. non planned economy.
 - d. democratic economy
2. A closed economy is in which _____
 - a. Money supply is fully controlled
 - b. Deficit financing takes place
 - b. **Only export is there**
 - d. Import take place
3. India's wage policy is based on
 - a. **Cost of living**
 - b. Standard of living
 - c. Productivity
 - d. Manufacturing
4. What is the mainstay of Indian economy
 - a. **Agricultural**
 - b. Public sector
 - b. Business
 - c. Manufacturing
5. Take off stage in an economy means
 - a. **Steady growth begins**
 - b. Economy is stagnant
 - c. Economy is about to collapse
 - d. All controls are removed
6. The most appropriate measure of a country's economic growth is
 - a. GDP
 - b. NDP
 - c. **Per capita real income**
 - d. GNP
7. The concept of five year plans in the constitution of India is borrowed from _____
—

- a. **Russia**
 - b. England
 - c. The united states
 - d. Germany
8. Which of the following organisation calculates Gross Domestic Product in India?
- a. **National statistical office**
 - b. Ministry of commerce and industry
 - c. Indian statistical institute
 - d. Reserve Bank of India
9. Which of the following is a tidal port?
- a. Vishakhapatnam
 - b. **Kandla**
 - c. Tuticorin
 - d. Chennai
10. The Veer Savarkar International Airport is located in _____
- a. Mumbai
 - b. **Andaman and Nicobar Islands**
 - c. Chandigarh
 - d. Delhi

UNIT II

1. Which sector is the backbone of Indian economy?
- a. Service sector
 - b. Financial sector
 - c. Tourism sector
 - d. **Agricultural sector**
2. When was the new agricultural policy established ?
- a. **July 2000**
 - b. March 2002
 - c. March 2004
 - d. January 2004
3. Agricultural related activities come under
- a. **Primary sector**
 - b. Secondary sector
 - c. Tertiary sector

- d. Quaternary sector
4. Markets in which business is done in accordance
5. "golden Revolution " is related to _____
- a. Precious minerals
 - b. Pulses
 - c. Jute
 - d. Horticulture and honey**
6. Muga silk is associated to which of the following states of india?
- a. Arunachal Pradesh
 - b. Bihar
 - c. Maharashtra
 - d. Assam**
7. Which colour is associated with the revolution in fertilisers?
- a. Pink
 - b. Golden
 - c. Black
 - d. Gray**
8. "slash and burn " agricultural is a type of _____
- a. Shifting agricultural
 - b. Intensive agricultural
 - c. Commercial agricultural
 - d. Subsistence farming
9. National bank for agricultural and rural development is a _____
- a. Development Bank**
 - b. Commercial Bank
 - c. Small and Medium Enterprise
 - d. Supervisory institution
10. Gray revolution is related to _____
- a. Leather
 - b. Silk
 - c. Fish
 - d. Fertilizer**

UNIT III

1. Which of the following is not part of the eight-core industries of the Indian economy?

- a. Coal
 - b. Crude oil
 - c. Fertilizer
 - d. Automobile**
2. Primary sector of the economy is related to
- a. Agricultural**
 - b. Manufacturing
 - c. Information and technology
 - d. Transportation
3. Which of the following is a tertiary economic activity?
- a. Weaving
 - b. Farming
 - c. Trading**
 - d. Hunting
4. Where was the first steel plant set-up in India?
- a. Bolero
 - b. Jamshedpur**
 - c. Bhadravati
 - d. Rourkela
5. Which is the measure of industrial activities in the Indian economy?
- a. Gas and water supply**
 - b. Electricity
 - c. Mining
 - d. Manufacturing
6. Which is the oldest industry in India?
- a. Woollen industry
 - b. Cotton textiles industry**
 - c. Paper industry
 - d. Synthetic fiber industry
7. Railtel corporation is a _____
- a. Private sector enterprise
 - b. Public sector undertaking**
 - c. Partnership firm
 - d. Joint sector enterprise
8. Which city is called the cottonopolis of India?
- a. Mumbai**

- b. Chennai
 - c. Kolkata
 - d. Patna
9. Which sector has more growth rate to accelerate the industrial growth of India in 2015-2016?
- a. Mining and quarrying
 - b. Construction
 - c. Manufacturing**
 - d. Electricity
10. Which of the following is not a maha-ratna industry?
- a. GAIL
 - b. Coal India limited
 - c. SAIL
 - d. Airport Authority of India**

UNIT IV

1. In which year was the new currency symbol of the Indian rupee officially adopted?
- a. 2018
 - b. 2000
 - c. 2010**
 - d. 1995
2. Among the following taxes, which one is NOT a direct tax in India?
- a. Goods and services tax**
 - b. Income tax
 - c. Minimum alternate tax
 - d. Corporation tax
3. Which of the following is not a digital transaction in India?
- a. Cash transaction**
 - b. Credit card transaction
 - c. payTm
 - d. ATM transaction
4. The allocation toward health and well being was increased by _____ Over the previous year in Union Budget 2021-22.
- a. 140%
 - b. 125%

- c. **137%**
 - d. 100%
5. India imports maximum gold from which country?
- a. **Switzerland**
 - b. UAE
 - c. South Africa
 - d. Brazil
6. How much percent amount has been increased for the Culture Ministry in the budget of 2022-2023?
- a. **11.9%**
 - b. 19%
 - c. 12.9%
 - d. 10.9%
7. In the context of banking sector of India, what is the full form of IMPS?
- a. Instant payment sector
 - b. **Immediate payment service**
 - c. Immediate payment sector
 - d. Instant payment service
8. With which of the following did the ARDC merged with on 12th July, 1982?
- a. NABARD
 - b. EXIM bank
 - c. RBI
 - d. Indian bank
9. The first complete Indian Bank was established in which year?
- a. 1794
 - b. **1894**
 - c. 1896
 - d. 1902
10. What is the main cause of the export surplus?
- a. The country's stringent import policy
 - b. **Development in National and international markets**
 - c. The country's export promotion value
 - d. Expenditure on economic services

UNIT V

1. What is the integration between countries through foreign trade and foreign investment by multinational corporation (MNCs)?
 - a. International trade
 - b. Globalization**
 - c. International investment
 - d. World trade
2. The most common route for MNC investment is to buy up _____
 - a. Local resources
 - b. Local technology
 - c. Excess land for factories
 - d. Local companies**
3. _____ has helped most in the spread of production of services?
 - a. Email
 - b. Telegraph
 - c. Fax
 - d. call centres**
4. Globalization in, by connecting countries, shall result _____
 - a. Lesser competition among producers
 - b. Greater competition among producers**
 - c. No change in competition among producers
 - d. Purchase by a consumers
5. Removing barriers or restrictions set by the government is what is known as _____?
 - a. Globalization
 - b. Liberalization**
 - c. Regeneration
 - d. Expansion
6. Which Indian company has emerged as an MNC?
 - a. Mahindra & Mahindra
 - b. Tata Motors**
 - c. Renault
 - d. Maruti Suzuki
7. Which of the following organisations does not handle the globalization process?
 - a. World Bank
 - b. IMF

- c. WTO
 - d. Asian Bank**
8. What is the full form of SEZ?
- a. Special Economic Zones**
 - b. Special Education Zones
 - c. Social Economic Zones
 - d. Special Effective Zones
9. What are the benefits of Globalization?
- a. Use of innovation and technology**
 - b. Low production costs
 - c. Get access to various new cultures
 - d. High Product cost
10. Which of the following promotes Globalization?
- a. External trade**
 - b. Trade at a large scale
 - c. Trade at a small scale
 - d. Internal trade

Section-B

(2 marks)

Unit-I

1. Define Natural Resources.
2. What are fallow lands?
3. What is Afforestation and Deforestation?
4. Explain the third stage of demographic transition.
5. What is sex ratio?
6. What are the facilities that are included in Infrastructural facilities?
7. What is Per capita income?
8. What is GDP?
9. How to calculate the national income?
10. What is the main factor determinant of poverty?

Unit-II

1. What are the inputs of agriculture?
2. Explain water management.
3. Explain agricultural marketing.
4. What is Marketable surplus?
5. Define food security.
6. Explain agricultural finance policy.
7. Define sustainable agriculture.

8. Explain regulated markets.
9. Explain the lack of storage facilities in agriculture.
10. Explain Irrigation.

Unit-III

1. State the meaning for new classification of industries?
2. What are all the attitudes towards foreign capital?
3. State the classification of small sector?
4. Explain the aims of the new industrial policy 1991?
5. What is industrial licensing policy?
6. What is MRTP act?
7. When the government will take over the sick units?
8. What is privatisation?
9. How we create the private monopoly in place of public monopoly?
10. What is disinvestment:-

Unit-IV

1. Give a brief explanation about education in Information Technology sector.
2. What are the divisions of education in Information Technology sector?
3. Give the expansion for NASSCOM and ITES.
4. What is Information Technology sector?
5. Give some example for the usage of Information Technology sector.
6. State the categories of Information Technology sector.
7. Explain the competitiveness at individual level.
8. Define ATM? What is the usage of this ATM?
9. What is financial market?
10. What is Industrialisation?

Unit-V

1. Define import and export?
2. How the bulk imports are classified?
3. State the classifications of non-bulk import.
4. State the categories of export.
5. What do you mean by Handicraft products?
6. Define Balance of payment.
7. What are the classifications of balance of payment?
8. What does it mean the NRI Deposits?
9. Define foreign capital and state the reasons.
10. What is direct foreign investment?

Section-C

(6 marks)

Unit-I

1. State the principal features of the national income committee report.

2. Explain the net output and net income method in National income census method.
3. Discuss the first and second stages of demographic transition.
4. Explain the urbanisation and economic development.
5. State and explain the life expectancy.
6. What are all the problems involves in the increasing cultivable area?
7. State and explain the plan outlays of forests (1952).
8. Give a brief explanation about massive deforestation.

Unit-II

1. Explain the growth of high yielding variety seeds programme.
2. Explain the consumption and production of chemical fertilizers.
3. What are the reasons for low consumption of fertilizer in India?
4. Write short note on water management.
5. Explain the importance of irrigation in agriculture.
6. What are the various sources and kinds of irrigation?
7. What are the systems of agricultural marketing?
8. What are the advantages and disadvantages of co-operative marketing?
9. What are the defects of agricultural marketing?
10. What are the causes for low marketable surplus? What are the suggestions for improvement of the marketable surplus?

Unit-III

1. What are the important provisions of the 1956 industrial resolution.
2. State and explain the evaluation of the new industrial policy in 1977.
3. List out the primary objective of disinvestment.
4. What are all the measures taken by the public sector to improve the industrial sector?
5. Explain public and social security policy?

Unit-IV

1. State and explain SME's role and relevance in economic development.
2. State the features of SMEs.
3. What are all the strength and weakness of SME's?
4. List out imperative for success in banking and insurance in the field of I.T. sector.
5. Distinguish between individual and corporate competitiveness.
6. What are all the factors leading to liberalisation in India?
7. State the benefits of liberalisation to MNC's.
8. List out the criticisms of liberalisation in India.

Unit-V

1. Explain the form of foreign capital.
2. State the crisis of balance of payment.
3. State the recommendations of Rangarajan Committee report.

4. Explain the imports of consumer goods and food grains.
5. Write the pattern of export.
6. Measures the forms of foreign capital.
7. Short note on direction in foreign trade.
8. Short note on basic aims of the new policy in foreign trade.
9. Briefly explain the reason for foreign capital.

Section-D
Unit-I

(12 marks)

1. Explain the trends in National Income Growth and structure.
2. Discuss the theory of Demographic transition with their three stages sequence of birth and death.
3. Explain the various types of lands which are all come under land resources.
4. Discuss the relation between the economic growth and the forest resources.
5. Give a detail report on India transport systems towards the economic development.

Unit-II

1. Write issues of food security?
2. What are the inputs of agriculture? Explain their importance progress and short comings?
3. Explain the importance of irrigation and explain their sources and shortcomings?
4. Explain the defects of agricultural marketing and the measures taken by the government to remedy them.
5. Explain water housing in India.
6. Explain land reforms in India.
7. Explain the technological change in agriculture.
8. Explain co-operative marketing?

Unit-III

1. Give a brief explanation about industrial policy statement 1977?
2. Explain in detail about private and disinvestment.
3. What are the emergence of the disinvestment policy.

Unit-IV

1. State and explain the arguments in support of MNC's to India.
2. Explain the growth and performance of small scale industries in India.
3. Give a detail report on I.T Sector in Banking and Insurance.
4. Give a detail report on education in I.T Sector.

Unit-V

1. Write an essay on importance of foreign trade for a developing economy.
2. Write an essay on invisibles and balance of payment.
3. Explain India's Balance of payment on current account in and thereafter 1990-1991.
4. Explain the composition of India's foreign trade.
5. Explain the need and forms of foreign capital.

Semester – III			
Core XIII RURAL DEVELOPMENT			
Course Code: 21PECC33	Hrs / Week: 5	Hrs / Semester: 75	Credits : 4

UNIT-I: Rural Development

15 Hrs

Meaning, Definition, Scope and Concept of Rural Development, Components of Rural Development, Pre-Independence Rural Development Programmes

UNIT-II: Approaches and Policies for Rural Development

15 Hrs

Approaches for Rural Development: Broad Front Approach, Sectoral Approach-Policies for Rural Development: National Forest Policy-National Water Policy and National Agricultural Policy.

UNIT-III: Rural Development Programmes

15 Hrs

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)- Pradhan Mantri Gram Sadak Yojana (PMGSY) - Bharat Nirman – Swachh Bharat, P.M Jandhan Yojana- National Rural Health Mission (NRHM).

UNIT-IV: Area Development Programmes:

15 Hrs

Drought Prone Area Programme (DPAP)-Desert Development Programme (DDP)-Tribal and Hill Area Development Programme (THADP) - Integrated Wastelands Development Programme (IWDP)

UNIT-V: Rural Development and Welfare Schemes in Tamil Nadu:

15 Hrs

SC&ST Sub-Plan - Social Security Scheme - Old Age Pensions-Widow Pensions- Disabled Pensions- Maternity Aid to Pregnant Women

TEXT BOOKS:

Katar Singh. Rural Development principles, policies and Management. New Delhi: Sage publications, 2nd edition 1999

Reference Books:

1. Todaro M.P. Economic Development in III World. New Delhi: Orient Long Man, 3rd edition 1985
2. Arora R.C Integrated Rural Development in India. New Delhi: S.Chand Publications, 1st edition 1980.
3. K. Sahu. Rural Development in India. New Delhi: Anmol Publications, 4th edition 2003
4. M.J. Moseley. Rural Development: Principles and Practice. New Delhi: Sage Publications 6th edition 2013
5. R. Chambers. Rural development. New Delhi: Putting the Last First, Longman, 2nd edition 1983

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II M. A Economics

Core-III

Rural Development Sub. Code: 21PECC33

SECTION - A

UNIT – I

1 mark

Choose the correct answer

- Rural development means an action plan for the economic and social ____ of rural areas.
a. **Upliftment** b. Cultural c. Quality of life d. development
- Rural development aims at improving the ____ of people living in rural areas.
a. Welfare b. **quality of life** c. Healthy of life d. wealthy of life
- A process leading to ____ improvement in the quality of life of rural people, especially the poor.
a. **Sustainable** b. emolument c. increase d. pepole
- ____ would be the major occupation of rural area.
a. **Agriculture** b. Industry c. fisheries d. Service sector
- ____ wanted to develop a centre to extend his ideas on education in a rural setting.
a. Gandhiji b. **Shri Rabindra Nath Tagore** c. Subash Chandra bose d. Nehru
- Marthandam Project was also formed ____
a. Improving literacy b. egg selling c. bull clubs d. **honey club**
- ____ was a Gandhian concept and evoked great enthusiasm in Bombay since 1948-49.
a. Gurgaon project b. Brayne c. **Sarvodaya Movement** d. Marthandam Project
- ____ connectivity is a major sign of rural development which also improves the agriculture sector.
a. **Better road** b. Better planning c. Modern Techniques d. Basic amenities
- Introducing ____ techniques in agriculture and allied industries will automatically improve the overall development of villages.
a. **Modern** b. Old c. High d. technical
- In the villages, there are no good facilities for ____, health, communication and so on.
a. Basic amenities b. Modern Techniques c. **education** d. Better planning

UNIT – II

- ____ development planning in individual sectors like education, health, housing and social security are included.
a. **Sectoral** b. Growth Center c. Target d. Area
- ____ development approach contemplates that development of an area depends not only on the development of an adequate infrastructure network.
a. Sectoral b. **Area** c. Target d. Growth center
- The ____ approach gives primacy to the need for a minimum standard of living of the poor as a central concern of development planning.
a. **basic needs** b. Area c. Target d. Growth center
- The different programmes were brought under single umbrella of ____
a. **IRDP** b. DWCRA c. JRY d. TRYSEM
- The concept of “____” came into vogue with the need for a multipurpose thrust to rural planning.
a. Rural Development b. Growth Center
c. **integrated rural development** d. CBD
- The Community Development Program (CDP) was launched in ____
a. 1954 b. 1944 c. 1963 d. **1952**
- The CDP was initiated in 55 projects comprising ____ villages, each project covering a population of 2 lakhs.

- a. **300** b. 500 c. 200 d. 100
- 8. _____ policy is a crucial element in a rural development strategy.
 - a. **Land** b. Monetary c. fiscal d. technology
- 9. Improvements in _____ available to rural societies can have a big impact on them.
 - a. productivity b. **technologies** c. opportunities d. judicious
- 10. The first National Water Policy was adopted in September, _____.
 - a. **1987** b. 1988 c. 1989 d. 1990

Unit – III

1. The National Rural Employment Guarantee Act, (NREGA) was notified on September 7, _____.
 - a. **2005** b. 2007 c. 2009 d. 2004
2. The MGNREGA provides a legal guarantee for _____ days of employment in every financial year.
 - a. 105 b. 90 c. **100** d. 120
3. The _____ after due verification will issue a Job Card for the working people of the under the scheme of NREGA.
 - a. **Gram Panchayat** b. Zilla panchayat c. _____
4. Wages are to be paid according to the _____ 1948 for agricultural labourers.
 - a. **Minimum Wages Act** b. _____ c. _____ d. _____
5. The primary objective of the _____ is to provide connectivity by way of an all-weather road.
 - a. NREGA b. MRD c. CSS d. **PMGSY**
6. The _____ Government has planned and launched its new scheme, giving a step towards the improvement in the rural sector.
 - a. **Union** b. local c. state d. military
7. To accelerate the efforts to achieve a Swachh Bharat, Swachh Prayatan and bring focus on _____ & sanitation.
 - a. **Hygiene** b. health c. Nutrition d. welfare
8. The mission aims to achieve neat and clean tourist places which attract more _____ and Domestic Tourists.
 - a. Visitors b. **Foreign** c. traders d. entertainer
9. A clean India would be the best tribute India could pay to Mahatma Gandhi on his _____ birth anniversary in 2019.
 - a. 200 b. 146 c. **150** d. 151
10. _____ had referred to the ancient Sanskrit verse: Sukhasya Moolam Dharma, Dharmasya Moolam Artha, Arthasya Moolam Rajyam.
 - a. **Shri Narendra Modi** b. Manmohan Singh c. Rajiv Gandhi d. Indira Gandhi

UNIT – IV

1. Drought Prone Areas Programme (DPAP) is the earliest area development programme launched by the _____ Government.
 - a. **Central** b. local c. state d. military
2. The common Guidelines for _____ Development provide for a uniform strategy in the implementation of all area development programmes.
 - a. **Watershed** b. co-terminus c. **drought-proofing** d. Dryland farming
3. The Drought Prone Areas Programme was in operation in _____ blocks of 96 districts in 13 States during 1994-95.
 - a. 623 b. 654 c. **627** d. 681
4. The Drought Prone Area Development program **ultimately leading to the “_____”** of the affected areas.
 - a. **drought-proofing** b. Watershed c. Dryland farming d. co-terminus
5. _____ was initiated during Fifth Five Year Plan.
 - a. DPAP b. **HDAP** c. DDP d. CDP

6. Due to increase in tourism and commercial development by outsiders, deforestation and reckless construction activities, the fragile _____ of hilly areas are in danger causing widespread soil erosion.
 - a. **eco-system** b. eco preservation. c. eco- development d. eco-restoration
7. The main objective of HADP is _____, eco- development and eco preservation.
 - a. **eco-restoration** b. eco-system c. eco-free d. eco-friendly
8. The _____ of hilly and forested areas do not cooperate with the administration in development activities.
 - a. **tribal dwellers** b. **militant** c. sub area d. slam area
9. Watershed is a _____ until where rain falling in the area drains through a common point.
 - a. **Geographical** b. dry land c. degradation d. Desertification
10. Water and soil conservation also leads to improved green cover in the project areas leading to improved _____ of land.
 - a. **Productivity** b. non-productivity c. constructive d. non-constructive

Unit – V

1. SC & ST Sub Plan were introduced in the _____ Plan and Fifth Plan for channelizing to these categories of people their due share of plan benefits and outlays.
 - a. **Sixth** b. tenth c. fourth d. second
2. The main objective is to give a thrust to _____ oriented schemes of economic development of SCs below the poverty line.
 - a. Scheduled cast b. **family** c. Scheduled Tribes d. economic
3. _____ schemes were launched on 9th May, 2015.
 - a. Atal Pension Yojana
 - b. . Pradhan Mantri Suraksha Bima Yojana
 - c. Pradhan Mantri JeevanJyoti Yojana
 - d. **Social Security**
4. _____ Scheme is available to people in the age group 18 to 70 years with a bank / Post office account.
 - a. **Pradhan Mantri Suraksha Bima Yojana**
 - b. Atal Pension Yojana
 - c. Pradhan Mantri JeevanJyoti Yojana
 - d. Social Security
5. Atal Pension Yojana (APY) is being implemented with effect from 1st June, _____.
 - a. **2015** b. 2018 c. 2020 d. 2000
6. The APY is primarily focused on all citizens in the _____ sector, who join the NPS.
 - a. **Unorganized** b. Organized c. Public d. Private
7. Any Indian Citizen between _____-40 years of age can join through their savings bank account or post office savings bank account.
 - a. 10 b. 15 c. 13 d. **18**
8. _____ helps older citizens in India who are below the poverty line (BPL).
 - a. **Old age Pension** b. widow's pension c. Disability Scheme d. Maternity Benefit
9. IGWPS was launched by the Central Government in _____.
 - a. 1985 b. 1988 c. **1995** d. 1996
10. The _____ Scheme in Tamilnadu was launched in the year 1987 Under Dr. Muthulakshmi Reddy Ninaivu Mahapperu Uthavi Thittam.
 - a. Maternity Benefit b. widow's pension c. Disability Scheme d. Old age Pension

Section - B

Unit – I

2 Marks

1. Define -Rural development
2. Write the concept of rural development
3. Recall the objectives of developmental programmes of pre- independence era .
4. Write the Sriniketan project.
5. Write the drawback of Sriniketan project.
6. Write any three objectives of Economic Conference of Mysore.
7. Quote Marthandam project.

8. Tell the Sarvodaya movement.
9. Write the Gurgaon project.
10. Write the sequence of Indian Village Service.

Unit – II

1. List out the Approaches for Rural Development
2. Quote Sectoral Approach.
3. Recall the Target approach.
4. Write the concept Area development Approach.
5. What are the components of MNP?
6. What is the aim of IRDP?
7. Explain the National Water Policy.
8. Tell the aim of CDP.
9. Define land policy.
10. Define price policy.

Unit – III

1. Recall the NREGA
2. Write the objectives of NREGA.
3. What is the purpose of PMGSY?
4. Quote the Bharat Nirman.
5. List out the major sectors of the scheme.
6. Which scheme focus on hygiene & sanitation?
7. Which one is a biggest financial inclusion initiative in the world?
8. Describe the Swachh Bharat Mission.
9. NRHM- Sequence.
10. What are the features of NRHM.

Unit – IV

1. Recall the Drought Prone Areas Programme.
2. Write any two objectives of DPAP.
3. What are the major components of DPAP?
4. Quote the Desert development programme.
5. When was initiated of HDAP?
6. Write any two objectives of HDAP.
7. When was launched by IWDP.
8. List out the example of Watershed programme.
9. Write the full form of NLWDC.
10. What are the three groups comprise of wastelands?

Unit – V

1. Recall the SC & ST Sub Plan
2. What are the objectives of SC & ST Plan.
3. Quote SCP.
4. List out the Social Security Schemes
5. Atal Pension Yojana – Explain
6. Recall the old age pension
7. What are the objectives of National Widow Pension Scheme?
8. Who are the benefits of disability pension scheme?
9. In which year Tamilnadu launched Maternity Benefit Scheme?
10. Tell the general eligibility criteria for maternity scheme.

Section - C

Unit – I 5marks

1. Explain the scope of rural development.
2. Discuss the importance of developmental programmes.
3. Explain the merits and demerits developmental programmes.
4. Write a short note on sriniketan project.
5. Write a short note on Economic Conference of Mysore.
6. Explain the objectives of Gurgaon project.

7. Explain the activities introduced by Brayne.
8. Explain the Indian village service.

Unit – II

1. Explain the Area development approach.
2. Explain the target approach.
3. Discuss the Employment-oriented Integrated Approach.
4. Community-driven development – Explain
5. Discuss the aim of CDP
6. Write a short on land policy
7. Write a short on agricultural policy
8. Discuss the price policy.
9. Discuss the aim of National Forest Policy
10. Explain the aim of wildlife management in India.

Unit – III

1. Write a short note on MNREGS.
2. Explain the goals of MNREGS.
3. Outline the Pradhan Mantri Gram Sadak Yojana.
4. Discuss the objectives of PMGSY.
5. Explain the features of the Bharat Nirman Yojana.
6. Swachh Bharat Mission– Explain
7. Discuss the objectives of National Rural Health Mission.
8. Explain the Free Drugs and Diagnostics Service centre.
9. Explain the benefits of the National Rural Health Mission.
10. Village Health Sanitation and Nutrition Committee – Explain

Unit – IV

1. Write a short on drought prone areas programme.
2. Discuss basic objective of DPAP.
3. Explain the coverage of DPAP.
4. Discuss the major components of DPAP.
5. Write a short note on Desert Development Programme.
6. Explain the Tribal and Hill Area Development Programme.
7. Explain the problem of Hill area development plan.
8. Write a short note on Integrated Wastelands Development Programme.

Unit – V

1. Explain the role of SC& ST Sub- Plan.
2. Discuss the special component plan.
3. Discuss the Social Security Schemes.
4. Atal Pension Yojana – Explain.
5. Explain the old age pension scheme.
6. Write a short on widow's pension scheme.
7. Detail the benefits of widow's pension scheme.
8. Explain the Benefits of Indira Gandhi National Disability Scheme.
9. Explain the Benefits of Maternity Benefit scheme.

Section - D

Unit – I

10 Marks

1. Evaluate the concept and scope of rural development.
2. Discuss the developmental programmes of pre – independence era.
3. Propose of importance and objectives of developmental programmes.
4. Evaluate the Sriniketan project and its drawbacks.
5. Explain the components of rural development.
6. Discuss the Indian village service and Gurgaon projects.

Unit – II

1. Prove the approaches for rural development.
2. Discuss the basic needs approach and area development approach.
3. Explain the Employment-oriented Integrated Approach to Rural Development.

4. Critically evaluate the Broad Front Approach.
5. Evaluate the Policies for rural development.
6. Discuss the National Forest Policy.
7. Explain the National Water Policy and its salient features.

Unit – III

1. Detailed explanation of National Rural Employment Guarantee Act.
2. Explain the Salient Features of NREGA.
3. Discuss the major sectors of Bharat Nirman Yojana.
4. Evaluate the Pradhan Mantri Jan Dhan Yojana.
5. Detailed explanation of Swachh Bharat Mission.
6. National Rural Health Mission - Explain

Unit – IV

1. Explain the Drought Prone Areas Programme.
2. Discuss the Strategy and coverage of DPAP.
3. Explain the Desert Development Programme and its objectives.
4. Tribal and Hill Area Development Programme and objectives - Explain
5. Discuss the Integrated Wastelands Development Programme.

Unit – V

1. Rural Development and Welfare Schemes in Tamil Nadu- Discuss
2. Discuss the objectives of SC & ST Sub- Plan.
3. Pradhan Mantri Jeevan Jyoti Bima Yojana – Explain.
4. Explain the Atal Pension Yojana.
5. Background of National Old Age Pension Scheme.
6. Indira Gandhi National Disability Pension Scheme – Discuss
7. Discuss the Maternity Benefit Scheme.

Semester – III			
Core XIV RESEARCH METHODOLOGY			
Course Code: 21PECC 34	Hrs/Week: 5	Hrs/ Semester: 75	Credits: 4

UNIT-I: Research Formulation and Design

15Hrs

Motivation and objectives – Research methods vs. Methodology-Types of research – Descriptive vs. Analytical-Applied vs. Fundamental-Quantitative vs. Qualitative-Conceptual vs. Empirical-concept of applied and basic research process- criteria of good research.

UNIT-II:Collection of Data**15 Hrs**

Types of Data: Primary and Secondary data - Methods of collection of Primary Data: Direct Personal Investigation, Indirect oral investigation, Information received through local agents, key informants, correspondents and mailed questionnaire - Secondary data: Sources, Limitations of Secondary Data - Precautions in the use of Secondary Data

UNIT-III: Processing and Analysis of Data**15 Hrs**

Editing, Coding, Classification, Objects, Rules, Tabulation, Preparation of a statistical table- Requisites of a good table - Types of Tables: Format of a simple one way table and three way tables

UNIT-IV:Testing of Hypothesis**15 Hrs**

Definition of Hypothesis, Characteristics, source of Hypothesis – Formulation of Hypothesis - Importance of Hypothesis – Pre-requisites for testing of Hypothesis, testing of Hypothesis, Types of errors in testing of Hypothesis, Level of significance

UNIT-V: Report Writing**15 Hrs**

Reporting - Requirements and mechanics of Report writing -Meaning of Interpretation- Technique of Interpretation-Precaution in Interpretation-Significance of Report Writing-Different Steps in Writing Report-Layout of the Research Report-Types of Reports-Oral Presentation-Research Reports-Conclusions.

Text Book:

Kothari, C.R. *Research Methodology*. New Delhi: Himalayas Publications, 2nd edition
2013.

Books for Reference

1. Cohen, M.R. and Nagal.*Introduction to Logic and Scientific methods Book-II*.Ireland:
Madison Publications, 2nd edition 1934
2. Good and Halt. *Methods in Social Research*. New Delhi:S.Chand
Publications,4th edition1993
3. Kurien C.T.A. *Guide to Research in Economics*.New Delhi:S.Chand Publications.
2013

St. Mary's College (Autonomous) Thoothukudi
Core IV Research Methodology Sub. code: 21PECC34
Question Bank

Section - A
Unit – I

1. The purpose of research is to _____ answers to questions through the application of scientific procedures.
a. **discover** b. learn c. realize d. overlook
2. The main aim of research is to find out the truth which is _____ and which has not been discovered as yet.
a. unsealed b. exhibited c. shown d. **hidden**
3. Research methodology is the specific procedures or _____
a. methods b. tools c. **techniques** d. models
4. _____ research is a type of research that describes a population, situation, or phenomenon that is being studied.
a. **Descriptive** b. Analytical c. Fundamental d. Applied
5. Empirical research is a type of research methodology that makes use of verifiable _____ in order to arrive at research outcomes.
a. **Evidence** b. Conceptual c. Quantitative d. Qualitative
6. _____ can be understood as the systematic and rigorous search for appropriate information on a specific subject.
a. Inquisition b. **Research** c. Inquest d. Inquiry
7. Research Methodology, as its name suggests is the study of methods, so as to _____ the research problem.
a. **Solve** b. unresolved c. resolved d. undecided
8. The main purpose of this research is to mention the criteria that may assist us to write a _____.
a. **good research** b. criteria c. basic research d. good criteria
9. In modern times, the role of research has increased in _____ economy.
a. **applied** b. Conceptual c. Empirical d. Qualitative
10. The purpose of research is to discover answer to questions through the application of _____ procedures.
a. **scientific** b. unscientific c. artistic d. systematic

Unit – II

1. Data can be defined as a _____ record of a particular quantity.
a. Systematic b. disorganized c. disabled d. orderly
2. Data may be qualitative or _____
a. **Quantitative** b. indefinable c. unspecifiable d. incalculable
3. The data that are collected for the first time by an investigator for a specific purpose is called _____ data.
a. **Primary data** b. trivial c. subsequent d. secondary
4. An interview is a method of data collection that involves _____ groups of people.
a. five b. **two** c. seven d. zero
5. The observation method is mostly used in studies related to _____ science.
a. moral b. computer c. social d. **behavioral**
6. _____ are gathering of 2 or more people with similar characteristics or who possess common traits.
a. **Focus Groups** b. Observation c. Surveys d. Experiment

7. A list of questions pertaining to the survey which is known as ____
 - a. posting b. pamphlet c. **Questionnaire** d. information sheet
8. Sources of secondary data include_____
 - a. **books** b. direct investigation c. indirect investigation d. census
9. _____are one of the most common online sources for data and may even be less authentic than websites.
 - a. **Blogs** b. books c. news paper d. diaries
10. _____records are a very important and authentic source of secondary data.
 - a. **Government** b. private c. public d. administrative

Unit – III

1. Information gathered during data collection may lack_____.
 - a. **uniformity** b. difference c. unlikeness d.dissimilarity
2. After Collecting data, the method of converting ____data into meaningful statement.
 - a. **raw** b. organized data c. processed data d. sorted data
3. _____also needs that data are relevant and appropriate and errors are modified.
 - a. Graph b.distribution c. Coding d. **Editing**
4. When the data in the table are tabulated to one characteristic, it is termed as a simple tabulation or ____ tabulation.
 - a. **one-way** b. two-way c. three-way d. four-way
5. When the data in the table are tabulated considering two different characteristics at a time is called as _____.
 - a. One-way b. three-way c. **two-way** d. four – way
6. A _____ is an aggregation of resources that bundles together the contents of an investigation or work.
 - a. **Research Object** b. Research work c. Research aim d. Research area
7. _____means the systematic presentation of the information contained in the data.
 - a. **Tabulation** b. graph c. editing d. distribution
8. The title is the main heading written in capitals shown at the ____of the table.
 - a. midpoint b. middle c. bottom d. **top**
9. The _____are given at the end of the table indicating the source the information has been taken from.
 - a. **source notes** b. foot notes c. prefatory notes d.
10. A _____chart is a graphical representation of categorical data with rectangular bars.
 - a. rectangular b. square c. pie d. **bar**

UNIT – IV

1. _____ is a starting of any investigation.
 - a. **Hypothesis** b. Null hypothesis c. Alternative hypothesis d. Assumption
2. _____knowledge and information regarding the topic of hypothesis will be extremely helpful to create a concrete hypothesis.
 - a. **Previous** b. present c. modern d. Up-to-date
3. A researcher's creative _____and imagination can sometimes aid in the formulation of a good hypothesis.
 - a. **thinking** b. talking c. conceiving d. considering
4. To create a good hypothesis, you need to _____the concept of hypotheses completely.
 - a. gather b. deduce, c. explain d. **understand**
5. Majorly, there exist only two types, i.e., the Alternative hypothesis and_____.
 - a. **Null Hypothesis**b.Simple Hypothesis c. Working Hypothesis d. Complex hypothesis
6. Alternative Hypothesis it is very often denoted as _____.
 - a. H b. H0 c. H2 d. **H1**
7. _____ type of claim is made when a theory is being validated through an experiment and observation.

- a. **Empirical Hypothesis** b. Null Hypothesis c. Simple Hypothesis d. Complex hypothesis
8. Hypotheses are assumptions that may be prove to be either correct or_____.
a. **incorrect** b. strong c. appropriate d. unmistakable
9. ____testing is a formal procedure for investigating our ideas about the world using statistics.
a. Hypothesis b. correlation c. median d. mode
10. The significance level, also known as ____
a. **alpha** b. beta c. omega d. outset

UNIT – V

1. A _____is a well-crafted document that outlines the processes, data, and findings of a systematic investigation.
a. **research report**b. research writing c. forms d. rules
2. A research report can be considered as a _____of the research process that clearly highlights findings, recommendations, and other important details.
a. brief b. **summary** c. digest d. breviary
3. Research report plays a key role in making ____decisions in marketing,
a. **Effective** b. taking c. good d. arrange
4. _____refers to the task of drawing inferences from the collected facts after an analytical and or experimental study.
a. editingb.coding c. mapping d. **Interpretation**
5. _____writing is a time consuming and expensive exercise.
a. Oral b. **Report** c. Study d. Research
6. The research outline is an organizational _____prepared by the researcher well in advance.
a. **Framework** b.remains c. shambles d. detritus
7. A qualitative research report is usually descriptive in _____.
a. **Nature** b. graphic c. picturesque d. depicted
8. A research report can be said to be _____or popular based on the target audience.
a. **Technical** b. nontechnical c. unethical. d. nonspecialized
9. A _____research report is a detailed document that you present after carrying out industry-based research.
a. **Technical** b. Causal c.Comparative d. Applied
10. _____presentation of the results that are drawn out of research is considered effective, particularly in cases where policy recommendations are to be made.
a. Writing b. Memorized c. Manuscript d. **oral**

Section - B

Unit – I

2Marks

1. Tell the any objectives of research.
2. Write the aim of research.
3. Define research.
4. Define research methodology.
5. List out the types of research.
6. Define applied research.
7. Tell the good research.
8. Define qualitative research.
9. Write any two example of empirical research.
10. Define basic research process.

Unit – II

2Marks

1. List out the types of data
2. Define primary data.
3. Describe the secondary data?

4. Write the procedure of collection of primary data.
5. Tell the oral investigation.
6. Write the sources of secondary data.
7. What are the precautions of use in secondary data?
8. Write the key informant interviews.
9. Write the merits of questionnaire.
10. Define quantitative data.

Unit – III

2Marks

1. What is data reduction?
2. Define editing data.
3. Tell about the coding data.
4. Define distribution of data.
5. Write the tabulation of data.
6. List out the types of tabulation.
7. Define one-way tabulation.
8. Define two-way tabulation
9. Define research object.
10. Write the requisites of good table.

Unit – IV 2Marks

1. Define hypothesis.
2. List out the types of hypothesis.
3. Write the sources of hypothesis.
4. Define alternative hypothesis.
5. Describe the null hypothesis.
6. Define empirical hypothesis.
7. Define formulation of hypothesis.
8. Write any two characteristics of hypothesis.
9. Find out the errors in testing hypothesis.
10. Write the level of significance.

Unit – V

2Marks

1. Tell the research report.
2. What is interpretation in research?
3. List out the steps in writing research report.
4. What is research outline?
5. List out the types of research report.
6. Define oral report.
7. Tell the review of literature.
8. How did you write the conclusion in your research report?
9. List out the layout of research report.
10. Write the oral presentation.

Section - C

Unit – I

6marks

1. Differentiate between Research methods Vs Methodology.
2. Define and explain the term “Research”. Explain its importance and objectives.
3. Explain the types of research.
4. Write a short note on analytical research.
5. Differentiate between qualitative and quantitative research.
6. Explain the basic research process.
7. Investigate the empirical research.
8. Analyze the applied research.
9. What are the characteristics of a research?
10. Explain the scope of research.

Unit – II

1. Differentiate primary data from secondary data.
2. List the methods of collecting primary data.

3. List the sources of collecting secondary data.
4. Explain the observation method.
5. Outline the Indirect Oral Investigation Method.
6. Discuss the key informant interviews.
7. Examine the Information received through local agents
8. Describe the merits and demerits of Information received through local agents
9. Analyze the common techniques used to conduct key informant interviews.
10. Discuss the limitations of secondary data.

Unit – III

1. Explain Data Collection.
2. Discuss the types data collection methods
3. Tools with appropriate explanation of data collection.
4. Categorize the types of distributions.
5. Outline the preparation of a statistical table.
6. Discuss about the Tabulation of data.
7. Simplify the One-way Tabulation.
8. Discuss the Research Object.
9. Explain the characteristics of good table.
10. Outline the general rules of tabulation.

Unit – IV

1. Explain the hypothesis and its importance.
2. Explain the characteristics of hypothesis.
3. Discuss the formulation of hypothesis.
4. Why the hypothesis so important in your thesis?
5. Errors in testing a hypothesis- Analyze
6. Explain the steps in hypothesis testing.
7. Explain the rejection rule of the null hypothesis.
8. Explain in detail with their formulae of P-Value and Significance Level.

Unit – V

1. Discuss the significance of Report Writing.
2. Enumerate the interpretation of research.
3. Design the techniques of interpretation.
4. Discuss the features of a Research Report
5. Explain the types of research report.
6. Categorize the research report.
7. Discuss the oral report and what the value of oral report is.
8. Make a conclusion research report.
9. Describe the precautions of writing a research report.

Section - D

Unit – I

12 Marks

1. Discuss the research objectives and its methods.
2. Differentiate between descriptive Vs Analytical researches.
3. Why we are giving most important to empirical research.
4. Compose the criteria of good research.

Unit – II

12 Marks

1. Discuss the methods of collecting primary data.
2. Discuss the various sources of collecting secondary data.
3. Describe the merits and demerits of conducting personal interview.
4. Differentiate interview method from questionnaire.

Unit – III

1. What is Data Processing? Explain its Operations in detail.(validation, Editing, Coding, Classification, Tabulation).
2. Explain the types of tabulation.
3. Format of a simple one way and three way table.
4. Discuss the types of table.
5. Examine the requisites of good table.

Unit – IV

1. Explain the sources of hypothesis
2. Analyze the pre- requisites for testing of hypothesis.
3. Examine the level of significance.
4. Outline the testing of hypothesis.
5. How can you formulate and test the hypothesis?

Unit – V

1. Formulate the steps in writing research report.
2. Precautions for Writing Research Reports- Explain
3. Give a detail explanation about nature of research.
4. Explain the significance of Report Writing.
5. Layout of the research report.
6. Give a detail report of oral presentation.

Semester – III			
CORE XV PUBLIC FINANCE			
Course Code: 21PECC 35	Hrs/Week: 4	Hrs/ Semester: 60	Credits: 4

UNIT-I: The Theory of Public and Private Goods

10 Hrs

Efficiency of Public Goods – Private preference for Public goods –Voluntary Exchange Theory –Samuelson Theory-Externalities –Negative Externalities –Positive Externalities and inefficiency.

UNIT-II:Allocation of Resources

10 Hrs

Definition – Types of allocations - Importance and dependency of government budget – Imbalance allocation of resources - Opportunity cost and Allocation - Efficient Allocation of Resources –Optimum Budget- Allocation of resources in Privatisation – Allocation of resources and the developing country.

UNIT-III: Taxation and Public Expenditure

15 Hrs

Sources of Revenue –Kinds –Direct and Indirect Tax –Merits and Demerits –Income Tax
–Progressive –Regressive –Degressive Tax –Double Taxation - Public Expenditure: Canons ofPublic Expenditure – Reasons for the growth of Public Expenditure

UNIT-IV: Public Debt

10 Hrs

Meaning –Causes –Classification - Sources -Burden – Kinds of burden - Measurement of Debt Burden –Redemption of Public debt - Budget in India –Process –Procedure –Purpose of Budget –Types –Revenue and capital Budget

UNIT-V:Federal Finance**15 Hrs**

Allocation of Revenue -Resources between Centre and States –Division of Functions – Division of Resources – Central Resources – State List –Finance Commission –Functions – Major Recommendations of 12th and 13th Finance Commission - Local Finance –Meaning and Importance

Text Book

R.A.Musgrave and P.B.Musgrave.*Public Finance in Theory and Practice*.New York : McGrawHill Publications,5th edition 1989

References:

1. Atkinson, A.B and J.E.Siglitz. *Lectures on Public Economics*.New York:Tata McGraw Hill,2004
- 2.John Cullis and Philip Jones, *Public Finance and Public Choice*.Delhi: Oxford University Press Ist Edition, 1998
3. B.P.Tyagi.*Public Finance*.Revised by Dr.H.P.Singh, New Delhi: Jai PrakashNath& Co , 4thedition 2003.
- 4.Harvey Rosen.*Public Finance*.New York: McGraw Hill Publications, 7th edition, 2005

ST.MARY'S COLLEGE(AUTONOMOUS)THOOTHUKUDI**Question Bank****M.A. Economics****Core-V Public Finance****Sub.Code: 21PECC35****Semester–III**

UNIT I**1mark****Choose the correct answer:**

1. Goods can be classified into _____
a. **Two** b. Six c. Three d. Five
2. An externality is a cost or _____ of an economic activity experienced by an unrelated third party.
a. Benefit b. Goods c. **Price** d. Income
3. Externality are categorized as either negative or _____
a. Unifying b. **Positive** c. Quality d. Disputable
4. A factory burns fossil _____ to produce goods
a. Fire b. **Fuels** c. Propellant d. Power
5. People living near a large airport suffer from high _____ levels.
a. water b. traffic c. **noise** d. air
6. Real estate prices would likely _____ due to better accessibility.
a. Slow b. **Increase** c. Decrease d. Fast
7. _____ Results in negative effects not only on the health of a smoker but on the health of other people
a. Drinking b. **Smoking** c. Diffusing d. Vanishing
8. A company that discovers a new technology as a result of R&D activities

creates _____ that help society as a whole.

- a. Detriment
- b. Good Point
- c. **Benefits**
- d. Harms

9. Positive externalities can also be distinguished as production and

- a. Ruination b. **Consumption** c. Elimination d. Explosion
10. A tanker spills oil, destroying the wildlife in the sea and affecting the people living in _____ areas.
- a. Urban b. Forest c. Rural d. **Coastal**

UNIT-II

1. Identify the indirect taxes from the given option _____
 a. **GST, Corporate tax** b. GST, custom duty
 b. Income tax, GST d. custom duty, corporate tax
2. Which of the following does not come under purview of “paper tax”?
 a. **Gift tax** b. Specific tax c. Adveloram Duty d. Wealth tax
3. Which among the following is a progressive tax?
 a. Sales tax b. **Income tax** c. Customs duty d. Development surcharge
4. _____ Is a progressive tax
 a. Custom duty b. **Income tax** c. Single tax d. Sales tax
5. Which of the following is not a tax saving investment?
 a. Home loan principal b. Fixed deposits
 b. Life insurance premium d. **Public provident fund**
6. The uncommitted pension received by a government servant is _____
 a. Up20% b. Up50% c. **Fullytaxable** d. Fully exempted
7. The value added tax first adopted on _____
 a. 1960 b. 1958 c. 1946 d. **1954**
8. A tax levied on property is called _____
 a. Income tax b. Single tax c. **Property tax** d. Specific tax
9. _____ Taxes are more elastic
 a. Indirect tax b. Superiority tax c. **Progressive** d. Direct tax
10. In _____ taxation, the larger the income of tax-payer, smaller is the proportion that he contributes.
 a. Regressive b. **Proportional tax** c. Progressive d. Digressive

UNIT-III

1. An example of a public good is _____
 - a. A loaf of breads
 - b. **National defence services**
 - c. A ford truck
 - d. A home computer
2. Public goods are those for which consumptions is _____
 - a. Rival
 - b. Non Rival
 - c. **Unregulated**
 - d. Regulated
3. When consumption is rival and exclude able, the product is a _____
 - a. Private goods
 - b. **Public goods**
 - c. Mixed Goods
 - d. Service not a goods
4. Government failure is predicted by _____
 - a. **Market failure theory**
 - b. The coarse theorem
 - c. Social interest theory
 - d. Public choice theory
5. Which of the creates a positive consumption externality?
 - a. **National defence**
 - b. Weeds growing in your neighbour's yard
 - c. Vaccinations
 - d. Lighthouse
6. The income elasticity of demand for a better environment has increase because ____
 - a. Zero
 - b. Negative
 - c. Positive
 - d. **Equal to the price elasticity**
7. Where is the biggest reserve of mica?
 - a. South Africa
 - b. **India**
 - c. USA
 - d. Australia
8. What option does the central government not include in the development expenditure?
 - a. Grants to states
 - b. Expenditure on social and community services
 - c. Expenditure on economic services
 - d. Defence expenditure
9. What option does the central government not include in the development expenditure?

- a. Grants to states
 - b. **Expenditure on social and community services**
 - c. Expenditure on economic services
 - d. Defence expenditure
10. _____ Is away of escape from the burden of a public debt
- a. **Redemption**
 - b. repayment
 - c. desirable
 - d. public loan

UNIT- IV

1. Who is the father of public finance
 - a. **Dalton**
 - b. Pigou
 - c. Smith
 - d. Musgrave
2. The largest component of revenue expenditure in India is _____
 - a. Pension
 - b. **Interest payment**
 - c. Education
 - d. Health
3. The zero-based budgeting was first adopted in
 - a. India
 - b. France
 - c. Germany
 - d. **USA**
4. Identify the Indirect tax from the given options
 - a. **GST, custom duty**
 - b. Custom duty, corporate tax
 - c. Income tax, GST
 - d. GST, corporate tax
5. Which of the following does not come under the purview of paper taxes?
 - a. Gift tax
 - b. Estate duty
 - c. **Excise tax**
 - d. Wealth tax
6. Which among the following is a progressive tax?
 - a. Custom duty
 - b. VAT
 - c. Sales tax
 - d. **Income tax**
7. Which one of the following is not a tax saving investment?
 - a. Home loan principal repayment
 - b. Public provident fund
 - c. Life insurance premium
 - d. **Fixed deposit**
8. The uncommitted pension received by a government servant is _____
 - a. Fully exempted
 - b. Up to 50%
 - c. **Fully taxable**
 - d. Up to 20%
9. Income is taxable the head “salaries” only if there exists a _____ relationship between the payer and payee
 - a. **Employer – employee**
 - b. Government – member of parliament
 - c. Seller – buyer
 - d. Student and principal
10. The finance commission in India is appointed by
 - a. **President**
 - b. Prime Minister
 - c. Chief Minister
 - d. Finance Minister

UNIT-V

1. The finance commission is appointed ever
a. 3years b. **5years** c.6 years d. 7years
2. The first finance commission was appointed in the year
a. 1949 b.1950 c.**1951** d.1952
3. Elastic revenue response to marginal tax rate reduction is called
a. Marginal tax curve b. Functional curve
b. **Laffer curve** d. Verticalequity
4. Then eo-Keynesian approach to public finance is called
a.Functional finance b. Aggregate demand
b. Global finance d. **Federal finance**
5. According to Musgrave the major functions of public finance is
a. Allocation function b. Distributive function b.
Stabilisation function d. Federal function
6. Public debt management refers to
a. Terms of new bonds
b. Proportion of different components of public debt
c. Maturity
d. Fiscal deficit
7. Functional finance function through
a. Buying and selling b. Giving and taking
c.Lending and borrowing d. Present and future
8. The VAT was 1st introduced in the year a.2003
b. 2004 c. **2005** d.2006
9. When expenditure exceeds total tax revenue it is called ----- budget
a. Surplus b. Balanced c. **Deficit** d. Progressive
10. The most accepted theory of taxation in modern times _____theory
a.Benefit b.Costof service c.Financial d.**Ability**

Section–B

(2Marks)

Unit–I

1. Define organized society.
2. Write a short note on Public sector
3. Define Private sector
4. What are the services to providing the people in public sector?
5. What is the aim of private sector?
6. Define–Public Economics
7. What is Economic Planning?
8. What is meant by Private Goods?
9. Define–Public Goods.
10. Define–Social wants.

Unit–II

1. What do you mean by Public revenue?
2. Define-Tax
3. What are the sources of Public revenue?
4. What is meant by Non-tax revenue?
5. Define-cannon of taxation.
6. Define–Direct tax
7. What is meant by Indirect tax?
8. Give the meaning of Incidence.
9. Define-Shifting
10. What is the main objective of tax?

Unit–III

1. Define–Public Expenditure
2. Give the scope of public expenditure.
3. Define–Private expenditure
4. Define–Wagner’s law
5. Which one these condthes is of the growth of public expenditure?
6. What is meant by “Displacement effect”?
7. What do you mean by public investment criteria?
8. Define–cost benefit analysis.
9. Define-Budget

10. Define Zero based budgeting

Unit-IV

1. Define–Public debt
2. What are the main features of public debt?
3. What is the main aim of public debt?
4. What are the principles of new classical macroeconomics?
5. What do you mean by burden of public debt?
6. Define-Indirect money burden
7. What are the principles of public debt management?
8. Define–Public debt management
9. Define-Public loans
10. What are the types of public debt?

Unit–V

1. Define-Fiscal federalism
2. What do you mean by federal government?
3. Define–verticalim balance
4. Define–Horizontalim balance
5. Define–Local finance
6. What is meant by village Panchayat?
7. What are the sources of revenue for Panchayat?
8. What is the other name of local finance?
9. What is a constitutional provision?
10. Whoistheheadof14thfinance commission?

Section –C

(5 marks)

Unit–I

1. Distinguish between Public Sector and Private Sector.
2. “Government is anagent for economic planning and development”- Discuss.
3. What is the role of government in organized society?
4. What is the main role public sector?
5. What are the characteristics of Public goods?
6. Explain the difference between social wants and merit wants.
7. What are characteristics of Private goods?

8. Write a short note on Economic Planning.

Unit –II

1. Explain the sources of Public revenue.
2. Discuss the characteristics of tax.
3. Describe the characteristics of good tax system.
4. Explain the Principles of tax incidence.
5. Explain the merits of direct tax.
6. Write a short note on Impact of tax.
7. Discuss the demerits of Indirect tax.

Unit-III

1. Discuss the scope of Public Expenditure.
2. Explain the Budgeting Procedures.
3. Critically discuss the criteria for Public investment.
4. What are the Principles of budgeting?
5. Critically evaluate the objectives of budgeting.

Unit-IV

1. What is the main aim of Public debt?
2. Explain the objectives of Miscellaneous
3. What are the differences between Public and Private Debts?
4. Discuss the objectives of Public debt management.
5. Explain the burden of internal Public debt.
6. Analyze the Aggregate supply.

Unit–V

1. Discuss about the major recommendations of 13th Finance commission.
2. Elucidate the functions of Local Government.
3. Discuss the imbalances in federal finance.
4. Explain the vertical imbalance.
5. Explain the devolution of resources and grants.
6. Write a short on Indian constitution.

Section – D

(10 marks)

Unit-I

1. Analyze the role of government in organized society.
2. Discuss the difference between Private goods and Public goods.
3. Explain the economic planning and development.
4. Explain the tool for operationalizing the planning process.

Unit-II

1. Critically evaluate the objectives of taxation.
2. Explain the classification of Public revenue.
3. Briefly discuss about the types of taxation.
4. Explain the Principles of taxation.
5. Discuss the effects of taxation.

Unit-III

1. Evaluate the Wiseman-Peacock hypothesis of Public Expenditure.
2. Explain the causes for the growth of Public Expenditure.
3. Discuss the cost benefit analysis.
4. Discuss the structure of Public Expenditure.
5. Explain the Zero Base Budgets.

Unit-IV

1. Explain the objectives of Public debt.
2. Explain the sources of Public borrowing.
3. Discuss the different types of Public debt.
4. Discuss the Principles of Public debt management.
5. Public debt in India-Discuss
6. Discuss the various methods of Public debt redemption.

Unit-V

1. Analyze the centre–state financial relationship in India.
2. Discuss the Principles of Federal Finance.
3. Explain the fiscal federalism in India.
4. Explain the Present constitutional Provisions.
5. Discuss the major Recommendations of latest Finance commission.

Semester- III			
CORE ELECTIVE II HUMAN RESOURCE MANAGEMENT			
Course Code: 21PECE 31	Hrs/Week: 4	Hrs/ Semester: 60	Credits: 4

UNIT-I:Nature and Scope 10Hrs

Human Resource Management: Meaning and scope, functions and objectives - HRMM Model - Human Resources planning - Job design and Job analysis.

UNIT-II:Recruitment and Selection 15H

rs Recruitment: Definition - Recruitment process and screening - Definition of Selection and role - Selection process - New Methods of Selection – Absenteeism and labour turnover: Determinants and types – Motivation.

UNIT- III: Training and Development 10Hrs

Nature and Importance of Training and Development - Impediments - Effective Training Performance Appraisal and Organizational Strategy

UNIT-IV: Employee Remuneration

10Hrs Theories of Remuneration - Ideal Remuneration - Factors influencing remuneration - types of incentives schemes

UNIT-V: Benefits, Safety and Welfare 15Hrs

Types of Benefits and Services -Principles of Fringes -Empowerment - Quality of Work Life -Welfare Measures - Need for Safety and health -Business ethics - Human Resource Audit

Text Book:

R.D. Agarwal .*Dynamics of Personnel Management in India*. New Delhi:Skylark Publication. 13th edition 1994

Books for Reference:

1. Swathappa.*Human Resources and Personal Management*.New Delhi:Tata McGraw Hill Publishing Co.Ltd. 4th edition 2003
2. John Storey. *Human Resource Management*.New Delhi: Rutledge Publications,2ndedition 1995
3. Terry, L. Leap, Michael D. Crino.*Personnel / Human Resource Management*. Chennai:Macmillan Publications, 3rd edition 2012
4. C.S. Venkataratnam and B.K. Srivastav.*Personal Management & Human Resources*. New Delhi:Tata McGraw Hill Publishing & Co.2nd edition 1991.

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI 628 001
QUESTION BANK
II MA Economics
Elective – II Human Resource Management 21 PECE32
Semester-III

Section A

Choose the Best answer:

UNIT - I

1. ----- is required to design necessary educational and developmental programmes to handle such changes effectively.
a) **Manager** b) Investor c) Consumer d) Employee
2. The main aim of human resource management is to achieve the organizational and ----
----- goals.
a) **Individual** b) Government c) Industrialist d) Foreigners
3. The term personnel administration refers to all types of inter personal relationships between chief ----- and subordinate.
a) **Executives** b) Manager c) Clerk d) Investor
4. There are two functions of HRM, they are Managerial and ----- functions.
a) **Operative** b) Control c) Central d) Demand
5. ----- is an all pervasive and the most basic function of management.
a) **Planning** b) Maintaining c) Controlling d) Participating
6. Operative functions are of ----- nature and are entrusted to the personnel department.
a) **Routine** b) Segregated c) Falls d) Rise up
7. Bonus is paid to the workers according to the Payment of Bonus Act -----
a) **1965** b) 1975 c) 1985 d) 1995
8. Disablement benefits to the disabled workers under the Workmen's Compensation Act in the year -----
a) **1923** b) 1924 c) 1925 d) 1926
9. Work Design is concerned with the _____ of work system in any type of organisation or institution.
a) Study b) Design c) Study and design d) **Management**
10. High levels of productivity result in
a) **Good quality** b) Lower costs c) Higher purchasing power d) Low Quality

UNIT-II

1. Recruitment logically aims at
a) Attracting a large number of qualified applicants b) Offering enough information to unqualified persons c) encouraging potential applicants d) **All of the above**
2. Which is the least expensive method of recruitment?
a) **Walk-in interviews** b) Campus placements c) Employment exchange d) Consultants
3. Recruitment usually highlights the need for establishing
a) **Job specification** b) Job analysis c) Job description d) Job classification
4. _____ is the process of interviewing and evaluating candidates for a specific job & choosing an individual for employment based on certain criteria
a) **Selection** b) Recruitment c) Promotion d) Orientation
5. Employment exchanges are _____ source of recruitment
a) Modern b) Suitable c) **External** d) Classical
6. How many broad sources of recruitment are there?
a) 4 b) 8 c) **2** d) 6

7. Validity of a particular recruitment technique is expressed on a scale of _____
 a) 1 to 10 b) 0 to 5 c) 1 to 100 d) **0 to 1**
8. Which of the following is not a part of job description?
 a) Job title b) General information c) **Induction process** d) Purpose of position
9. The selection process includes _____ techniques that ensure the selection of a suitable candidate for the position
 a) **Fitting technique** b) Recruitment technique c) Orientation technique d) Finalisation technique
10. Which of the selection step is most critical?
 a) Physical Examination b) **Selection decision** c) Reference and Background Checks d) Employment Interviews

Unit – III

1. Training is most effective in resolving:
 a) **Skill gaps** b) Attitudinal problems c) Poor motivation d) Attendance issues
2. The term which describes long term training which includes a combination of both on-the-job and in-class training is:
 a) Mentorship b) Computer based training c) Vestibule training d) **Apprenticeship**
3. Which item is NOT an example of an indirect training cost?
 a) Overtime b) Increased scrap c) **Room and food charges** d) Low productivity
4. The phrase "transfer of training" refers to:
 a) Moving training schedules around to accommodate production concerns
 b) Freely sharing written training material with colleagues
 c) Acquiring and evaluating skills during a training course
 d) **Implementing and maintaining new knowledge and skills back in the workplace**
5. Labour Market adjustment services refer to the stakeholder interests of:
 a) Supply side training such as anticipated shortages for particular trades
 b) Skill mismatches c) Those that have difficulty entering or re-entering the workforce d) **Those who have suffered a job loss**
6. A key principle of adult learning suggests that adults:
 a) Are keenly open to change b) **Tend to be problem centred**
 c) Do not need theoretical knowledge, just practical applications

d) Prefer a relaxing "lecture style" training delivery

7. The evolution of training activities has moved towards:

a) **Specific on the job requirements using technology as the learning coach**

b) Time and motion studies c) Needs driven by productivity and efficiency concerns

d) Identifying opportunities to build intellectual capital

8. The motivational component of self efficacy:

a) Is when a person believes they can manipulate their environment and control their fate b)

Is when a person believes they can learn the knowledge and skills and do the job c)

Relates to the ability to use fine motor skills d) Is when a person know to behave well

9. The diagnostic process of needs assessment often starts with:

a) A job analysis b) A gap analysis c) **A concern** d) An organizational audit

10. A potential advantage of centralizing the training function is that:

a) **Control and economies of scale** b) Customization and ownership

c) Local budget control d) Local government control

Unit – IV

1. Wages are paid to -----

a) **Labour** b) House owner c) Producer d) Land Owner

2. Minimum wages Act on -----

a) **1948** b) 1949 c) 1950 d) 1951

3. Children below the age group ----- can't work as labor, according to Labor Law.

a) **14** b) 18 c) 21 d) 15

4. Compensation is the reward for a labour -----

a) **Contribution to organisation** b) Smartness c) Hard work d) Performance

5. Which is not the objective of Compensation?

a) To establish equity b) to improve employee efficiency c) To control Cost d) **To comply with illegal regulations**

6. Who is responsible for compensation decision making?

a) **HR unit & Manager** b) Worker c) Laymen d) BOD

7. First step of compensation process -----

a) Developing of pay structure b) Evaluation of job c) Pricing of job d) **Analysis of Job**

8. When the Royal commission on labor was appointed?

a) 1975 b) 1938 c) **1928** d) 1958

9. When the new economic policy has been passed?

a) **1991** b) 1992 c) 1993 d) 1999

10. Which one is not the Internal Contingent factor in compensation plan -----

a) **Trade Union** b) Organization Strategy c) Nature of Jobs d) Nature of Personnel

Unit – V

1. Which type of unemployment increases during a recession or depression?

a) **Cyclical Unemployment** b) Structural Unemployment

c) Disguised unemployment d) Frictional Unemployment

2. Which of the following area, where central government is exclusively competent to enact legislations—

a) Trade unions; industrial and labour disputes

b) Social security and social insurance; employment and unemployment

c) Welfare of labour including conditions of work, provident funds, employers' liability, workmen's compensation, invalidity and old age pensions and maternity benefits

d) **Regulation of labour and safety in mines and oilfields**

3. A premises including precincts thereof is a 'factory' within the meaning of the Factories Act, 1948 wherein a manufacturing process is being carried on without the aid of power and where the number of worker working is –

a) 10 or more workers b) 20 or more workers

c) 15 or more workers d) **50 or more workers**

4. The present wage ceiling per month for the purpose of the Employees' State Insurance Act, 1948 is –

a) Rs. 10,000/- b) **Rs. 15,000/-** c) Rs. 18,000/- d) Rs. 20,000/-

5. Which Schedule of the Factories Act, 1948 specifies Beryllium poisoning, Anthrax and Arsenic poisoning or its sequelae etc, as notifiable diseases?

a) First Schedule b) Second Schedule c) **Third Schedule** d) Fifth Schedule

6. The present wage ceiling per month for the purpose of the Payment of Wages Act, 1936 is —

a) Rs. 10,000/- b) Rs. 15,000/- c) **Rs. 18,000/-** d) Rs. 20,000/-

7. As per Payment of Wages Act, 1936, in railway factory or industrial or other establishment upon or in which less than one thousand persons are employed, wages shall be paid before the expiry of the —

a) **Seventh day of the month** b) Tenth Day of the months

c) Third Day of the months d) Fifth day of the month

8. The verification of membership of unions operating in establishment in central sphere is conducted by Chief Labour Commissioner office under Code of Discipline for the purpose of granting recognition as and when directed by the —

a) **Ministry of Labour and Employment** b) ESI Corporation

c) Labour Tribunal d) Office Bearer of Trade Union

9. As per the provisions contained in Chapter VB of the Industrial Dispute Act, 1947 establishment employing _____ persons or more are required to seek prior permission of Appropriate Government before effecting lay-off, retrenchment and closure.

a) 50 b) **100** c) 250 d) 500

10. _____ have been set up under the provisions of Industrial Dispute Act, 1947 for adjudication of industrial disputes in an organisation.

a) Lok-Adalat b) Industrial Tribunal c) **Labour Court** d) Consumer court

Section-B

Unit – I

(2 marks)

1. Define human resource management.
2. List out the functions of human resource manager.
3. Specify the objectives of human resource management.
4. Describe the importance of human resource management.
5. State the qualities of the human resource manager.
6. Express the various roles played by human resource manager?
7. Define human resource planning.
8. List out the features of human resource planning?

9. Describe the scope of human resource planning.
10. List out the objectives of human resource planning.

Unit-II

1. Define what the term recruitment means.
2. What are the various sources of recruitment?
3. What is campus recruiting?
4. What are walk-in-interviews?
5. What is E-Recruiting?
6. What do you mean by outsourcing?
7. State the various techniques of recruitment.
8. State the benefits of cyberspace recruiting.
9. What is selection?
10. What are the stages in selection?

Unit-III

1. Define training.
2. State the different types of training.
3. What are the various methods of training?
4. What is on -the-job training?
5. What are the various off-the-job training methods followed in practise?
6. What is apprenticeship training?
7. What do you mean by transactional analysis?
8. List out the various techniques of training.
9. Define merit rating.
10. Distinguish between merit rating and job evaluation.

Unit-IV

1. Define the terms wages and salaries.
2. What are the factors that affect wage level?
3. State the steps involved in establishing a pay rate.
4. What do you mean by time wage system?
5. What is piece wage system?
6. Discuss the merits of Halsey plan.
7. What are the important features of Taylor's system?
8. Describe briefly Emerson's efficiency plan.
9. What are the various kinds of incentive plans?
10. State the types of group incentive plans.

Unit-V

1. What are employee benefits?
2. List out the benefits that are generally offered to employees?
3. Define morale?
4. What are the factors that determine morale?
5. Suggest the measures to boost morale?
6. State the methods that increase morale?
7. What is meant by labour welfare?
8. List out the features of labour welfare?
9. What are the objectives of labour welfare?
10. What are the principles of labour welfare?

Section-B
Unit-I

(6marks)

1. What is human resource management? State its features:-
2. Describe the operative functions of human resource management.
3. What are the qualities of a human resource management?
4. Describe the roles played by a human resource manager.
5. Explain the objectives of human resource management.
6. Explain the relationship of human resource management with personnel management.
7. What is human resource planning? Describe its need?
8. Write an essay on merits and demerits of human resource planning.
9. Briefly explain the various factors that affect human resource planning.
10. List out the steps involved in human resource planning.

Unit-II

1. What is motivation? State its methods.
2. Explain the types of motivation briefly.
3. Describe Maslow's hierarchy of needs briefly.
4. Briefly explain any three important theories of motivation.
5. What are the assumptions under "Y" theory?
6. Describe ERG theory.
7. Explain briefly equity theory.
8. What are the techniques that are commonly adopted to increase motivation?
9. What is recruitment? List out the various sources of recruitment?
10. What are the advantages and disadvantages of internal sources of recruitment?

Unit-III

1. What are the benefits of training?
2. Describe the different types of training.
3. What is on-the-job training? Explain the various forms of on the job training?
4. What is vestibule training? What are its advantages and disadvantages?
5. What are the various guidelines that are to be followed while training the employees?
6. How will you evaluate a training programme?
7. What do you mean by merit rating? Give the points of distinction between merit rating and job evaluation.
8. Describe critical incident technique.
9. Briefly explain the various methods of merit rating.
10. What are the merits of merit rating?

Unit-IV

1. What are financial incentives?
2. What are non-financial incentives?
3. What are the essentials for a satisfactory wage system?
4. What is time wage system? List out its features, merits and demerits?
5. What is piece wage system? What are its merits and demerits?
6. What are the essentials of good incentive plan?
7. How will you calculate wages under Halsey plan?
8. Describe the calculation of wages under Rowan plan.

9. What are the features of Gantt task and bonus plan? List out its advantages and disadvantages?

Unit-V

1. Briefly describe the various approaches to labour welfare?
2. What are the different types of labour welfare?
3. Briefly describe the various approaches to labour welfare?
4. What are the different types of labour welfare?
5. List out the advantages of labour welfare?
6. List out the welfare measure taken by the Government?
7. What is morale? State the factors determining it?
8. Describe the methods of increasing morale?
9. Discuss the relationship between morale and productivity?
10. What are the advantages of high morale?

Section-c

(12marks)

Unit-I

1. Define human resource management. Describe its features and nature.
2. Explain briefly the various functions performed by a human resource management.
3. Identify and discuss the managerial and operative functions of personnel management.
4. "Personnel management is a basic management pertaining to all levels and types of management" Explain.
5. Describe the impact of environment of human resource management.
6. Explain the qualities and qualifications necessary for a personnel manager.
7. What do you mean by human resource planning? List out its features merits and demerits?
8. Describe the various steps involved in human resource planning.
9. Enumerate the various statistical methods used in forecasting the human resource planning.
10. How will you organise a manpower planning?

Unit-II

1. What is meant by selection? How the candidates are selected for various posts in organisations?
2. Describe briefly the various steps involved in the selection process.
3. Why tests are conducted while conducting interviews for the selection of candidates?
4. Describe the tests that are commonly adopted in the selection process.
5. What are placement and induction? How they are made in an effective way?
6. What are the various sources of recruitment? Explain them briefly?
7. Explain the various techniques of recruitment.
8. What do you understand by motivation? Briefly explain its characteristics?
9. Discuss Maslow's hierarchy of needs. Point out how it can be used to motivate middle level managers.
10. Discuss critically Herzberg's theory of motivation, differentiating clearly between Motivators and De motivators.

Unit-III

1. What is training? Why it is conducted? What are its uses and limitations?
2. Describe various methods of training.
3. What are the various techniques of training? Explain them briefly?

4. What is merit rating? What are its purpose and features? How will design a merit rating programme?
5. Explain the various methods of merit rating briefly.
6. Write an essay on the advantages and dangers of merit rating. Suggest suitable measures for improving it.

Unit-IV

1. Define wage and describe the need and essentials of a satisfactory wage system.
2. Describe briefly the factors affecting remuneration levels.
3. How will you establish pay rates?
4. Explain time wage system and piece wage system briefly.
5. Describe various kinds of incentive plans briefly. What do you mean by employee benefits?

Unit-V

1. Briefly explain the various benefits provided to employees?
2. What do you mean by morale? What are the factors determining morale?
3. Briefly explain the methods increasing morale?
4. Define morale. Describe its relationship with productivity?
5. Define labour welfare. What are its features, types and advantages?
6. Describe briefly the labour welfare measures taken in India by various agencies?
7. What are collective bonus payment systems? Describe its kinds briefly?
8. What do you mean by incentives? Why they are given?
9. Describe briefly the different forms of incentives given to workers.

Semester – IV			
CORE XVI MONETARY ECONOMICS			
Course Code: 21PECC41	Hrs/Week: 6	Hrs/ Semester: 90	Credits: 4

UNIT-I: Introduction

20 Hrs

Meaning, functions and kinds of money; components of supply of money, Measures of money supply - Features of a developed money and capital market - Functions of commercial banks and prerequisites of a sound commercial banking system - A brief review of the measures taken in India to liberalize the financial system.

UNIT-II: Supply of Credit, Term Structure of Interest Rates

15 Hrs

The theory of bank credit and bank deposits-Allocation of institutional credit-factors influencing institutional credit- the credit supply curve- Term structure and risk structure of interest rates-Theories of term structure of interest rates-Expectations theory-Market segmentation theory-

Preferred habitat theory.

UNIT-III: Functions & growth of financial institutions **20 Hrs**

Functions and objectives of central bank; instruments of credit control- Objectives and limitations of monetary policy - Role of non-banking financial institutions in India - mutual funds, LIC, Investment companies, venture capital- Role of regulatory authorities -SEBI and IRDA.

Unit-IV: The structure of financial markets **15 Hrs**

Call money, treasury bills and commercial bills; the stock market and market for gilt-edged securities; unregulated credit markets - Financial sector reforms in India.

Unit-V: Monetary Policy and Financial System **20 Hrs**

Monetary policy—goals, tools, targets and limitations; Financial markets— classification of financial markets, Instruments of developed money and capital markets; Financial intermediaries—classification and functions; Role of financial system in economic development.

Text Book:

Gupta, S.B. *Monetary Economics*. New Delhi: S.Chand & Company, 2006

Books for Reference:

1. Mitra, S. *Money & Banking*. New York: Random House, 2002
2. Chandler, L.V. *The Economics of Money and Banking*. New York : Harper & Row 1989
3. S.M. Goldfeld Sayers. *Modern Banking*. New Delhi : Oxford University Press, 2nd edition 2000
4. Smith, P.F. *Economics of Financial Institutions & Markets*. New Delhi: Prentice-Hall of India pvt. ltd, 3rd edition 2000
5. Gupta, S.B. *Monetary planning for India*. New Delhi: S. Chand & Company, Pvt.Ltd 3rd edition 1990

ST. MARY'S COLLEGE (AUTONOMOUS) THOOTHUKUDI
II M.A. ECONOMICS –
SEMESTER IV

Core I – Monetary Economics - 21PECC41
Question Bank

Unit – I

Choose the correct answer

1 Mark

1. Select the Fisher's equation of exchange:
a) $PM=VT$ b) $MT=Pv$ c) **$MV=PT$** d) $MS=MD$
2. The Cambridge demand equation for money is
a) $Md=Ms$ b) $Md= Mv$ c) $Md=kPI$ d) **$Md=kPY$**
3. The ----- motive is meant to bridge the interval between the receipt of income and its disbursement.
a) Income b) **Business** c) Expenditure d) Tax

4. $L_r = kY$ in this equation What is L_r ?
 - a) **Transaction demand for money** b) total demand for money c) total income d) supply of money
5. Who used theory of Liquidity preference?
 - a) Prof. Johnson b) Adam Smith c) **J.M. Keynes** d) Fried Man
6. According to classist money perform ----- role.
 - a) **Netural** b) Important c) no d) basic
7. In equation $V = R/r$: the R denotes
 - a) Annual Income b) **Annual return on Bond** c) annual income from wealth d) total income
8. The speculative demand for money is a decreasing function of the -----
 - a) **Rate of interest** b) rate of return c) rate of bonds d) rate of income
9. The monetary authority cannot influence the rate of interest even by following ----- money policy.
 - a) Dear b) borrow c) **cheap** d) debit
10. -----analyses the transaction demand for real balances there by emphasizing the absence of money illusion.
 - a) **Baumol** b) Tobin c) Keynes d) Classical

Unit – II

1. Demand deposits are ----- and current accounts of depositors in a commercial bank.
 - a) **Savings** b) time deposits c) current deposits d) income
2. Time deposits and ----- deposits of customers in a commercial bank is frozen in character.
 - a) **fixed** b) future c) forecast d) individual
3. ----- is the sum of commercial bank reserves and currency held by the public.
 - a) High rate of interest b) high supply of money c) **High powered money** d) total money
4. Credit creation by banks will be less and the --- supply will be a low level.
 - a) **Money** b) raw material c) investment d) wealth
5. M1 is a ----- money.
 - a) **Narrow** b) broad c) casual d) demand
6. M3 denotes
 - a) Narrow b) **broad** c) casual d) demand
7. Give examples for quasi-financial institutions:
 - a) **IDBI** b) IMF c) IBRD d) World bank
8. A liquid asset is one which is easily spendable and -----
 - a) **Transferable** b) communicable c) favorable d) un favorable
9. Which is the broadest money?
 - a) M1 b) M2 c) M3 d) **M4**
10. What is E_r ?
 - a) **Excess reserves** b) extra reserves c) example requires d) extra revenues

Unit – III

1. When the rise in prices is very slow like snail or creeper, it is called ----- inflation.
a) Walking b) **creeping** c) running d) hyper inflation
2. The inflationary gap can be wiped out by increase in savings so that the aggregate demand is -----
a) **Reduced** b) increased c) constant d) fixed
3. Who says an inflationary Gap is the result of excess demand in the goods market as well as in the factor market?
a) Holzman b) Keynes c) **Bent Hansen** d) Dalton
4. The inflationary gap can be closed by ----- taxes and reducing expenditures.
a) Reducing b) **increasing** c) constant d) regression
5. When the money supply increases it creates more demand for -----
a) **Goods** b) borrowings c) credits d) factors
6. ----- inflation caused by the increase in aggregate demand.
a) Cost push b) **demand pull** c) cost pull d) demand push
7. ----- inflation is caused by an increase in wages and profits.
a) **Cost push** b) demand pull c) cost pull d) demand push
8. Profit push inflation is also called ----- push inflation.
a) **Price** b) demand c) cost d) supply
9. The ----- curve examines the relationship between the rate of unemployment and money wages
a) Pigou b) Marshall c) Malthus d) **Philips**
10. The stagflation is also called inflationary -----
a) **Recession** b) gap c) regression d) increases

Unit - IV

1. The market in which short term financial instruments are traded is called ----- market.
a) Capital b) **money** c) share d) debt
2. In a primary market ----- issues of financial assets are bought and sold,
a) **New** b) old c) second - hand d) productive
3. The efficient market resources are used in ----- manner.
a) Wasteful b) useful c) detail d) **non- wasteful**
4. ----- prices are independent of individual buyers and sellers.
a) **Security** b) mortgage c) credit d) debit
5. ----- funds sell their shares to individuals and firms and invest the proceeds in various types of assets.
6. There should be proper ----- of financial assets in an efficient market.

- a) **Valuation** b) information c) valediction d) depreciation
- 7. A market should be efficient must hedge and reduce ----- against possible future contingencies.
 - a) Ability b) **risk** c) profit d) loss
- 8. Marketing efficiency depends on information -----
 - a) **Arbitrage** b) value c) conceptual d) about pension
- 9. Which is the earliest type of bill?
 - a) Treasury bill b) inter-bank term c) **promissory note** d) bills of exchange
- 10. A developed money market has many ----- money assets.
 - a) **Near** b) real c) nominal d) demand

Unit V

- 1. International monetary institution established by 44 nations under the Britton Woods Agreement of July -----
 - a) **1944** b) 1945 c) 1946 d) 1847
- 2. The usual targets of ----- policy are money supply, availability of credit and interest rates.
 - a) Fiscal b) **monetary** c) government d) private
- 3. Full employment is always related to balance of payments -----
 - a) Debt b) surplus c) **deficit** d) balance
- 4. The central bank cannot control output and -----
 - a) **Prices** b) supply c) demand d) raw materials
- 5. ----- supply and interest rate are intermediate targets of monetary policy.
 - a) Goods b) Raw material c) **Money** d) stock
- 6. Who suggests the market yield on equity as a target variable for monetary policy?
 - a) **Tobin** b) Keynes c) Philips d) Pigou
- 7. The rise in production and demand for ----- will bid up the interest rate.
 - a) Product b) **investment** c) savings d) money
- 8. When there is fall in the consumer demand for goods and services and in demand for investment good will -----
 - a) **Decrease** b) increase c) constant d) equal
- 9. Money supply and interest rate are intermediate targets of ----- policy
 - a) **Monetary** b) fiscal c) mixed d) demographic
- 10. An ----- monetary policy is used to overcome recession or a depression.
 - a) Contractionary b) **expansionary** c) commitment d) traditionary

(2 Marks)

Unit – I

- 1. Define money

2. Recall kinds of money
3. Define commercial bank
4. State the money market
5. Define capital market
6. What is financial system
7. What is money supply
8. State the Commercial bank system
9. Define supply of money
10. Define monetary supply

Unit – II

1. Define bank credit
2. Define bank deposit.
3. What is meant by institutional credit?
4. What is credit supply curve?
5. Define the Cambridge equation of money
6. What is speculative demand for money
7. Recall the market.
8. Define risk structure.
9. Define interest rate.
10. What is risk?

Unit – III

1. Define central bank
2. Define credit control
3. Define monetary policy
4. Define RBI
5. Define SEBI
6. Recall IRDA
7. What is monetary policy
8. Define mutual fund
9. Short note on LIC
10. Define non banking financial institution

Unit – IV

1. Define call money
2. Define treasury bill
3. Recall the instruments of credit control
4. Define stock market
5. What is credit market

6. Define commercial bill
7. Define interest rate
8. Define market
9. Define finance
10. What is depositary institution

Unit – V

1. Define monetary policy.
2. Recall the financial markets.
3. List out financial markets.
4. What is the fixed exchange rate?
5. Define financial intermediaries
6. Define money markets
7. What is meant by call markets?
8. What is the role financial system?
9. Define forward exchange rate
10. Write any important points of monetary policy.

Unit – I

6 Marks

1. Explain function of money
2. Explain the kinds of money
3. Explain the components of supply of money
4. Explain the features of money
5. Give the details on commercial bank system
6. Explain the function of commercial banking system
7. Explain the Measure of money supply
8. Explain the function of capital market
9. Explain the liquidity trap with the figure
10. Give the short on money supply

Unit – II

1. Explain the theories of bank credit.
2. Bring out the credit supply curve.
3. Give details of term structure.
4. Explain the expectations theory.
5. Estimate the bank deposits and interest rate.
6. Give the equation of money supply
7. Write a short note on preferred habitat theory.

Unit – III

1. Explain the function of central bank

2. Give a notes on limitation of monetary policy
3. What are the role of regulatory authorities
4. Explain the functions of IRDA
5. Discuss the limitation of LIC
6. Explain the credit markets
7. Explain the functions of non banking financial institution
8. What are the instruments of credit control
9. Explain the role of non banking financial institution
10. Explain venture capital

Unit – IV

1. Examine the unregulated credit markets
2. Explain the function of treasury bill
3. Explain the securities of stock markets
4. Explain the objectives of call money
5. Examine Commercial bank
6. Discuss the structure of financial markets
7. Discuss the feature of call money
8. What are the function of money markets
9. Explain the instruments of money markets
10. List out the structure of financial markets

Unit – V

1. Discuss the roll of monetary policy.
2. Explain the capital markets.
3. Explain the instruments of money markets.
4. Critically evaluate the functions of financial intermediaries.
5. Explain the classification of financial markets.
6. Shorts notes on foreign exchange rate
7. Investigate the tools of monetary policies.

Unit – I

12 Marks

1. Analyze components of supply of money
2. Briefly review of liberalize the financial system
3. Commercial banking system
4. Bring out the relationship money and capital markets
5. Explain the Measures of money supply
6. Explain the Function and features of commercial bank

Unit – II

1. Differentiate between bank credit and bank deposit.
2. Evaluate the allocation of institutional credit.
3. Briefly explain the factors influencing institutional credit.
4. Discriminate the risk structure of interest rate.
5. Investigate the market segmentation theory.
6. Outline the term structure of interest rate.

Unit – III

1. Briefly explain SEBI and its functions.
2. Discuss the instruments of credit control
3. Explain the objective and limitations of money supply
4. Examine the role of non banking financial institution in India
5. Evaluate the SEBI
6. Examine the theory of bank credit

Unit – IV

1. Discuss the financial sectors reforms in India
2. Analyze the market securities
3. Explain the unregulated credit markets
4. Explain the futures and functions of commercial bank
5. Stock markets and markets edged securities
6. Briefly explain the structure of financial markets

Unit – V

1. Discuss the monetary policies and its tools.
2. Critically evaluate the limitations of monetary policy.
3. Briefly explain the classifications of financial intermediaries.
4. Critically analyze the role of financial system in economic development.
5. Discuss the instruments of developed money and capital markets.

Semester – IV			
CORE XVII ENVIRONMENTAL ECONOMICS			
Course Code: 21PECC42	Hrs/Week: 6	Hrs/ Semester: 90	Credits: 4

UNIT-I: Introduction

20Hrs

Meaning of Environment - Environmental Economics - Nature & Scope -significance
- fundamentals of Environmental Economics - Importance of
Environmental Economics-Functions and Objectives-Role of economic
environment-Environmental economics issues

UNIT-II: Theory of Environmental Economics

15Hrs

Basic theory of Environmental Economics - Environmental quality as
a public good - forms of environmental quality— Environmental issues-
Natural Resource of Environmental Economics -Conservation of Natural
Resources.

UNIT-III: Environmental Education **15Hrs**

Environmental Education -Environmental awareness - Education through Environmental movements - Environmental Education and Training Program- Environmental education grants – Environmental Internships and fellowships- Environmental education awards

UNIT-IV: Environmental Pollution **20Hrs**

Environmental Pollution – Types of Pollution (Air, Water, Land, Noise, Indoor and Nuclear) - Forest and Environmental quality - urbanization and its impact on environment - population and environmental quality - pollution control and Environmental protection- Environmental Problems.

UNIT-V: Economics of Solid Waste Management **20Hrs**

Define Solid Waste Management – Types and impacts- - Solid Waste Disposal and Management- Methods of Solid Waste Disposal and Management- Methods of Solid Waste Management- Categories of Waste-recycling and reuse of solid waste management.

Text book:

S. Sankaran. *Environmental Economics*. Chennai: Margham Publications, 2nd edition 2013

Reference Books :

1. M. Karpagam. *Environmental Economics*. New Delhi : Sung Publication Pvt.Ltd, 2nd edition 2011
2. T. Eugene. *Environmental Economics*. New Delhi: Virinda Publication Pvt. Ltd, 2010
3. Dorfman, Robert and Nancy Dorfman. *Economics of Environment*. Bombay: W.W.NortoCompany 2nd edition 2000

ST. MARY'S COLLEGE (AUTONOMOUS) THOOTHUKUDI

II M.A. ECONOMICS –

SEMESTER IV

Core II– Environment Economics – 21PECC42

Question Bank

Unit – I

Choose the correct answer

1 Marks

1. Environment can be defined as a sum totals of all the living and non-living elements and their effects that influence _____.
a. **human life** b. human species c. human race d. community
2. The term environment has been derived from a _____ word.

- a. **French** b. Greek c. Latin d. English
3. While all living or called as _____
- a. **Biotic elements** b. abiotic elements c. human d. Animals
4. _____ and normative science is both a part of ecological economics.
- a. assured b. Negative c. Optimistic d. **Positive**
5. Scientific theories and application of welfare economics form a base for _____ economics
- a. **Environmental** b. Macro c. Micro d. Labour
6. Addressing _____ capability is necessary to overcome the problem of economic pollution.
- a. clearance b. demolition c. destruction d. **waste disposal**
7. The _____ purpose of environmental economics is to create stability between economic development and the quality of the environment.
- a. **Primary** b. Secondary c. basic d. elementary
8. This scope of environmental economics is mainly related to _____ and their impact on the quality of the environment.
- a. **economic activities** b. business activities. C. commercial activities d. d. trade activities
9. _____ must preserve limited resources such as water, forests, and fisheries for economic welfare.
- a. Children b. Government c. People d. **Society**
10. Environment provides us with wide tangible resources like minerals, _____ and soil.
- a. Nutrition b. **Water** c. HO d. CO₂

Unit – II

1. A _____ is one whose consumption or use by one individual does not reduce the amount available for others.
- a. **public good** b. private goods c. commercial goods d. trade goods
2. An example of a public good is _____ which is available to one person and is also available to others without any additional cost.
- a. **water** b. land c. soil d. gold

3. The environmental quality can be defined as ‘level and competition of the stream of all _____, except the waste receptor services’.
 - a. **Environmental services** b. functions c. accounts d. activities
4. People enjoy all amenities provided by nature at _____ costs.
 - a. minimum b. **free** c. Zero d. low
5. _____ is the life blanket of the earth, the essential ingredient for all living things.
 - a. heavens b. **Atmosphere** c. sky d. troposphere
6. Types of air pollutants _____
 - a. **Two** b. Three c. Six d. Five
7. _____ pollution can cause serious damage to plants and vegetation.
 - a. **Air** b. Water c. Noise d. Land
8. _____ pollution can greatly affect the productivity of irrigated land.
 - a. Land b. Air c. Noise d. **Water**
9. _____ is a peculiar organism of unlimited kindness and benevolence.
 - a. Human b. Animals c. **Forest** d. Sea
10. Forests protect soil and deforestation can cause _____.
 - a. **soil erosion** b. decay. c. decomposition d. breakdown.

Unit – III

1. _____ Education is a process in which individuals gain awareness of their environment.
 - a. **Environmental** b. Physical c. Social d. value
2. Environmental awareness is an integral part of the movement’s _____.
 - a. attainment b. feat c. glory d. **Success**
3. _____ is a complex process, covering not just events, but a strong underlying approach to society building as a whole.
 - a. **EE** b. ME c. SE d. VE
4. Environmentalism is an ideology that evokes the necessity and responsibility of humans to respect, _____, and preserve the natural world from its anthropogenic afflictions.
 - a. **protect** b. safe c. complements d. save
5. Environmental awareness is an _____ part of the movement’s success.
 - a. **integral** b. major c. vital d. important
6. Being environmentally friendly means _____ your impact on the

environment as much as possible.

- a. **reducing** b. abbreviating c. compressing d. condensing
7. _____ is poisoning marine life, and the burning of oil alongside other fossil fuels is contributing to the greenhouse effect.
- a. Plastic goods b. Deforestation c. **Oil drilling** d. soil erosion
8. The environmental movements favour the _____ management of natural resources.
- a. Marketing b. **Sustainable** c. business d. government
9. The environment is necessary for the continuation of life on _____.
- a. **earth** b. sun c. star d. people
10. Environmental _____ give you the connections and tools you need to really make a difference.
- a. **Internships** b. fellowship c. guidanship d. education

Unit – IV

1. Forms of energy such as sound, heat or _____ can also cause pollution.
- a. **Light** b. mechanical c. atomic d. nuclear
2. Pollution, even in minuscule amounts, impacts the _____ balance.
- a. **Ecological** b. sociological c. physical d. psychological
3. _____ pollution is caused by the release of gaseous particles, molecules, and particulates into the atmosphere.
- a. Noise b. Water c. Soil d. **Air**
4. Soil pollution involves the influx of unwanted _____ to soils, causing them to become contaminated and less fertile.
- a. **Chemicals** b. plastic c. E- waste d. Medical waste
5. Nuclear pollution is also known as _____ pollution and is a result of improper nuclear waste disposal and nuclear power plant explosions.
- a. radioactivity b. emission c. **radiation** d. broadcast
6. _____ pollution refers to any contamination of the air within a building.
- a. **Indoor air** b. outdoor c. water d. land
7. _____ play an important role in environmental protection.
- a. **Forests** b. soil c. mountain d. buildings
8. Environmental quality is a key indicator of _____ development.

- a. environmental b. socio c. life d. **human**
9. Climate changes like global warming are the result of human practices like the emission of _____gases.
- a. **Greenhouse** b. CFCs c. HCFCs d. dioxide
10. The depletion of the crucial Ozone layer of the atmosphere is attributed to pollution caused by Chlorine and Bromide found in_____.
- a. **CFCs** b. HCFCs c. COH d. COHIS

Unit – V

1. The term solid waste management mainly refers to the complete process of collecting, treating and _____of solid wastes.
- a. **disposing** b. analyzing c. separating d. monitoring
2. _____and unsanitary landfills contribute to contamination of drinking water and can cause infection and transmit diseases.
- a. unwated b. closed c. dumping d. **open**
3. Municipal solid Waste commonly consists of items we use on an _____basis then dump it.
- a. **everyday** b. once daily c. frequent d. usual
4. Hazardous wastes are _____for human health and the environment at large.
- a. **Unsafe** b. unhealthy c. unwanted d. unused
5. Throwing daily wastes in burial pits or what are also known as_____.
- a. **Landfills** b. collecting c. monitoring d. dumping
6. Burning of waste at high temperatures and converting them into residue or gaseous products is known as ‘_____’.
- a. burn b. ignite c. **incineration** d. fire
7. The process of reusing the discarded materials and converting them into something new is known as ‘_____’.
- a. **recycling** b. reusing c. reducing d. repair
8. Toxic metals, _____, and chemicals can be found in solid industrial waste.
- a. **hazardous wastes** b. bio waste c. e-waste d. medical waste
9. Animals suffer the impacts of pollution brought on by _____disposed of waste, because of our carelessness with it.
- a. **improperly** b. mistakenly c. erroneously d. inappropriately

10. _____ is the process of using worms for the degradation of organic matter into nutrient-rich manure.

- a. burning b. composting c. root dry d. **vermicomposting**

Unit – I

2 Marks

1. Define Environment.
2. Define Environmental economics.
3. What is Environmental pollution?
4. Recall the Environmental accounting.
5. What is Ecological valuation?
6. Define Environmental Policy.
7. Write any two objectives of environmental economics.
8. Write a short note on Environmental economics strategies.
9. What is the key objective of environmental economics?

Unit – II

1. Define environmental economics.
2. What are environmental goods? Give examples
3. Define the environmental quality.
4. What is a pure public good?
5. What are Environmental Issues?
6. How do you treat environmental quality as a public good?
7. How does economic growth affect environmental quality?
8. What is meant by global warming?
9. What are the sources of water?
10. What is the meaning of Conservation?

Unit – III

1. Define Environmental Education.
2. What does it mean to be environmentally aware?
3. Define Environmental awareness.
4. What is meant by deforestation?
5. What is an Environment Grant?
6. What are Environmental Educational Grants?
7. Define Environmental internships
8. What is meant by fellowships?

Unit – IV

1. Define Environmental pollution.
2. List out the Environmental pollution.
3. What is meant by air pollution?
4. Define Water pollution.
5. What human activities cause water pollution?
6. What are noise pollution and its effects?
7. Define Environmental Quality.
8. What is meant by Global Warming?
9. How can we control environment pollution?
10. Define environmental Protection.

Unit – V

1. Define solid waste
2. Define solid waste management
3. What do you understand by solid waste pollution?
4. Bring out the importance of recycling of waste.
5. What do you think about recycling?
6. List out the solid waste.
7. How can we dispose solid waste properly?
8. What is the process of Vermicomposting?
9. How can the waste Landfill.
10. What is meant by incineration?

Unit – I

6 Marks

1. Discuss the nature of environmental economics.
2. Write a short note on significance of environmental economics
3. Discuss the fundamentals of environmental economics.
4. Prove the environmental economics is micro or macro study.
5. Environmental Pollution as an Economic issue- Discuss

Unit – II

1. Discuss the forms of environmental quality.
2. Brief explanation about environment as a public good.
3. Air as an Environmental Quality – Explain

4. Discuss the common sources of air pollution.
5. Give a detailed explanation about importance of water conservation
6. Explain the Non-renewable natural resources.

Unit – III

1. Write a short note on environmental economics.
2. Explain the components of environmental education.
3. Environmental awareness- Discuss
4. Enumerate the education through environmental movements.
5. Why the environmental training programmers are so important in our society?
6. Write a short note on environmental education grants.

Unit – IV

1. Discuss the environmental pollution and causes of pollution.
2. Forest and Environmental quality – Discuss
3. Environmental quality factors
4. Briefly explain the various environmental problems.
5. Bring out the environmental consequences of rural – urban migration.
6. Discuss the reasons of urbanization.

Unit – V

1. Write a short note on Solid waste management.
2. Briefly examine the MSW.
3. Discuss the impact of solid waste.
4. Give a important points about solid waste management
5. Examine the biodegradable Waste and types.
6. Discuss the biodegradable and non degradable waste.

Unit – I

12 Marks

1. Enumerate the functions of environmental economics.
2. Discuss the objectives of environmental economics.
3. Outline the environmental policies.
4. Explain the environmental issues.

5. Explain the nature and scope of environmental economics.
6. Discuss the environmental economics strategies

Unit – II

1. Basic theory of environmental economics-Explain
2. Impact of natural resource economics – Discuss
3. Enumerate the conservation of natural resources
4. Explain the classification of natural resources.

Unit – III

1. Examine the environmental internships and fellowships.
2. Outline the environmental education awards
3. Examine the environmental educational grants
4. Bring out the environmental education and training programme

Unit – IV

1. Explain the urbanization and its impact on environment.
2. Briefly examine the Population and its causes of environmental quality.
3. Pollution control and environmental Protection- Explain
4. How can we control environment pollution- Discuss.
5. Discuss the major environmental Problems and causes.
6. Ozone Layer Depletion and its causes- Overview

Unit – V

1. Methods of Solid waste disposal and Management - Overview
2. Briefly examine the recycling and reuse of solid waste management.
3. Discuss the types of waste and its causes.
4. Discuss the categories of waste and its major problem in India.

Semester – IV

CORE XVIII FINANCIAL INSTITUTION AND MARKETS

Course Code: 21PECC43	Hrs/Week: 6	Hrs/ Semester: 90	Credits: 4
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UNIT-I: Financial System **15 Hrs**

Nature & Role of Financial System – money and near money – Financial intermediation and financial intermediaries – the structure of the financial system – Functions of the financial sector; Equilibrium in financial markets

UNIT-II: Interest Rates **15 Hrs**

Structure of interest rates – level of interest rates – long period & short period rates – term structure of interest rates – spread between lending & deposit rates – administered interest rates – appropriate interest rate policy.

UNIT-III: Non – Bank Financial Institutions **15 Hrs**

Non-bank financial intermediaries, definition and types of non- bank

financial institutions - growth and impact on India's economic development-
Measures taken to control their operations.

UNIT-IV: Money Market and Capital Market **15 Hrs**

Role and structure of money & capital market – call money market, Treasury bill market- Commercial bill market including commercial paper and certificate of deposits. Discount market – Government securities market – markets for derivatives: future and options and other derivatives- SEBI, its impact on capital market in India; IDRA and its role in financial markets

UNIT-V: Role of Financial Markets **15 Hrs**

International financial markets – nature, organization and participants – reforms in international monetary system and its impact on developing countries-Euro- dollar and Euro- currency markets; their developmental role and regulation at the international level

Text Book:

Bhole L.M. *Financial Institutions and Markets*. New Delhi: TMH Publications, 2nd edition 2010

Books for Reference:

1. Bhole L.M. *Indian Financial System*. Allahabad: Chugh Publications, 2010
2. Edminster R.O. *Financial Institutions, Markets & Management*. New York: McGrawHill, Khan, M.Y. 2nd edition 2005
3. Prasad K.N. *Development of India's Financial System*. New Delhi: Arup & Sons, Publications, 2003
4. Chandra. P. *Financial Markets*. New Delhi: TMH Publications, 2nd edition 2000

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II M.A. ECONOMICS

SEMESTER IV

Core-III - Financial Institution and Markets - 21PECC43

Question Bank

Unit –1

Choose the correct answer:

1 Mark

1. ----- is generally accepted as payment for goods and services
 - a) Near money **b) Money** c) Commodity Money d) Fiat Money
2. Finance in this investment management called-----for individuals and ----- for institutions.
 - a) **Money & Assets** b) Money & Finance c) Assets & Finance d) Dept. & Assets
3. Individuals and businesses need to have ----- available to meet immediate obligations
 - a) Fiat Money b) Near Money **c) Cash Money** d) Assets
4. The Indian Money market is the market in which -----funds are borrowed and lent.
 - a) Long term **b) Short term** c) Medium term d) Both a & b
5. The lower the -----and -----cost the higher the financial development.
 - a) **Transaction & Information** cost b) Saving and Investment c) Production and Savings d) Income and Expenditure
6. Money demand always equals----- at equilibrium, so interest rate adjust.
 - a) Production b) Interest Rate **c) Money Supply** d) None of the above
7. The economic development of any country is dependent on its----- system.
 - a) Marketing system **b) Financial system** c) Production system d) currency system
8. Bond and stock market rise and fall with the -----for investment.
 - a) Supply **b) Demand** c) Price d) assets
9. Financial risk classified in to ----- types.
 - a) 3 **b) 5** c) 6 d) 2
10. ROA explanation
 - a) **Return on Assets** b) Revenue on Assets c) Risk on assets d) Rest on assets
11. The formula for ROA
 - a) Net Income/Average total assets b) Annual Income/Net total assets c) Percapita Income/Average total assets d) None of the above

UNIT-II

1. Marginal productivity of capital determines the -----
 - a) Savings b) Investment **c) Rate of Interest** d) Demand for money
2. The higher productivity of capital market the interest -----
 - a) Lower b) Medium **c) Higher** d) Equal
3. ----- point of view interest is the cost of easier and earlier availability of goods
 - a) Producers **b) Consumers** c) Capitalist d) Consumers & Producers
4. A rise in the rate on interest increases the quantity of future goods available to people willing to sacrifice-----
 - a) Future consumption **b) Current consumption** c) Future savings d) current savings
5. The interest rate is typically noted on an annual basis known as the -----
 - a) **APR** b) MPR c) ECB d) AR
6. The European Central Bank operates-----approach
 - a) Profit **b) Twin pillar** c) Savings d) Production
7. National economics are increasingly open to the influence of -----markets.
 - a) Monetary **b) International Financial** c) Money d) Finance
8. Interest rates of bods are plotted against their terms this is called the-----
 - a) Productivity curve b) Savings curve **c) Yield curve** d) Investment curve

9. The difference between long and short term interest rates is large the yield curve is said to be -----
 - a) Horizontal **b) Steep** c) Vertical d) Low
10. The rate of interest comes to the ----- position at the level at which the demand for capital becomes equal to its supply.
 - a) Upwards b) downwards **c) equilibrium** d) Normal

UNIT-III

1. NBFC full form-----
 - a) National Bank Financial Company **b) Non-bank Financial Company** c) National Bank Financial Corporation d) National Bank Fixed Company
2. NBFC is a company registered under the companies Act-----
 - a) 1946 b)1958 **c) 1956** d) 1966
3. You could sell shares in your business if you want to raise-----
 - a) Short term finance **b) Long termfinance** c) Medium term finance d) None of the above
4. NBFC's help attain the objective of -----policies of creating more jobs in the country by promoting SMEs and private industries through lending them loans.
 - a) Micro Economic b) **Macro Economic** c) Monetary d) Finance
5. You could----- in your business, if you want to raise long-term finance.
 - a) Buy shares b) Buy commodity **c) Sell shares** d) Sell commodity
6. This one is directly adds on to the National income and results in the progression of-----
 - a) Gross Domestic Product** b) Net Domestic Product c) Net Production d) Marginal Product
7. The financing of such transaction is known as-----finance company?
 - a) Lower purchase b) Own purchase **c) Hire Purchase** d) None of the above
8. The RBI regulate the activities of non-banking financial companies under the companies acceptance of deposits rules-----
 - a) 1985 **b) 1975** c) 1983 d) 1978
9. All the Non-banking financial companies are required to submit periodical returns to the -----on various matters relating to their operations.
 - a) SEBI **b) RBI** c) NBFC d) NOF
10. The RBI has issued directions insisting certain NBFC's like leasing companies and hire purchase companies to maintain-----of their deposits in liquid assests.
 - a) 15% b) 20% **c) 10%** d) 5%

UNIT- IV

1. Secondary market is Money market are used for -----lending?
 - a) Short term** b) Long term c) Medium term d) None of the above
2. A form of capital market where issued securities are bought and sold secondary market has got two wings namely-----and -----

- a) **Cash market & Derivative market** b) Money market & Capital market c) Short market & Cash market d) Finance and Capital market
3. SEBI full form
 a) State Exchange Bank and India b) **Securities and Exchange Board of India** c) State Exchange Bank and Institution d) None of the above
4. The call money market is an essential part of the Indian-----
 a) **Money market** b) Capital market c) Share market d) Finance market
5. The loan are of short-term duration varying from 1-14 days are traded in call-----
 a) Near money b) Capital market c) **Money market** d) Finance market
6. The treasury bill market is the market that deals in-----
 a) Cash bill b) **Treasury bill** c) Money bill d) Finance market
7. Demand bills are payable -----when they are presented to the drawee
 a) **Immediately** b) after some time c) Not now d) None of the above
8. Bills that are drawn and payable in India on a person who is resident in India are called-----
 a) **Inland bills** b) Foreign bills c) Clean bills d) Documentary bills
9. Bills that are drawn outside India and are payable either in India or outside India are called-----
 a) Inland bills b) **Foreign bills** c) Indigenous bills d) None of the above
10. Indigenous bills are used by -----bankers
 a) Foreign b) **Indigenous** c) Commercial d) Private

UNIT -V

1. The stock market trades shares of ownership of-----
 a) **Public companies** b) Private companies c) Own purpose d) None of the above
2. -----is where traders and investors buy and sell natural resources or commodities.
 a) Stock market b) Finance market c) **Commodities market** d) Money market
3. Investors aim to make-----from their securities.
 a) **Profit** b) price c) Value d) Credit
4. They can use -----to sell their securities or make investments as they desire.
 a) Derivatives markets b) **Financial markets** c) Stock markets d) Securities
5. Euro – dollar market attracts funds by offering ----- of interest.
 a) **High rates** b) Low rates c) wider range d) None of the above
6. Euro – dollars are useful for the financing of -----
 a) **Foreign trade** b) Capital market c) Money market d) Financing trade
7. The Eurocurrency market is the -----for currency outside of the country where it is legal tender.
 a) Capital market b) **Money market** c) Finance market d) Stock market
8. Euro – currency market does not deal only in the -----.
 a) **European Currency** b) Indian currency c) Pound sterling d) Frank
9. The Euro-currency market is essentially a -----market.
 a) **Wholesale** b) Retail c) Stock d) Exchange

10. The Euro-currency market has brought about a closer integration in the international -----market.
- a) Finance market b) Capital market c) Money market d) None of the above

UNIT-I

2 Marks

1. What is finance?
2. What is money and near money?
3. What are the main three constituents of financial system?
4. Explain the banking system.
5. What is financial market?
6. Define the financial risk.
7. What is return on assets?
8. What is the formula for ROA explain?
9. Definition of Risk Return Trade Off.
10. Explain the book value.

UNIT- II

1. What is interest rate?
2. Long term rates- Define?
3. What is yield curve?
4. Define lending and deposits rates.
5. What is called borrowing?
6. Explain the lending to customer.
7. Define appropriate interest rate.
8. Explain the short term period.
9. What is APR?
10. Define the periods of Interest rates.

UNIT-III

1. What is NBFI?
2. What is NBFC?
3. Explain the equity finance.
4. Explain the crowd funding.
5. What is long-term credits?
6. Explain the mobilization of funds.
7. Growth of National Income explains?
8. What is Investment company?
9. Explain the cash reserves in NBFI.
10. Define RBI.

UNIT IV

1. What is cash market?
2. Recall the Derivative market
3. SEBI full form.

4. What is commercial bill market?
5. What is Treasury bill market?
6. Write about the Inland bill.
7. Recall the Foreign bills.
8. What is transfer of risk?
9. What is SEBI?
10. Why it is called as Secondary market?

UNIT-V

1. What is stock market?
2. What is Bond market?
3. Define Commodities market.
4. Meaning of Euro – Dollar.
5. What is the Euro-Currency market regulation?
6. Meaning of Euro – Currency market?
7. What is wholesale market?
8. Define domestic money market.
9. List out the financial markets.
10. Write a note on derivatives markets.

6 Marks

UNIT-I

1. Explain the structure and functions of Indian financial system.
2. Differentiate between money and capital market.
3. Explain the Indicators of financial development?
4. Briefly explain the financial market equilibrium?
5. Explain the role of the financial system in economic development.
6. Critically examine the evaluate assets.
7. Briefly explain the return of assets.
8. Explain the types of security valuation.
9. Explain the financial intermediate and intermediation.
10. Discriminate the money and near money.

UNIT- II

1. Explain the structure of interest rates.
2. Briefly explain the long period and short period.
3. Evaluate the marginal productivity theory of rate on interest.
4. Discuss the shape of the yield curve.
5. Explain administered and appropriate interest rates.
6. Discuss the borrowing and deposits rates.
7. Explain the merits of Interest rate in capital firm.
8. Explain the demand and supply theory for rate of interest.
9. Explain the loanable funds theory on the demand side.
10. Briefly explain the Interest rate and interest periods.

UNIT-III

1. Explain the types of Non-bank financial institutions.
2. Explain the NBFC and NBFIL.
3. Discriminate the equity, crowd and Government financial support.
4. Explain the long term and short term credits.
5. Explain the non-bank financial company.
6. Critically evaluate the residuary Non-banking company.
7. Explain the impact of National Income in NBFC's.
8. Functions of RBI's departments of financial companies in controlling NBFC's. -
Discuss
9. Evaluate the functions of financial companies.
10. Explain the Mutual Funds and FD and Shares.

UNIT IV

1. Explain the role and structure of money market.
2. Explain the role and structure of capital market.
3. Structures of Indian money market –Explain
4. Discuss the types of treasury bills.
5. Characteristics of Commercial bill .
6. Explain the Inland and Foreign bills.
7. Discuss the advantages of Commercial Paper
8. List out the types of derivatives –Objective of SEBI.
9. Objectives of IRDA?

UNIT-V

1. Explain any two types of financial markets.
2. Functions of the financial markets - Explain
3. Discuss the Characteristics of Euro-dollar markets.
4. What are the benefits of Euro-dollar market?
5. Effects of Euro-dollar market explain?
6. Explain the major drawbacks of the Euro-dollar market.
7. Origins of Euro-currency market - Discuss
8. Impact of Euro-currency market in developing countries.

12 Marks

UNIT-I

1. Indicator of financial development and the ratio of money to income - Explain
2. Explain the types of financial risk.
3. What is ROA? And how to calculate the ROA .
4. Explain the security valuation and also explain the 4 types of valuation.

UNIT –II

1. Briefly explain the loanable funds theory and advantages & disadvantages.
2. Explain the level and structure of interest rates and explain the time periods.
3. Illustrate the yield curve and appropriate interest rates.

UNIT-III

1. Briefly explain the types of Non-bank financial Institution.
2. Growth and impact on Indian economic development - Explain
3. Classification of NBFC's depending upon the type of activities.
4. Estimate the measures taken to control their operations.
5. Explain the main functions of the financial companies.

UNIT- IV

1. Explain the capital market.
2. Discuss the types of Commercial bills
3. Functions and types of derivatives - Explain
4. Functions and objectives of SEBI - Discuss
5. Explain the IRDA objectives functions and organisational setup.

UNIT- V

1. What is financial market? And explain the types of financial markets.
2. Benefits and effects of Euro-dollar market on International financial system - Explain
3. Explain the growth of Euro-currency market.
4. Major roles of Euro-currency market in International financial system- Overview.

Semester– IV			
CORE XIX DIGITAL ECONOMY			
Course Code: 21PECC 44	Hrs/Week: 6	Hrs/ Semester: 90	Credits: 4

UNIT- I: Introduction**20 Hrs**

Meaning of Digital economy-digital economy and its components- Importance of digital economy- Transformation of the real economy into digital economy- Role of technology revolution in the world economy- Knowledge economy vs. Digital economy- Advantages and disadvantages of the digital economy

UNIT- II: Digital Innovation**15 Hrs**

Digital innovation and its impact on economic growth- Importance of

digital innovation - low code support digital innovation-digital business innovation-digital transformation- difference between digital innovation and digital transformation-Concept of the Fourth Industrial Revolution

UNIT-III: Digital Economy's Ecosystem **15 Hrs**

Digital ecosystem- digital business ecosystem- a new regulatory framework for the digital ecosystem-features of digital ecosystem-challenges to digital ecosystems-Implications for competitive strategy-digital platform ecosystem

UNIT-IV: Households in the Digital Economy **15 Hrs**

Individualization of products and services- changing structure of consumption- potential for economic participation- Digital economy's social impact - The digital divide - Key factors of globalization and economic growth in the digital age.

UNIT-V: States in the Digital Economy in India **20 Hrs**

E-government, e-public service-digital enabling- evolving governance frameworks relevant to the digital economy – History of digital economy in India-Role of digital economy in India-challenges of digital economy in India – Importance of digital economy in India – presentation on digital economy in India

Text Book:

David L. Rogers. *The Digital Transformation Playbook*. New Delhi: Sultan Chand and Co, 2nd edition 2000

Reference Book:

1. Jan A. Audestad. *Digital Economics*. Mumbai: Springer Nature Publications, 1st edition 2015.
2. T.L. Mesenbourg. *Measuring the Digital Economy In India*. Chennai: Sung Publications, 2nd edition 2001.
3. Avi Goldfarb, Shane Greenstein and Catherine Tucker. *Economic Analysis of the Digital Economy*. New Delhi: Arup & Sons, Publications, 2003
4. Eric Brousseau. Nicolas Curien. *Internet and Digital Economics: Principles, Methods and Applications*. New Delhi : Virinda Publication Pvt. Ltd 2008

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II M.A. ECONOMICS – SEMESTER IV

Core IV– Digital Economy – 21PECC44

Question Bank

Unit – I

Choose the correct Answer

1 Marks

1. The _____ economy is the worldwide network of economic activities.
a. **Digital** b. Social c. Money d. Capitalized
2. An economy is a system that produces and distributes goods and services in an effort to _____ the needs of society.
a. stimulate b. Sate c. excite d. **Satisfy**
3. The _____ has taken over the world and transformed how we live, work, and play.
a. **Internet** b. government c. house head d. money
4. The digital economy is powered by _____.
a. **Electronic** b. service c. money d. goods and service
5. _____ is the lifeblood of the digital economy.
a. Social activities b. money c. goods & services d. **Data**
6. _____ has made it possible for businesses to reduce their costs.
a. **Technology** b. money c. data d. internet
7. The digital economy has generated _____ as there is an influx of new businesses and startups.
a. **new job opportunities** b. new idea c. new information d. new technique
8. Digitizing businesses and business processes lead to _____.
a. new technique b. new idea c. new information d. **Innovation**
9. Up-skilling and _____ the workforce is no doubt a top priority for organizations around the world.
a. **Re-skilling** b. re- instilling c. re-instructing d. re-training
10. The increased use of _____ has also led to an increase in cybercrime.
a. **Technology** b. untechnical c. nontechnical d. automation

Unit – II

1. Digitization the mass adoption of connected digital services by consumers, _____, and governments.
a. **Enterprises** b. students c. buyers & sellers d. common people
2. Digitization _____ economic growth and facilitates job creation.
a. recede b. decrease c. diminish d. **Accelerates**
3. _____ must ensure the capabilities and enablers for sectoral digitization are in place.
a. Policymakers b. Price makers c. Price taker d. Policy taker
4. Creating digital markets and _____ digitization can yield significant economic benefits.
a. **Boosting** b. drop c. depress d. sink
5. _____ innovation is the implementation of new digital technologies to solve existing business problems and improvise organizational practices.
a. **Digital** b. Marketing c. Education d. company

6. Digital technology can help improve_____, collaboration, content management, access to analytics data and social networking.
 - a. attached
 - b. interconnecting
 - c.united
 - d. **Communication**
7. A _____platform requires minimal coding, which in turn helps with faster development, more experimentation, quick innovation, and rapid deployment.
 - a. **low code**
 - b. net work
 - c. data
 - d. media
8. Digital business is the processes of applying _____to reinvents business models and transform a company's products and customer experiences.
 - a. **Digital technology**
 - b. innovation
 - c. new idea
 - d. new model
9. Digital transformation is the process of using digital technologies to create new or modify _____
 - a. **Existing business**
 - b. bankrupt
 - c. closed
 - d. ruined.
10. Example of Fourth Industrial Revolution_____
 - a. cloud computing
 - b. 3D printing
 - c. mobile devices
 - d. **Robotics**

Unit – III

1. A _____is a network of interconnected digital technologies, platforms, and services that interact with each other to create value for businesses and consumers.
 - a. **digital ecosystem**
 - b.digital platform
 - c.digital world
 - d.digital device
2. Digital Ecosystem Example: _____
 - a. **Amazon**
 - b. Robotics
 - c. 3D printing
 - d. mobile devices
3. One of the main advantages of using a digital ecosystem is_____
 - a. **Data drive**
 - b. Automation
 - c. global
 - d. dynamic
4. _____is one of the key elements in lowering the price.
 - a. dynamic
 - b. Automation
 - c. global
 - d. **Data drive**
5. _____is one of the simplest ecosystems and gets usually built around an existing product or offering of a company.
 - a. **Functional eco system**
 - b. Modular Producer
 - b. Ecosystem Orchestrator
 - d. customer
6. _____is the provides a common platform under which developers, producers and engineers.
 - a. Google
 - b. Email
 - c. Whatsapp
 - d. twitter
7. A digital ecosystem is a group of _____information technology resources that can function as a unit.
 - a. separate
 - b. **Interconnected**
 - c. unconnected
 - d. unrelated
8. Poor resource management planning and lack of _____resources are some of the critical challenges related to digital transformation.
 - a. ITCC
 - b. ICT
 - c. WWW
 - d. **IT**
9. _____is a concern for most visionaries as cyber security is complex, dynamic, and fast-changing.
 - a. **Data security**
 - b. Data drive
 - c. digital platform
 - d. digital device
10. _____in the organization’s cultures are one of the biggest business transformation challenges.
 - a. **Shortcomings**
 - b. Technology
 - c. Innovation
 - d. Network

Unit- IV

- _____ is a strategy that tries to shift focus from the mass market towards the individual customer.
 - Individualization**
 - Product
 - promotions
 - special content
- Individualization in marketing is the process of making a _____ or service unique for each individual.
 - promotions
 - Product**
 - special content
 - communication
- Changing consumption patterns will require a multipronged strategy focusing on _____, meeting the basic needs of the poor.
 - special content
 - Product
 - promotions
 - Demand**
- Economic growth coupled with population increase and globalizations have engendered _____ in consumption patterns around the world.
 - Structural changes**
 - Contingent
 - demanding on natural resources
 - unsustainable challenges
- Shifts in food consumption have led to increased _____ and changes in the composition of world agricultural trade.
 - Trade**
 - production
 - supply
 - quantity
- Institutional collaboration will be critical to addressing the scale of the unemployment and _____.
 - skills challenge**
 - partnership
 - blueprint
 - sustainable workforce
- Small and mid-sized enterprises (SMEs) and _____ were hit hard during the pandemic.
 - Entrepreneurs**
 - employed
 - workers
 - daily labors
- The _____ wave of digitization has significant implications for productivity improvements.
 - fifth
 - First
 - second
 - Third**
- The _____ refers to the gap between demographics and regions that have access to modern information and communications technology.
 - digital divide**
 - digital platform
 - digital ecosystem
 - digital network
- The _____ is a rich library of information.
 - Internet**
 - Google
 - you tube
 - face book

Unit –V

- _____ refers to the use by government agencies of information technologies.
 - E-Government**
 - E-book
 - E- commerce
 - E-business
- _____ have a unique direct interaction with citizens.
 - Municipalities**
 - State Govt
 - Central govt
 - sovereignty
- The e-Government objective is to create a new dynamic relation between governments and _____.
 - social network
 - municipalities
 - school children
 - Citizens**

4. _____Scheme, technical and financial assistance are being provided to the States.
 - a. **SWAN** b. SST c. SFDS d. SWAM
5. Digital government services also called as _____
 - a. **e-government** b. State Govt b. Central govt d. sovereignty
6. _____tools aimed to cover the critical indicators for the main building blocks of the digital economy.
 - a. framework b. **Assessment** c. Computing d. Data
7. The _____includes plans to connect rural areas with high-speed internet networks.
 - a. **Initiative** b. Technology c. Innovation d. Network
8. The biggest challenge faced by _____in India is the slow/delayed infrastructure development.
 - a. **digital evolution** b. digital innovation c. digital technology d. ICT
9. _____threats will continue to expand and transform the economy.
 - a. **New global** b. Net work c. Communication d. Technology
10. Today, it is the single most important driver of_____, growth, and job creation.
 - a. high speed net b. data c. new technology d. **Innovation**

Unit – I

(2 Marks)

1. Define digital economy.
2. Define Knowledge economy.
3. What is digital transformation?
4. What is data?
5. Define E- business.
6. Define cyber crime.
7. What is data security?
8. What is the role of net work transformation?
9. Define E- commerce.
10. If the digital innovation leads to innovation?

Unit – II

1. Define digital innovation.
2. Do you agree the digitization accelerates economic growth?
3. Do you believe the digitalization to creating digital markets and boosting digitization?
4. Give any two highlights of digital innovation?
5. Write a short note on digital business innovation.
6. How its help in the real modern world.
7. Do you agree the digitization create new job facilities?
8. What is low code support?

Unit – III

1. Define digital ecosystem.

2. Give any example of digital ecosystem.
3. Give any reason
4. What is Platform Ecosystem?
5. Define Super Platform Ecosystem.
6. What is Functional Digital Ecosystem?
7. Define DBE.
8. List out the digital business ecosystem.
9. Recall the Macro-business ecosystems.
10. Recall the Micro-business ecosystems.

Unit – IV

1. What is individualization?
2. Define Individualized services.
3. What are the factors changing consumption patterns?
4. Do you agree the digital economy to create new job?
5. What is the full form of SMEs?
6. Digital Economy is affecting the social impact?
7. List out the three wave of digitalization.
8. Define digital divide.
9. List out the types of digital divide.
10. Give a short note on digital divide in education.

Unit – V

1. Define E- Government
2. Define E- Public service
3. What is digital enabling?
4. List out the National e-Governance Plan.
5. Recall - State Wide Area Network.
6. Recall - State Service Delivery Gateway.
7. Write a short note on Common Service Centre.
8. What is State Data Centre?
9. Say any example of ICT Technology.

Unit – I

6 Marks

1. Discuss the digital economy and its components.
2. Explain the importance of digital economy.
3. Enumerate the transformation of real economy into digital economy.
4. Explain digital economy and how does it work?
5. Explain the components of the digital economy?

Unit – II

1. Explain the importance of digital innovation.
2. Discuss the digital business innovation.
3. Explain the role of digital transformation.
4. Enumerate the digital innovation and its impact in the market.

5. How much does digital economy contribute to GDP?
6. Which industrial revolution introduced the internet?

Unit – III

1. Detailed explanation with the example of digital ecosystem.
2. Characteristics of a digital ecosystem – Explain
3. Role in a digital ecosystem- Discuss
4. Discuss the types of digital ecosystems.
5. Discuss the importance of business ecosystems.

Unit – IV

1. Write a short note on individualization of product and services
2. Give a short note on individualized services.
3. Discuss the types of digital divide.
4. Explain the impact of digital divide on the economy.
5. Explain the key factors of globalization and economic growth in the digital age.

Unit – V

1. Explain the concept of National e-Governance Plan.
2. Outline the digital enabling
3. Explain the benefits of Digital Government Services.
4. Discuss the role of digital government services.
5. Examine the State Wide Area Network.

Unit – I

12 Marks

1. Differentiate between knowledge economy Vs digital economy.
2. Explain the role of technology revolution in the real economy.
3. Discuss the advantages and disadvantages of digital economy.
4. Give a detail report on knowledge economy.

Unit – II

1. Digital innovation and its impact on economic growth- Discuss
2. Discuss the low code support digital innovation.
3. Differentiate between digital innovation and digital transformation.
4. Fourth Industrial Revolution – Explain

Unit – III

1. Give detailed explanation about types of business ecosystems.
2. New regulatory framework for the digital ecosystem – Discuss
3. Enumerate features of digital ecosystem.
4. Challenges to Digital ecosystem – Explain.
5. Detailed explanation about platform ecosystem.

Unit – IV

1. Compose the factors changing consumption patterns.
2. Analyze the potential for economic participation.
3. Discriminate the digital economy and its social impact.
4. Evaluate the Digital Divide.

Unit – V

1. Evolving governance frameworks relevant to the digital economy.
2. Enumerate the history of digital economy in India.
3. Discuss the role of digital economy in India.
4. Explain the challenges of digital economy in India.
5. Discuss the importance of digital economy in India.
6. Assemble the presentation of digital economy in India.



ST. MARY'S COLLEGE (Autonomous)
(Re-accredited with 'A+' Grade by NAAC)
Thoothukudi – 628 001, Tamil Nadu
(Affiliated to Manonmaniam Sundaranar University)



QUESTION BANK

M.Sc. Botany
School of Biological Sciences
(W.e.f.2021)

S. No	Course Code	Course Title
1.	21PBOC11	Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)
2.	21PBOC12	Plant Microbe Interaction
3.	21PBOC13	Bioinstrumentation and Research Methods
4.	21PBOC14	Phytochemistry and Pharmacognosy
5.	21PBOC21	Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)
6.	21PBOC22	Marine Botany
7.	21PBOC23	Developmental Botany
8.	21PBOC24	Genetics and Bioinformatics
9.	21PBOC31	Biochemistry and Biophysics
10.	21PBOC32	Taxonomy of Angiosperms
11.	21PBOC33	Molecular Biology and Genetic Engineering
12.	21PBOC34	Ecology and Conservation Biology
13.	21PBOC41	Plant physiology
14.	21PBOC42	Horticulture and Seed Technology
15.	21PBOC43	Plant Biotechnology
16.	21PBOE41	Entrepreneurship Botany

SECTION A

UNIT I

- Microscopic observation of an Alga shows the presence of pigments chl a and chl b, cellulosic cell wall with starchy reserve and lives in fresh water
(a) **Volvox** (b) *Cladophora* (c) *Ulva* (d) *Enteromorpha*
- Gracillaria* and *Ectocarpus* are similar because
(a) both are unicellular fresh water algae (b) both have cup shaped chloroplast
(c) **both are marine algae** (d) both belong to Phaeophyceae
- Which of the following best describes on pyrenoids
(a) **starchy body deposited with vitamins** (b) photosensitive organs of the algae
(c) protein body deposited with starch (d) solicitous deposits of algal cells
- Which of the following is the parasitic alga
(a) *Acetabularia* (b) Diatoms (c) ***Cephaleurus*** (d) *Oedogonium*
- Sexual reproduction and mobile cells are lacking in ---"
(a) *Rivularia* (b) *Chlorella* (c) Diatoms (d) *Chlamydomonas*
- Which one of the following statements related to *Volvox* correct
(a) It does not produce zoospores
(b) It does not produce hormogonia
(c) It comes under oedogoniales based on Fritsch
(d) **It has many *Chlamydomonas* like cells**
- Which among the following do you consider as the best evidence to show that two species of algae are closely related
(a) They both are found in the same habitat
(b) They both reproduce sexually
(c) They both respire and release CO₂
(d) **They both have same type of pigments**
- Eliminate the eukaryotic characters seen in Cyanophyceae
(a) Peptidoglycon in the cell walls
(b) **70S ribosomes in the cytoplasm**
(c) Rubisco for photosynthesis
(d) Heterocysts for nitrogen fixing

9. One of the following is present in blue green algae
a) Galactan sulphate b) **phycocyanin** c) any polysaccharide d) floridean starch
10. Red colour of the red alga is due to
a) xanthophyll b) chlorophyll a c) chlorophyll b d) **phycoerythrin**
11. Laminarian is an energy storage material characteristic of
a) Chlorophyta b) Chrysophyta c) **Phaeophyta** d) Rhodophyta
12. The study of algae is called
(a) Mycology (b) **Phycology** (c) Pteridology (d) Bryology
13. According to Fritsch algae are classified into
(a) **11 classes** (b) 13 classes (c) 8 classes (d) 16 classes
14. The dominant pigment found in the members of cyanophyceae
(a) **phycocyanin** (b) chlorophyll (c) carotenoid (d) fucoxanthin
15. The dominant pigment found in the members of cyanophyceae
(a) **c- phycocyanin** (b) chlorophyll (c) carotenoid (d) fucoxanthin.
16. The reserve food materials in brown algae
(a) **mannitol and laminarin** (b) starch and oil (c) glucose and fat (d) oil and fat.
17. Haplontic life cycle is characterized by
(a) **zygotic meiosis** (b) gametogenic meiosis (c) zygotic mitosis (d) meiosis.
18. Foliaceous thallus is noted in
(a) *Cladophora* (b) ***Ulva*** (c) *Volvox* (d) *Spirogyra*.
20. Silicious wall is the characteristic feature of
(a) *Chlamydomonas* (b) ***Diatoms*** (c) *Gracilaria* (d) *Sargassum*
21. Sexual reproduction is absent in
(a) *Volvox* (b) *Sargassum* (c) *Gracilaria* (d) ***Oscillatoria***.
22. Flagellated asexual reproductive cell is called
(a) **zoospore** (b) aplanospore (c) hypnospore (d) autospore
23. The sporophytic plants of *Ectocarpus* bear
(a) plurilocular sporangia (b) unilocular sporangia
(c) **plurilocular sporangia and unilocular sporangia** (d) multilocular sporangia

24. Haplobiontic life cycle is seen in
 (a) ***Batrachospermum*** (b) *Gracilaria* (c) *Padina*(d) *Turbinaria*
25. In diatoms the zygote grows in to a spore called
 (a) zoospore (b) aplanospore (c) hypnospore(d) **auxospore**
26. Diplobiontic life cycle is seen in
 (a) *Batrachospermum* (b) ***Gracilaria*** (c) *Padina*(d) *Turbinaria*
27. Diplontic life cycle is characterized by
 (a) zygotic meiosis (b) **gametogenic meiosis** (c) zygotic mitosis (d) meiosis.
28. Heteromorphic alternation of generation is found in
 (a) ***Laminaria*** (b) *Gracilaria* (c) *Padina*(d) *Turbinaria*
29. Isoomorphic alternation of generation is seen in
 (a) *Laminaria* (b) *Sargassum* (c) ***Ulva*** (d) *Turbinaria*
30. Heterocyst is characteristic to
 (a) **Cyanophyceae** (b) Rhodophyceae (c) Phaeophyceae(d) Bacillariophyceae
31. Branched filamentous thallus is noted in
 (a) ***Cladophora*** (b) *Ulva* (c) *Volvox* (d) *Chlamydomonas*

UNIT II

1. The reserve food materials in brown algae
 (a) **mannitol and laminarin** (b) starch and oil (c) glucose and fat (d) oil and fat
2. The thallus of *Caulerpa* is
 (a) multicellular (b) **coenocytic** (c) saprophytic (d) parasitic
3. *Caulerpa* reproduces by
 (a) **vegetative and sexual** (b) vegetative and asexual
 (c) sexual and asexual (d) fragmentation
4. Transverse, longitudinal, cylindrical and interconnecting strands are running across the cavity of *Caulerpa* thallus
 (a) cisternae (b) **trabeculae** (c) xylem (d) vacuole
5. In *Caulerpa* the chloroplast is
 (a) cup-shaped (b) parietal(c) **discoïd** (d) ribbon-shaped

6. Air bladders are found in
(a) *Gracillaria* (b) *Volvox* (c) *Caulerpa* (d) ***Sargassum***
7. In *Sargassum* the sex organs are borne on specialized branches called
(a) receptacles (b) **conceptacles** (c) air bladders (d) leaves
8. The male sex organ in *Sargassum* is called
(a) **antheridium** (b) oogonium (c) archegonium (d) ascogonium
9. The sterile hair found in the conceptacle is called as
(a) **paraphysis** (b) stalk (c) antheridial branch (d) flagella
10. Agar-Agar is used in
(a) industry (b) medicine (c) laboratories (d) **all of these**
11. *Gracilaria* belongs to the class
(a) **Rhodophyceae** (b) Cryptophyceae (c) Bacillariophyceae (d) Phaeophyceae
12. Seaweeds are used as
(a) food (b) fodder (c) **food and fodder** (d) none of these
13. The botanical name of dulse is
(a) ***Rhodymenia palmata*** (b) *Sargassum* (c) *Laminaria* (d) none of the above
14. One of the antibiotic obtained from an alga is
(a) **Chlorellin** (b) Streptomycin (c) Terramycin (d) none of these
15. Following seaweed is best exploited for extraction of iodine
(a) **Kelps** (b) Sea grasses (c) Diatoms (d) Dinoflagellates
16. Alginates are
(a) proteins (b) **carbohydrates** (c) fats (d) lipid

UNIT III

1. Which among the following is also known as bog moss?
(a) *Riccia* (b) ***Sphagnum*** (c) *Marchantia* (d) *Funaria*
2. In some of the liverworts, spore dispersal is aided by
(a) **elaters** (b) peristome teeth (c) indusium (d) calyptra

3. Peat moss is used for transporting plants to distant places because
 (a) **it is hygroscopic** (b) it reduces transpiration
 (c) it is easily available (d) it serves as a disinfectant
4. Find the true statement about bryophytes
 (a) they have chloroplasts (b) they have archegonia
 (c) they are thalloid (d) **all of the above**
5. In mosses, meiosis takes place during
 (a) gamete formation (b) antheridia and archegonia formation
 (c) spore germination (d) **spore formation**
6. A characteristic feature of bryophytes is
 (a) a dominant and parasitic sporophyte
 (b) a dominant and spore-producing gametophyte
 (c) **a small sporophyte phase, which is dependent on the gametophyte**
 (d) sporophytes stay for a longer duration
7. All the plants like fern and mosses, which produce spores are grouped under
 (a) bryophytes (b) **cryptogams** (c) thallophytes (d) sporophytes
8. The basal swollen portion of the archegonium is:
 (a) **Venter** (b) Neck (c) Jacket (d) Oospere
9. Which plant does belong to Hepaticopsida?
 (a) *Funaria* (b) *Polytrichum* (c) *Porella* (d) ***Riccia***
10. Which plant does belong to Anthoceroopsida?
 (a) *Funaria* (b) *Polytrichum* (c) *Porella* (d) ***Anthoceros***
11. Function of elaters is
 (a) Absorption of food (b) Conduction of sap
 (c) **Spore dispersal** (d) To provide support
12. Bryophytes are dependent on water because
 (a) Archegonium has to remain filled with water for fertilization
 (b) Water is essential for fertilization for their homosporous nature
 (c) Water is essential for their vegetative propagation
 (d) **The sperms can easily reach upto egg in the archegonium**
13. Dichotomous branching is found in
 (a) Fern (b) *Funaria* (c) **Liverworts** (d) *Marchantia*
14. Which of the following is true about bryophytes
 (a) They possess archegonia (b) They contain chloroplast
 (c) They are thalloid (d) **All of these**

15. Bryophytes comprise
 (a) Sporophyte is of longer duration
 (b) Dominant phase of sporophyte which is parasitic
 (c) Dominant phase of gametophyte which produces spores
 (d) **Small sporophyte phase and generally parasitic on gametophyte**
16. Which place in India is called "The Golden Mine of Liverworts"
 (a) Eastern Himalayas (b) **Western Himalayas**
 (c) Western Ghats (d) Eastern Ghats
17. Saprophytic bryophyte is
 (a) ***Buxbaumia aphylla*** (b) *Ricciocarpus natans*
 (c) *Riccia fluitans* (d) *Radula sp*
18. The evidence for aquatic origin of bryophytes is
 (a) **Ciliated sperms** (b) Green colour
 (c) Protonema thread (d) Some are still aquatic
19. Gemmae are vegetative reproductive structures found in
 (a) Angiosperms (b) **Bryophytes** (c) Algae (d) Gymnosperms
20. Bryophytes can be separated from algae, because they
 (a) Are thalloid forms (b) Have no conducting tissue
 (c) **Possess archegonia** (d) Contain chloroplast
21. Last stage of gametophytic generation is
 (a) **Gametes** (b) Zygote (c) Spore mother cells (d) Spores
22. Marchantiales belongs to the class
 (a) Bryopsida (b) **Hepaticopsida** (c) Anthocerotopsida (d) Bryidae
23. Bryophytes are
 (a) **amphibious plants** (b) hydrophytes (c) terrestrial plants (d) aquatic plants
24. The simplest sporophyte is found in
 (a) ***Riccia*** (b) *Marchantia* (c) *Anthoceros* (d) *Polytrichum*
25. Which of the following has only capsule in its sporophyte?
 (a) ***Riccia*** (b) *Marchantia* (c) *Anthoceros* (d) *Polytrichum*
26. Spores are liberated from the sporangium by the decay of gametophyte in
 (a) ***Riccia*** (b) *Marchantia* (c) *Anthoceros* (d) *Porella*
27. Elaters are not found in
 (a) *Riccia* (b) ***Marchantia*** (c) *Pellia* (d) *Porella*
28. Barrel shaped air pores are found in

- (a) *Riccia* (b) *Marchantia* (c) *Pellia* (d) *Anthoceros*
29. Female sex organs in *Marchantia* are borne on
(a) elaterophore (b) sterile tissue (c) antheridiophore (d) **archegoniophore**
30. Basal elaterophore is found in the capsule of
(a) ***Pellia*** (b) *Marchantia* (c) *Anthoceros* (d) *Polytrichum*
31. Which of the following is a leafy member of Metzgeiales?
(a) ***Fossombronia*** (b) *Riccardia* (c) *Anthoceros* (d) *Polytrichum*
32. Meristematic tissue is present in the sporophyte of
(a) *Riccia* (b) *Marchantia* (c) ***Anthoceros*** (d) *Polytrichum*
33. An endophytic alga present in the thallus of *Anthoceros*
(a) ***Nostoc*** (b) *Chlorella* (c) *Chlamydomonas* (d) *Oscillatoria*
34. Name a bryophyte in which the cells of the thallus have chloroplast with pyrenoid
(a) *Riccia* (b) *Porella* (c) *Pellia* (d) ***Anthoceros***
35. Retort cells are present in
(a) *Porella* (b) ***Sphagnum*** (c) *Anthoceros* (d) *Pogonatum*
36. The pseudopodium present at the base of sporophyte in *Sphagnum* is
(a) **elongated part of archegonial axis** (b) basal part of the foot of the sporophyte
(c) part of the seta of the sporophyte (d) part of the seta and foot
37. Peat moss is the common name for
(a) *Funaria* (b) *Pogonatum* (c) *Polytrichum* (d) ***Sphagnum***
38. In *Sphagnum* the spore sac is
(a) spindle shaped (b) arc shaped (c) **dome shaped** (d) disc shaped
39. The presence of smooth walled and tuberculate rhizoids is the characteristic features of
(a) anthocerotales (b) sphagnales (c) **marchantiales** (d) polytrichales
40. Reduction division in bryophytes takes place during the
(a) germination of zygote (b) formation of capsule
(c) **formation of spores from spore mother cells** (d) germination of spores
41. The sporogonium in Jungermanniales lacks
(a) foot (b) seta (c) capsule (d) **stomata**
42. The capsule of *Pellia* dehises into
(a) **4 valves** (b) 2 valves (c) 5 valves (d) 6 valves

43. The under leaves in the Jungermanniales are known as
 (a) antical lobe (b) postical lobe (c) **amphigastria** (d) scale leaves
44. Divergent and drooping branches are present in the gametophyte of
 (a) **Sphagnum** (b) *Porella* (c) *Anthoceros* (d) *Polytrichum*
45. In *Polytrichum* the spore liberation is regulated by
 (a) operculum (b) columella (c) **peristome** (d) annulus
46. *Anthoceros* is commonly known as
 (a) stoneworts (b) **hornworts** (c) peatmoss (d) hairy cap moss

UNIT IV

1. This fungi division includes 'Club fungi'
 (a) Zygomycota (b) Deuteromycota (c) **Basidiomycota** (d) Ascomycota
2. This group is used to represent pathological fungi
 (a) Penicillium (b) Truffles, mushrooms and morels
 (c) **Smuts, rusts and moulds** (d) All of the above
3. The fungi which derive their food directly from dead organic matter are known as
 (a) Predators (b) **Decomposers** (c) Mutualists (d) Parasitic fungi
4. What is the name of the special hyphal tips through which parasitic fungi absorb nutrients directly from the cytoplasm of the living host?
 (a) **Haustoria** (b) Mildew (c) Constricting ring (d) All of the above
5. What does 'Perfect stage' of a fungus indicate?
 (a) indicates that it can reproduce asexually
 (b) indicates that it is perfectly healthy
 (c) **indicates that it is able to form perfect sexual spores**
 (d) All of the above
6. Death angel/death cap (*Amanita*) and Jack O Lantern mushroom are all examples of
 (a) **Poisonous mushrooms** (b) Edible mushrooms
 (c) None of the above (d) Both (a) and (b)
7. Absorptive heterotrophic nutrition is exhibited by
 (a) Algae (b) **Fungi** (c) Bryophytes (d) Pteridophytes
8. Mycorrhiza exhibits the phenomenon of
 (a) Parasitism (b) **Symbiosis** (c) Antagonism (d) Endemism
9. Which of the following secretes toxins during storage conditions of crop plants?

(a) *Aspergillus* (b) *Penicillium* (c) *Fusarium* (d) **A and B**

10. Which of the following environmental conditions are essential for optimum growth of *Mucor* on a piece of bread?

- A. Temperature of about 25° C B. Temperature of about 5° C
C. Relative humidity of about 5% D. Relative humidity of about 95%
E. A shady place F. A brightly illuminated place

Choose the answer from the following options?

- (a) B, C and F (b) A, C and E (c) **A, D and E** (d) B, D and E

11. Ergot of rye is caused by a species of

- (a) *Uncinula* (b) *Ustilago* (c) ***Claviceps*** (d) *Phytophthora*

12. Which pair of the following belongs to basidiomycetes?

- (a) Puffballs and *Claviceps* (b) *Peziza* and stinkhorns
(c) *Morchella* and *Aspergillus* (d) **Birds nest fungi and puffballs**

13. Bekanae disease was due to

- (a) Fungi toxin (b) **Growth hormones released by fungal infection**
(c) Inadequate nutrients (d) Change in photoperiods

14. Zygosporangium is formed from

- (a) **Gametangial copulation** (b) Gametic union
(c) Zygote (d) Oogamy

15. Which is not true for fungi

- (a) saprophytic (b) multicellular (c) **photosynthetic** (d) anaerobic

16. Which of the following is an edible 'Fungi'?

- (a) *Mucor* (b) *Penicillium* (c) ***Agaricus*** (d) *Rhizopus*

17. Which of the following fungi is found useful in the biological control of plant disease

- (a) *Penicillium notatum* (b) *Phytophthora parasitica*
(c) *Mucor mucido* (d) ***Trichoderma viridae***

18. Clamp connection is found in

- (a) **Basidiomycetes** (b) Ascomycetes
(c) Zygomycetes (d) Myxomycetes

19. The chemical produced by the host plant to protect themselves against fungal infection is

- (a) Toxin (b) **Phytoalexin** (c) Phytotoxin (d) Hormone

20. Parasexuality was first discovered in

- (a) Bacteria (b) Virus (c) **Fungi** (d) None of these
21. Fungal flagellum originates from
 (a) Dictyosome (b) **Kinetosome**
 (c) Glyoxisomes (d) Oxysomes
22. Citric acid is produced by
 (a) *Aspergillus niger* (b) *Candida*
 (c) *Penicillium notatum* (d) *Acetobacter xylinum*
23. Dolipore septum is characteristic to
 (a) Ascomycetes (b) **Basidiomycetes** (c) Oomycetes (d) Chytridiomycetes
24. Closed ascocarp is
 (a) **cleistothecium** (b) apothecium (c) perithecium (d) hypothecium
25. Which of the following spores is the result of asexual reproduction?
 (a) **sporangiospores** (b) zygospores (c) ascospores (d) basidiospores
26. The difference between septate hyphae and nonseptate hyphae is
 (a) a difference in haploid and diploid cells.
 (b) a distinction between saprotrophic fungi and parasitic or disease-causing fungi.
 (c) **determined by whether the hyphae have cross walls or lack cross walls.**
 (d) a distinction between sexual and asexual reproduction.
27. Dikaryotic cells of fungi
 (a) are just another form of haploid cells.
 (b) are just another name for diploid cells.
 (c) **contain two haploid nuclei but fail to fuse them for an extended time period.**
 (d) are nonseptate plasmodial masses with many nuclei and no cell partitioning.
28. An individual filament of a fungus, with an elongated mass of cytoplasm, is called
 (a) a mycelium. (b) a conidium. (c) a basidiospore. (d) **a hypha**
29. A dormant fungal structure that can survive unfavorable growing conditions is the
 (a) sporangium (b) ascocarp (c) basidium. (d) **zygospore**
30. The coprophilic fungi inhabit
 (a) **dung substratum** (b) dead wood (c) decaying leaves (d) food articles
31. Which of the following is not involved in the production of sexual spores in fungi
 (a) meiosis (b) nuclear fusion
 (c) **fragmentation** (d) nuclear fusion and meiosis

32. Fungi are not_____.
- (a) heterotrophs (b) multicellular (c) **prokaryotic** (d) unicellular
33. The plasmodium is always
- (a) haploid (b) **diploid** (c) triploid (d) tetraploid
34. The somatic phase in a myxomycetes fungus is called
- (a) hypha (b) mycelium (c) **plasmodium** (d) plectenchyma
35. Myxomycetes fungi are also known as
- (a) **slime molds** (b) bread molds (c) balck molds (d) blue molds
36. The nutrition in slime molds is
- (a) autotrophic (b) heterptrophic (c) holozoic (d) **holocarpic**
37. Heterothallism was discovered by
- (a) E.J. Butler (b) J.H. Craigie (c) **A.F. Blackeslee** (d) B.B. Mulleur
38. The mode of nutrition in *Pilobolus*
- (a) **saprophytic** (b) parasitic (c) symbiotic (d) autotrophic
39. The type of sexual reproduction in zygomycetes is
- (a) plasmogametic fusion (b) somatogamy
- (c) **gametangial copulation** (d) gametangial contact
40. A fungus producing eight spores in a sac like structure should rightly be placed in
- (a) Phycomycetes (b) **Ascomycetes** (c) Basidiomycetes (d) Deuteromycetes
41. Stroma is
- (a) **compact somatic hyphae with fruit bodies**
- (b) loosely inter-woven hyphae (c) small hyphal branches (d) a group of spores
42. The protective covering of sterile hyphae around ascocarp is known as
- (a) **peridium** (b) pericarp (c) appendage (d) epidermis
43. An ascocarp which is flask shaped with ostiole is
- (a) apothecium (b) **perithecium** (c) cleistothecium (d) hypothecium
44. Perfect stage of fungus implies that
- (a) the fungus is perfectly healthy (b) the fungus reproduces asexually
- (c) **the fungus reproduces sexually** (d) the fungus produces resting spores
45. The number of basidiospores produced on each basidium is
- (a) 2 (b) **4** (c) 6 (d) 8

46. Parasexual like cycle was discovered by

- (a) **Pontecarvo and Roper** (b) Blakslee (c) Alexander Fleming (d) Butler

47. Which of the following are wood rotters

- (a) *Agaricus* (b) ***Polyporus*** (c) *Marchella* (d) *Mucor*

48. Fungal hyphae are capable of indefinite growth under

- (a) all conditions (b) **favorable conditions**
(c) unfavorable conditions (d) None of the above

49. **Assertion (A):** Cytologists, geneticists, and biochemists have found that fungi can be important research tools in the study of fundamental biological processes.

Reason (B): rapidity with which some fungi grow and reproduce, a much shorter time is required to obtain a number of generations of fungi than of plants or animals.

- (a) (A) is correct (B) is incorrect
(b) (A) and (B) is incorrect
(c) **(A) is correct (B) is the explanation of (A)**
(d) (A) is correct (B) is not the explanation of (A)

50. Geneticists and biochemists use _____ as an experimental tool.

- (a) *Saccharomyces* (b) *Rhizopus* (c) ***Neurospora*** (d) *Penicillium*

51. _____ is an excellent experimental organism for the study of DNA synthesis, the mitotic cycle, morphogenesis.

- (a) *Saccharomyces cerevisiae* (b) ***Physarum polycephalum***
(c) *Rhizopus nigricans* (d) *Penicillium notatum*

52. Each of the filaments of fungi is known as a _____

- (a) **Hypha** (b) Mycelium (c) Thallus (d) Coenocytic

53. The mass of hyphae constituting the thallus of a fungus is called the

- (a) Hypha (b) **Mycelium** (c) Thallus (d) Coenocytic

54. **Assertion (A):** Light plays an important part in spore dispersal

Reason (B): The spore-bearing organs of many fungi are positively phototropic and discharge their spores toward the light.

- (a) (A) is correct (B) is incorrect
(b) (A) and (B) is incorrect
(c) **(A) is correct (B) is the explanation of (A)**
(d) (A) is correct (B) is not the explanation of (A)

55. Fungi having regularly septate hyphae a small densely staining or refractive body known as _____ found near the hyphal apex.

- (a) Lipid (b) Glycogen (c) Dolipore (d) **Spitzenkorper**

56. Fungi usually store excess food in the form of _____
 (a) Sucrose (b) **Glycogen / Lipid** (c) Dolipore (d) Spitzenkorper
57. The reproductive organs arise from only a portion of the thallus, while the remainder continues its normal somatic activities called _____.
 (a) **Eucarpic** (b) Holocarpic (c) Coenocytic (d) Heterothallic
58. The hyphae may break up into their component cells that behave as spores known as _____.
 (a) Conidia (b) Zoospores (c) Chlamydo spores (d) **Arthrospores**
59. The most common method of asexual reproduction in fungi is by means of _____.
 (a) **Spores** (b) Copulation (c) Fragmentation (d) Budding
60. _____ is a sac-like structure whose entire contents are converted through cleavage into one or more, usually many, spores.
 (a) Conidia (b) **Sporangium** (c) Perithecium (d) Apothecium
61. The motile sporangiospores are called _____.
 (a) **Zoospores** (b) Aplanospores (c) Chlamydo spores (d) Arthrospore
62. Plasmogamy resulting in a binucleate cell containing one nucleus from each parent is called _____.
 (a) Monokaryotic (b) **Dikaryon** (c) Homothallic (d) Heterothallic
63. Haploid thallus alternates with a diploid, the life cycle is called _____.
 (a) **Diplobiontic** (b) Haplobiontic (c) Haplodiplontic (d) Diplohaplontic
64. The sex organs of fungi are called _____.
 (a) Sporangium (b) Sporangiospores (c) Zoospores (d) **Gametangia**
65. The mode of nutrition in *Rhizopus*, Yeast and *Penicillium* is
 (a) Parasitic (b) **Saprophytic** (c) Symbiotic (d) Autotrophic

UNIT V

1. Most of the scientists deem the algal-fungal relationship in lichens as helotism. Helotism is a
 (a) master-master relationship (b) **master-slave relationship**
 (c) a kind of mutualism (d) a kind of symbiotic association
2. The symbiotic association of algae and fungi is known as
 (a) Mycorrhiza (b) **lichen** (c) Mycoplasma (d) Both (a) and (b)
3. Vegetative reproduction in lichens takes place by
 (a) isidia (b) soredia (c) fragmentation (d) **all of the above**
4. In the studies on the atmospheric pollution, lichens are important as they

- (a) can readily multiply in polluted atmosphere
(b) are very sensitive to pollutants
(c) efficiently purify the atmosphere
(d) can also be grown in greatly polluted atmosphere
5. This lichen is pioneer in xerosere
(a) fruticose lichen (b) foliose lichen (c) **crustose lichen** (d) leprose lichen
6. A common phycobiont in lichens are
(a) *Cetraria* (b) *Oscillatoria* (c) ***Trebouxia*** (d) *Oedogonium*
7. Reindeer moss is a lichen known as
(a) *Usnea* (b) *Rocella* (c) ***Cladonia*** (d) *Parmelia*
8. Lichens are ecologically important as they
(a) Purify air (b) **Are pioneers of barren rocks**
(c) Are symbionts of algae and fungi (d) Are associated with mycorrhizal roots
9. Association of fungus with roots of tracheophytes is
(a) **Mycorrhiza** (b) Commensalism (c) Helotism (d) Amensalism
10. Fungus/Lichens which grow on wood is
(a) Terricolous (b) Saxicolous (c) **Lignicolous** (d) Corticolous
11. Litmus is obtained from
(a) **Lichen** (b) Algae (c) Fungi (d) Protozoa
12. Lichens which seems to be something painted on the rocks is
(a) **Crustose** (b) Foliose (c) Fruticose (d) Mycobiont
13. Most of the lichens consist of
(a) **Green algae and ascomycetes** (b) Brown algae and higher plant
(c) Blue green algae and basidiomycetes (d) Red algae and ascomycetes
14. Which one of the following statement about lichens is wrong?
(a) **These grow very rapidly (2 cm per day)**
(b) They show fungal and algal symbiotic relationships
(c) Some of its species are eaten by reindeers
(d) These are pollution indicators
15. Lichens are a well-known combination of an alga and a fungus where fungus has
(a) A saprophytic relationship with the alga (b) An epiphytic relationship with the alga
(c) A parasitic relationship with alga (d) **A symbiotic relationship with alga**
16. There exists a close association between the alga and the fungus within lichen. The fungus
(a) **Provides protection, anchorage and absorption for the algae**
(b) Provides food for the alga
(c) Fixes the atmospheric nitrogen for the alga

(d) Releases oxygen for the alga

17. Which of these entities is an indicator of the SO₂ pollution of air?

(a) Puffballs (b) Mushrooms (c) Mosses (d) **Lichens**

18. Lichens indicate SO₂ pollution because of they

(a) show association between algae and fungi (b) grow faster than others
(c) **are sensitive to SO₂** (d) flourish in SO₂ rich environment

SECTION B

UNIT I

1. Define Coenobium with example
2. Give an account in reproduction in cyanophyceae
3. Polyhedral bodies in cyanophyceae
4. Distinguish haplontic and diplontic life cycle with examples
5. Outline the graphic representation of diplohaplontic life cycle
6. Differentiate between non-tubular hairs and tubular hairs
7. Chromatophores
8. Flagella
9. Chlamydo spores
10. Coenobium
11. Hormogones
12. Heterocyst
13. Auxospore
14. Phycobilisome
15. Dendroid habit
16. Trumpet hyphae
17. Aplanospores
18. Palmelloid form
19. Eye spot

UNIT II

1. General characteristics of chlorophyceae
2. What are zoospores?

3. Comment on rhizomorphs
4. What is the role of tetrapolar multiple allele heterothallism?
5. Write the significance of parasexual cycle
6. Write notes in thallus organisation of phaeophyceae
7. Cystocarp in Rhodophyceae
8. List out the uses of agar – agar
9. Name the different classes of algae based on Fritsch's classification.
10. Write the pigment and reserve food of class cyanophyceae.
11. List out the algae used as food
12. What is Phycocolloid?

UNIT III

1. Differentiate smooth walled rhizoids from tuberculate rhizoids with labelled sketches
2. What is gemmae
3. Why bryophytes are called amphibians of plant kingdom?
4. What are elaters ?
5. Distinguish liverworts and hornworts
6. What is oogamy?
7. Define homosporous
8. Give the distinguishing characters of Jungermanniales acrogynae and anacrogynae.
9. Write the various theories on origin of Bryophytes
10. List the uses of Peat moss
11. Distinguish between anthocerotopsida and bryopsida?
12. Why do Anthocerotopsida nick named as horn worts
13. Write any two similarity between bryophytes and alga
14. Why bryophytes are called as 'the amphibians of plant kingdom'?
15. What is monoecious?
16. Define dioecious
17. What is amphigastria?
18. What are quaking bogs?
19. What are Hydroids

20. What are leptoids
21. Protonema
22. Peristome
23. Gemma cup
24. Retort cells
25. Antheridiophore
26. Smooth Rhizoids
27. Elaterophore
28. Scales

UNIT IV

1. Dolipore septum
2. Septate mycelium
3. Plurilocular sporangium
4. Coenocytic condition
5. Plectenchyma
6. Prosenchyma
7. Write the somatic variations in myxomycetes
8. Distinguish apothecium and cleistothecium
9. What are woronin bodies?
10. Differentiate Phragmobasidia and holobasidia
11. What is mycorrhiza?
12. Differentiate between facultative and obligate parasites. Give one example each.
13. What are sclerotia and rhizomorph?
14. What is facultative parasite? Give one example.
15. Distinguish between appressorium and infection thread.
16. What are conidiospores?
17. Heterokaryotic mycelium
18. Conidia
19. Zoospore
20. Aplanospore

21. Holocarpic
22. Eucarpic
23. Obligate saprophyte
24. Pycnidia
25. Chlamydospore
26. Oidia
27. Fragmentation
28. Binary fission
29. Budding
30. Heterotrophic
31. Haustoria
32. Homothallic
33. Heterokaryosis
34. Heterothallic fungi
35. Parasexuality
36. Mycelium
37. Obligate parasite
38. Heterothallism in fungi
39. Plasmogamy
40. Cleistothecium
41. Basidium
42. Ascus
43. Perithecium
44. Ascocarp

UNIT V

1. Define heliotism
2. What is Foliose lichen?
3. Define phycobionts
4. What are mycobionts?

5. Name any two Cyanophycean algae associated with lichen
6. Name the lichen used as flavouring agent?
7. What are reindeer moss
8. Why lichens are called pollution indicators?
9. Give the reasons for lichens pioneer of colonization.
10. What is the role of lichen in soil formation

SECTION C

UNIT I

1. Who is the father of Indian Algology? Mention his contribution in Phycology?
2. With neat diagram mention the types of sexual reproduction in algae
3. Mention the differences between haplontic and diplontic life cycle
4. Give an account on reserved food materials in algae.
5. Write short notes on reserve foods in algae.
6. Write notes on haplontic life cycle with an example
7. Give a brief account on diplontic life cycle in algae.

UNIT II

1. Write an account on different types of life cycle pattern in algae
2. Give an account on thallus organization in Phaeophyceae
3. List out the industrial applications of algae
4. Write short notes on post fertilization changes in Rhodophyceae
5. Describe the range of thallus structure in Phaeophyceae.
6. Discuss the range of thallus structure in Cyanophyceae.
7. Write the morphological structure of diatoms.
8. Illustrate auxospore formation in Bacillariophyceae.
9. Write a note on general features of Cyanophyceae.
10. Write a short note on salient features of Rhodophyceae.
11. Describe any four types of chloroplasts in green algae with examples
12. Explain the methods of reproduction in Cyanophyceae

UNIT III

1. Write notes on the economic importance of bryophytes
2. Discuss on the theories on origin of bryophytes
3. Write the vegetative characters of Sphagnales
4. Give the general characters of anthocerotales
5. Discuss why polytrichales are considered as advanced bryophytes
6. Give an account on alternation of generation in Bryophytes.
7. Explain the vegetative reproduction in Sphagnales
8. Mention the general characteristics of polytrichales.
9. Write briefly about the classification of Bryophytes by Rothmaler
10. Describe the structure of sporophyte of *Sphagnum*.
11. Describe the gemma cup of *Marchantia*.
12. Explain the internal structure of leaf of *Polytrichum*
13. Explain the structure of archegonial branch of a *Polytrichum*
14. Describe the structure of sporophyte of *Anthoceros*
15. Explain the variation in the mechanism of spore dispersal in Marchantiales

UNIT IV

1. Discuss the nutritional types in fungi
2. Write the asexual methods of reproduction in fungi
3. Write the various types of fungal hyphal tissues/ modifications
4. Describe the various fructification seen in Ascomycetes with labelled diagrams?
5. Write the distinctive features of zygomycetes
6. Give detailed account on fructification in basidiomycetes
7. Write on Heterothallism in fungi
8. What is parasexuality? Discuss the role of parasexuality in fungi
9. Role of fungi in medical industry
10. Give a brief account on the somatic structure of fungi.
11. Write an account on different types of ascocarp.
12. Illustrate asexual reproduction in fungi.
13. Write short notes on septa in fungi.

14. Explain parasexuality in fungi.
15. List the general characters of Deuteromycetes.

UNIT V

1. Explain the various types of reproduction in lichens
2. Discuss on lichens as pollution indicators
3. Write the role of lichens as pioneers of colonization
4. Give an account on the economic importance of lichens

SECTION D

UNIT I

1. Write an essay on classification of algae by Fritsch.
2. Give the contribution of different algologists in India
3. Discuss on the economic importance of algae
4. Give an detailed account on eukaryotic alga and their cell components
5. Describe the ultra structure of a Cyanophycean cell with labelled diagrams ?
6. Write an essay on reproduction in Algae.
7. Write an essay on life cycle patterns in Algae.
8. What is alternation of generation? Explain it with citing suitable examples from algae.

UNIT II

1. Write the different life cycle patterns in algae
2. What are the different types of thallus organization seen in algae
3. Give the general characters of Bacillariophyceae
4. Distinguish the characters of phaeophyceae and rhodophyceae
5. Write an account of general characters of Chlorophyceae.
6. Give an account of general characters of Cyanophyceae.
7. With suitable examples, discuss the post fertilization changes in Rhodophyceae.
8. Write an essay on thallus organization in green algae.
9. Write an account on salient features of Pheaophyceae.
10. Give the characteristic features of Bacillariophyceae

UNIT III

1. Brief the spore dispersal mechanism in bryophytes.
2. Give the classification of Bryophytes by Rothmaler (1951)
3. Discuss on the life cycle of anthocerotales
4. Write the alternation of generation in Marchantiales
5. Write the various theories on bryophytes origin
6. Describe the general characters of Anthocerotales.
7. Compare the sporophytes of marchantiales and jungermanniales
8. Give a detailed account on vegetative reproduction in bryophytes.
9. Give an account on the life cycle of *Sphagnum*.
10. Explain the spore dispersal mechanism in bryophytes.
11. Compare the gametophytes of *Sphagnales* with Polytrichales.
12. Explain the position and structural variation in archegonia of Bryophytes you have studied.
13. Discuss the reproduction in marchantiales
14. Discuss the gametophytic variations in marchantiales.

UNIT IV

1. Brief the classification of fungi based on Alexopoulos and Mims (1979).
2. Give an account on the various economic importance of fungi
3. Discuss on heterothallism in fungi
4. Write the various types of fructification seen in fungi
5. With illustrations explain the sexual reproduction in fungi.
6. Describe the stages of sexual reproduction in ascomycetes.
7. Discuss the salient features of mastigomycotina.
8. Give a detailed account on structure and reproduction of Zygomycetes.
9. Describe the structure and reproduction in Myxomycetes
10. With suitable sketches describe various kinds of ascocarps.
11. Discuss heterothallism in fungi.

12. Explain the distinguishing characters and reproduction of the class Basidiomycetes.
13. Write an essay on the parasexuality in fungi.

UNIT V

1. Classify lichens based on habit, fungal partner, thallus structure and distribution of fungal and algal component
2. Discuss on the economic importance of lichens
3. Write an account on the various types of reproduction in lichens
4. Give an account on the inter-relationship of Phycobionts and Mycobionts

ST. MARY'S COLLEGE (Autonomous), THOOTHUKUDI
I M. Sc Botany – Semester I
Core II – Plant Microbe interaction - Course code: 21PBOC12

Section A

Unit I

1. Anthracis was isolated by
(a) Louis Pasteur (b) **Robert Koch** (c) Anton van Leewenhoek (d) Edward Jenner
2. Streptomycin is a aminoglycoside antibiotic derived from
(a) *Xanthomonas citri* (b) *Staphylococcus aureus* (c) ***Streptomyces griseus***
(d) *Pseudomonas denitrificans*
3. Which of the following antibiotics functions as cell wall inhibitors?
(a) **Penicillin** (b) Tetracycline (c) Streptomycin (d) sulfonamides
4. Which of the following is a direct measurement of growth?
(a) Determination of nitrogen content (b) **Determination of Dry weight of cells**
(c) Turbidimetric methods (d) Measurement of a specific chemical change
5. What was the first invention of Leeuwenhoek?
(a) Incubator (b) Hot Air Oven (c) Colony Counter (d) **Microscope**
6. Penicillin is produced by the fungus _____ and _____
(a) *Penicillium notatum* (b) *Pencillium chrysogenum* (c) **Both (a) and (b)** (d) None of the Above
7. The antibiotic streptomycin was isolated from
(a) *Salmonella typhi* (b) ***Streptomyces griseus*** (c) *Penicillium notatum*
(d) *Pencillium chrysogenum*
8. Which antibiotic was first time demonstrated by Fleming (1929)?
(a) **Penicillin** (b) Streptomycin (c) Tetracycline (d) Gliotioxin
9. Penicillin is effective for
(a) **Gram positive bacteria** (b) Gram negative bacteria (c) Both gram positive and gram negative bacteria (d) Acid-fast bacteria

10. Who discovered *Mycobacterium tuberculosis*?

- (a) Louis Pasteur (b) **Robert Koch** (c) Anton van Leewenhoek (d) Edward Jenner

Unit II

1. A portion of a pathogen which is capable of infecting host is known as

- (a) Parasite (b) **Inoculum** (c) Immune (d) Infection

2. Diseases which are natural to one country or part of earth is referred as

- (a) Epidemic (b) **Endemic** (c) Pandemic (d) Sporadic

3. Which of the following choices lists the steps of pathogenesis in the correct order?

- (a) invasion, infection, adhesion, exposure (b) adhesion, exposure, infection, invasion
(c) **exposure, adhesion, invasion, infection** (d) disease, infection, exposure, invasion

4. IPM stands for _____

- (a) **Integrated Pest Management** (b) Integrated Project Management
(c) Integrated Power Management (d) Integrated Pack Management

5. _____ is the study of microorganisms and environmental factors that cause diseases in Plants

- (a) Microbiology (b) **Plant Pathology** (c) Phycology (d) Mycology

6. _____ dissemination occurs at short distances and related to the dispersal of pathogen in a given geographical unit

- (a) Discontinuous dissemination (b) **Continuous dissemination** (c) Both (a) and (b)
(d) None of the above

7. Factors responsible for disease occurrence

- (a) Host and pathogen (b) Susceptible host and pathogen (c) **Susceptible host, virulent pathogen and favourable environment** (d) Susceptible host and virulent pathogen

8. Who is also known as the 'Father of Plant Pathology' in India?

- (a) **E.J. Bulter** (b) Alexander Fleming (c) Louis Pasteur (d) Edward Jenner

9. Etiology means

- (a) **Cause of disease** (b) Removal of disease (c) Disease management (d) Pest management
10. An organism that lives on or within another organism on which it is metabolically dependent is called a
(a) Host (b) **Parasite** (c) Commensal (d) Pathogen
11. When a parasite is growing and multiplying within or on a host, the host is said to have
(a) A vector (b) Pathogenicity (c) **An infection** (d) A symptom
12. Any organism or agent that produces a disease is known as a
(a) **Pathogen** (b) Vector (c) Reservoir (d) commensal
13. The degree or intensity of pathogenicity is known as
(a) Latency (b) Infective capacity (c) **Virulence** (d) Infection

Unit III

1. Which of the following is not the symptom of bacterial disease?
(a) Tumor and gall (b) Blight (c) Canker (d) **Mosaic**
2. Identify the disease which is known as Black arm?
(a) Citrus canker (b) Late blight of potato (c) **Angular leaf of cotton** (d) Wilt of potato
3. Which bacteria cause Citrus Canker?
(a) *Agrobacterium* (b) ***Xanthomonas*** (c) *Serratia* (d) *Salmonella*
4. Which one of the following disease is caused by bacteria?
(a) Rust of wheat (b) **Tundu disease of wheat** (c) Yellow vein mosaic of bhindi
(d) Leaf roll of Potato
5. A dead area in the bark or cortex of stem especially of woody plants is called _____
(a) Spot (b) Die-back (c) **Canker** (d) Scorch
6. Tundu disease of wheat is due to infection caused by
(a) Nematodes and fungi (b) Fungi and bacteria (c) Nematodes and bacteria
(d) Algae and fungi
7. Tundu disease of wheat is otherwise called as
(a) yellow ear rot (b) black rot (c) ring rot (d) fungal rot of ear

8. Citrus canker was originate from
 (a) **South China** (b) England (c) Japan (d) Philippines
9. Which of the antibiotics is effective in controlling citrus canker?
 (a) Pencillin (b) **Streptomycin** (c) Tetracyclin (d) Amphicilin
10. Angular leaf spot of disease is caused by
 (a) Virus (b) Fungi (c) **Bacteria** (d) Protozoa

Unit IV

1. All fungi are
 (a) autotrophic (b) lithotrophic (c) **heterotrophic** (d) chemotrophic
2. Which disease shows the symptoms of stunted with smaller leaves and bolls?
 (a) **Wilt of cotton** (b) Bunchy top of Banana (c) Citrus Canker
 (d) Tundu disease of wheat
3. In which plant disease does white mildew appear typically on underside of leaves?
 (a) Angular leaf spot (b) Bacterial blight (c) Canker (d) **Downy mildew**
4. The biological source of ergot is _____ of *Claviceps*
 (a) Leaves (b) Fruits (c) Roots (d) **Dried sclerotinum**
5. Downy mildew of grapes is caused by :-
 (a) *Plasmopara halstedii* (b) *Plasmopara viticola* (c) *Peronospora destructor*
 (d) *Peronospora effuse*
6. When the animals or human beings consume ergot contaminated grains or flour a serious disease occurs which is _____
 (a) Ergotism (St. Anthony's fire) (b) Itching (c) **Both A and B** (d) Blood coagulation
7. Dinocap (methyl heptyl dinitrophenyl crotonate) is sold in market as—
 (a) Bravo (b) Dexon (c) Botron (d) **Karathane**
8. 'Fungi and Plant Diseases' was written by—
 (a) BB Mundakur (b) JF Dastur (c) G **Rangaswami** (d) KC Mehta
9. Downy mildew of grapes was first time reported in India from—
 (a) Punjab (b) Tamil Nadu (c) **Maharashtra** (d) Uttar Pradesh
10. The disease ergot of rye produces sclerotia is caused by—
 (a) *Claviceps purpurea* (b) *C. fusiformis* (c) *Claviceps sativae* (d) All of these

Unit V

1. Ekatox or Rogor is a
(a) Herbicides (b) Aphids (c) **Insecticides** (d) Antibiotic
2. Yellow vein mosaic of bhindi was first reported by
(a) **kulkarni** (b) Thodas (c) Sudras (d) Pandiyas
3. Bunchy top of banana disease is transmitted by the aphid vector
(a) ***Pentalonia nigronervosa*** (b) *Aphis crosypic* (c) *Myzus persiae* (d) *Toxoplorecitricida*
4. The common viral disease of Papaya is
(a) Leaf canker (b) Leaf mosaic (c) **Leafcurl** (d) Leaf blight
5. Viruses are mainly transmitted by:-
(a) **Insects** (b) Fungi (c) Bacteria (d) Nematodes
6. Bunchy top of banana plant disease is caused due to:
(a) Bacteria (b) Fungus (c) **Virus** (d) None of the above
7. Which of the following is not a method by which a virus enters a healthy host?
(a) By vectors (b) **Meristem** (c) Infected fungal spores (d) Through wounds
8. Which of the following is not a common measure of controlling viral infections?
(a) Using healthy virus-free seeds (b) **Antibiotics** (c) Using resistant varieties
(d) Protection from insect vectors
9. Which of the following group of viruses generally attack plants?
(a) Retroviruses (b) **Riboviruses** (c) Rheoviruses (d) Enteroviruses
10. The yellow vein mosaic of Bhindi is caused by pathogen
(a) *Synchytrium eudobioticum* (b) *Plasmodiophora brassicae* (c) *Sclerospora sorglti*
(d) **Yellow Vein Mosaic Virus (YVMV)**

Section - A (Each question carries 2 marks)

Define / comment / write notes on

UNIT-I

- 1 Two important findings of Robert Koch.
2. Differentiate pure culture and mixed culture.
3. Contributions of Louis Pasteur

4. Synchronous growth
5. Chemostat
6. Stationary phase
7. Contributions of Edward Jenner
8. Koch's postulates
9. Spontaneous generation theory
10. Findings of Anton van Leeuwenhoek

UNIT-II

1. What is disease?
2. Causal Organism.
3. Causes of diseases.
4. Disease pyramid.
5. Localized diseases.
6. Systemic diseases.
7. Pathogenicity.
8. Iatrogenic diseases.
9. Role of pectinase in disease development
10. sporadic disease
11. Autonomous dissemination.
12. Disease cycle
13. Passive dissemination
14. Air- Borne diseases

UNIT-III

1. Control measures of Tundu disease of wheat
2. General symptoms of bacterial diseases
3. Tumors and galls
4. Cankers
5. Control measures of bacterial diseases.
6. Causal organism of *Citrus* canker.
7. Vascular wilt

8. Control measures of Angular leaf spot of cotton
9. Symptoms of *Citrus* canker
10. Leaf spot

UNIT-IV

1. Symptoms of wilt of cotton.
2. Systematic of position of *Claviceps*
3. Anthracnose
4. Systematic position of *Fusariumoxysporum*
5. Damping - off
6. *Phytophthora* sp
7. Downy mildew
8. Management of ergot of rye
9. Witches broom
10. Control measures of damping off of seedlings.

UNIT-V

1. General characters of virus
2. Mosaic
3. Vein-clearing
4. Leaf curling
5. Enations
6. Control of plant viruses
7. Causal organism of leaf curl of papaya
8. Symptoms of bunchy top of banana
9. Control measures of yellow vein mosaic of bhindi
10. Virescence

Section - C

Write in about 200 words:

Unit I

1. Explain the different phases of growth in batch culture
2. Discuss the mode of action of streptomycin
3. List out the contributions of Anton van Leeuwenhoek.
4. Explain synchronous growth.
5. Write an account of contributions of Louis Pasteur.
6. Explain Koch's postulates.
7. Write notes on germ theory of disease.

Unit II

1. Describe the components of disease pyramid
2. Explain the methods of passive dissemination of plant pathogens
3. Distinguish between primary and secondary infection.
4. Write notes on inoculum potential.
5. Explain how the pathogens are disseminated?
6. Briefly write the developments in plant pathology
7. Write about the plant-parasite relationship
8. Give a short account on Integrated disease management

Unit III

1. List out the symptoms produced by plants in response to bacterial infection
2. Write the symptoms and control measures of *Citrus* canker.
3. Describe the disease cycle of Angular leaf spot of cotton
4. List out the control measures of Tundu disease of wheat
5. Enumerate the symptoms and control measures of Angular leaf spot of cotton
6. Differentiate between canker and vascular wilts
7. Write the systematic position and disease cycle of Citrus canker
8. Discuss the survival and spread of bacterial plant pathogens

Unit IV

1. Write disease cycle of the pathogen that causes ergot of rye
2. Give an account on general symptoms caused by fungi
3. Write notes on damping off.
4. What are the symptoms produced on grapes due to downy mildew.
5. Differentiate between mildew and rust.
6. Comment on etiology of fungal diseases.

7. Explain the management of downy mildew of grapes
8. Bring out the symptoms and control measures of wilt of cotton.
9. Write disease cycle of the pathogen that causes ergot of rye.
10. Write the control measures that can be adopted to eradicate ergot of rye.

Unit V

1. Write the causal organism, symptoms and disease cycle of yellow vein mosaic of bhindi
2. Write down the general symptoms caused by plant viruses
3. List out the control measures of bunchy top of banana.
4. Enumerate the symptoms and control measures of yellow vein mosaic of bhindi
5. Differentiate between vein clearing and leaf curl
6. Write the systematic position and disease cycle of the pathogen causing bunchy top of banana
7. Write the systematic position and disease cycle of pathogen causing leaf curl of papaya

Section D

Write in about 500 words each (Each question carries 10 Marks)

1. How will you purify and quantify the plant viruses?
2. Discuss the mode of action of streptomycin and penicillin
3. Write an account of contributions of Louis Pasteur and Edward Jenner
4. List out the contributions of Anton van Leeuwenhoek and Robert Koch

Unit II

1. Explain the various stages in the disease development
2. Write notes on invasion and penetration
3. Explain how the pathogen penetrates into the host
4. Write an essay on history of plant pathology
5. What are agents of plant disease? Explain
6. Discuss the different kinds of enzymes that are shown to play role in disease development.
7. Write an essay on different types of dissemination
8. Discuss about the integrated disease management

Unit III

1. Give an account of the causative organism, symptoms and control measures of citrus canker.
2. Bring out the symptoms, disease cycle and control measures of Tundu disease of wheat

3. Write the causal organism, systematic position and symptoms of pathogen causing tundu disease of wheat and angular leaf spot of cotton
4. Write the causal organism, symptoms, etiology, crop loss and control measures of red rot of sugarcane.
5. Bring out the general symptoms caused by bacteria

Unit IV

1. Write a brief account on downy mildew of grapes
2. Write an essay on wilt of cotton
3. Explain the history, disease cycle and disease management with reference to ergot of rye
4. Write an essay on any one of the fungal diseases studied by you.
5. List out the symptoms produced by plants in response to fungal infection

Unit IV

1. Write any two methods of purification of plant viruses
2. Bring out the general symptoms produced by plants in response to viral infection
3. Write the systematic position, symptoms and disease cycle of the pathogen causing bunchy top of banana
4. Give an account of the causative organism, symptoms, disease cycle and control measures of Yellow vein mosaic of bhindi.
5. Write the systematic position, symptoms and disease cycle of pathogen causing leaf curl of papaya

ST. MARY'S COLLEGE (AUTONOMOUS) – THOOTHUKUDI

M.Sc. Botany – Semester II

Core III - Bioinstrumentation and Research Methods Course Code : 21PBOC13

Section A

Unit- I

1. During image formation in phase contrast microscope the diffracted rays causes dark contrast and non-diffracted rays causes bright contrast. _____ interference occur for bright contrast
(a) destructive (b) **constructive** (c) cumulative (d) accumulative
2. In electron microscopes instead of glass lenses the magnetic fields and electric fields are applied to manipulate the electron path. Since,
(a) **glass lenses cannot pass electron**
(b) Electron beams could break the glass lenses
(c) Electron beams can be refracted by glass lens
(d) None of the above
3. Which of the following device in the phase contrast microscope convert the light phases into amplitude differences
(a) **Annular phase plate** (b) sub stage annular stop (c) sub stage condenser
(d) dichoric beam splitter
4. Which of the following device you will prefer if you want to study the internal structural details of specimen with 1 million time magnification
(a) **TEM** (b) fluorescence microscope (c) SEM (d) stereomicroscope
5. "Glasses are optically denser than water". Refractive index (RI) of glass is 1.88. If so, pick up the RI of water from the choices below
(a) **1.33** (b) 1.88 (c) 2.80 (d) 4.5
6. Which of the following is not a failure in pH meters?
(a) Defective electrodes (b) Defective input circuitry
(c) Defective electronic circuitry (d) **Defective calibration**
7. An aqueous solution has a hydrogen ion concentration of 0.0015 M. Calculate the pH of this solution
(a) **2.824pH** (b) 11.18pH (c) 2.292pH (d) 1.824 pH
8. The pH of a liquid solution is a measure of:
(a) Dissolved salt content (b) **Hydrogen ion activity** (c) Hydroxyl ion molarity
(d) Electrical conductivity
9. Hydrochloric acid completely ionized in solution hence it is
(a) Weak monobasic acid (b) **Strong monobasic acid** (c) Weak monoacid base
(d) Strong monoacid base

10. What is the principle of centrifugation?

- (a) **Sedimentation principle** (b) Filtration principle (c) Evaporation principle
(d) Size reduction principle

11. Differential centrifugation is based on the differences in _____ of biological particles of different _____

- (a) Size, density (b) **Sedimentation rate, sizes and density** (c) Size, structure
(d) Mass, size

12. Which of the following statements about the basic principle of sedimentation is False?

- (a) The denser a biological structure is, the faster it sediments in a centrifugal field
(b) **The more massive a biological particle is, the slower it moves in a centrifugal field**
(c) The denser the buffer system is, the slower the particle will move in a centrifugal field
(d) The greater the centrifugal force is, the faster the particle sediments

13. Which of the following is/are the application of analytical centrifugation

i. the determination of the purity of macromolecules.

ii. the determination of the relative molecular masses of solutes in their native state.

iii. the examination of changes in the molecular mass of supramolecular complexes.

iv. the detection of conformational changes.

- (a) i only (b) i and ii only (c) i, ii, and iii only (d) **All of these**

14. After centrifugation of milk, the supernatant is

- (a) Fat (b) **whey** (c) casein (d) water

15. What is the use of density gradient centrifugation

- (a) **To purify viruses, ribosomes, membrane** (b) To remove dirt
(c) To remove fine particles (d) To remove large particles

16. Which of the following is used for sedimentation of red blood cells?

- (a) High speed centrifuge (b) **Low speed centrifuge** (c) Ultra centrifuge
(d) Vacuum centrifuge

17. Centrifugation is based on?

- (a) Patrick's Law (b) McLaren's law (c) **Stoke's Law** (d) Stain's Law

18. What are applications of centrifugation?

- (a) **To separate two miscible substances and analyze the hydrodynamic properties of macromolecules**

- (b) To separate two miscible substances and water treatment
- (c) Purification of mammalian cells and water treatment
- (d) Analyze the hydrodynamic properties of macromolecules and water treatment

19. What is the maximum speed of high speed centrifuge

- (a) 10000-15000rpm (b) **15000-20000rpm** (c) 30000-50000rpm (d) 50000-60000rpm

20. What is the fixed angle of rotors in centrifuge

- (a) 10° and 20°(b) **14° and 40°**(c) 20° and 40° (d) 34° and 48°

21. In $500 \times g$, what does g represent in accordance to centrifugation?

- (a) Gravitational force
- (b) **Centrifugal force is 500 times greater than earthly gravitational force**
- (c) Centrifugal force is 500 times less than earthly gravitational force
- (d) Centrifugal force is 500 times same as that of earthly gravitational force

22. Which of the following is used as a media for density gradient?

- (a) Agarose (b) **Ficoll** (c) Luria broth (d) Propylene glycol

23. At what speed do you centrifuge blood?

- (a) **2200-2500 RPM** (b) 3000-3200 RPM (c) 1000-1500 RPM (d) 4000 RPM

24. The cathode of transmission electron microscope consists of -----

- a) **tungsten wire**b) bulbc) iron filamentd) gold wire

Unit- II

1. Silica gel G is used in _____ chromatography.

- a) **Thin layer**b) Column (c) HPLC (d) GLC

2. AAS stands for_____.

- a) **Atomic Absorption Spectrometry** (b) Anionic Absorption Spectrometry
 c) Automatic Absorption Spectrometry (d) None of these

3. RPM is_____.

- a) **Revolutions per minute** (b) Regulation per minute
 c) Recording per minute (d) None of these

4. In Gas-liquid phase chromatography, the stationary phase is composed of _____ and the mobile phase is made of _____

- a) Solid, liquid (b) Liquid, liquid (c) **Liquid, gas**d) Solid, gas

5. Find out the binder used in the thin layer chromatography

- (a) starch (b) **calcium sulphate**(c) aluminiumsulphate (d) silica gel

6. Pick up the correct facts with regard to partition coefficient of components in the chromatographic separation techniques

- (a) it is the ability of the solute to move away from the solid phase
(b) it is the ratio of conc. of solute in the stationary phase to the concentration of mobile phase
(c) it is the ratio of the distance migrated by solvents to the distance migrated by the solute
(d) it is the ratio of pore size to trapping of the components
7. Which of the following solvent act as mobile phase in HPLC?
(a) ethanol (b) petroleum ether (c) **methanol** (d) acetone
8. The elution of solutes from the column is most probably effected by a single solvent. So it is
(a) **isocratic elution** (b) heterocratic elution
(c) polycratic elution (d) monocratic elution
9. In chromatography, the solvent carrying the mixture is referred as
(a) stationary phase (b) **mobile phase** (c) solid phase (d) ion phase
10. The general expression for the appearance of a solute in an effluent is (where V is the elution volume of a substance, V_0 void volume, kD distribution constant and V_i internal water volume)
(a) $V = V_0 + kDVi$ (b) $V = V_0/V_i$ (c) $V = V_0 - kDVi$ (d) $V/V_0 = kDVi$
11. The ratio between the mobility of solvent to that of solute is called
(a) **RF** (b) rpm (c) rate constant (d) Svedberg constant
12. Which of the following is not used for detection in GC?
a) Electrical conductivity (b) Flame ionisation (c) Infrared spectroscopy **d) NMR**
13. Thin layer chromatography is
(a) Partition chromatography (b) Size exclusion chromatography
(c) Adsorption chromatography (d) Ion exchange chromatography
14. Pick up the complementary pair
(a) Centrifuge--mobile and stationary phase (b) Potentiometer--separation of ions
(c) Rotar and motor- Centrifuge (d) TLC-- Sedimentation
15. In FTIR, initially spectra is recorded as
(a) Volts vs time (b) % Transmittance vs concentration
(c) Absorbance vs Concentration (d) Absorbance vs time
16. Advantage of FTIR over GC-MS
(a) Can easily differentiate between isomers
(b) Is not influenced by the presence of water
(c) It does not require a high volume of solvents
(d) The spectrum is easy to interpret
17. How is the wavelength controlled in an FTIR spectrometer?
(a) By a Michelson Interferometer (b) By a computer
(c) By a laser (d) By calibration with a standard sample
18. What does FTIR stand for?
(a) Further technical infrared spectroscopy
(b) Fourier transform infrared spectroscopy

- (c) Faster transmission infrared spectroscopy
- (d) Future triangulating infrared spectroscopy

19. Select the wavelength range corresponding to UV-visible region.

- (A) 400-800 nm **(B) 200-800 nm** (C) 25 μm -2.5 μm (D) 2.5 μm – 1mm

20. At alkaline pH, phenol loses one proton and exists as phenoxide anion as shown below. Select the correct statement regarding their absorption



- (a) Phenol shows more absorption than phenoxide anion
- (b) Phenoxide anion shows more absorption than phenol**
- (c) Phenol has equal absorption as phenoxide anion
- (d) Phenol shows absorption but phenoxide anion doesn't

21. In HPLC the analytical performance improves when

- (a) Particle diameter is increased **(b) Particle diameter is decreased**
- (c) Coarser particles are paired with shorter columns (d) Low temperature is used

22. In Column chromatography, the stationary phase is made of _____ and the mobile phase is made of _____

- a) Solid, liquid** b) Liquid, liquid c) Liquid, gas d) Solid, gas

23. What is Eluent?

- (a) is a liquid solution (b) is a liquid solution that is a result from Elution.
- (c) It is a solvent used for separation of absorbed material from stationary phase**
- (d) None of the above

24. The principle of column chromatography is _____

- (a) Capillary action (b) Gravitational force
- (c) Differential absorption of the substance on the solid phase**
- (d) Differential absorption of the substance on the phase

25. Which of the following is / are the advantage of HPLC over traditional LPLC?

- (a) sample recovery
- (b) Ideal for ionic species and large molecules
- (c) Greater sensitivity and reusable columns
- (d) All of these**

26. Arrange the following compounds in order of their increasing adsorption tendencies.

- a) Cellulose > starch > calcium carbonate > alumina**
- b) Cellulose > starch > alumina > charcoal
- c) Charcoal > cellulose > alumina > starch
- d) Calcium carbonate > alumina > starch > cellulose

27. Tungsten lamp filament has required how much temperature?

- (a) 2000k **(b) 3000k** (c) 4000k (d) 5000k

Unit- III

1. Electrophoretic techniques cannot be applied for separation of _____ types of molecules
 - (a) positively charged molecules (b) **uncharged** (c) zwitter ions
 - (d) negatively charged molecules
2. Electrophoresis was developed by:
 - (a) Tswett (b) Tsvedberg **(c) Tiselius** (d) Sanger
3. The role of TEMED in Electrophoresis
 - (a) catalyse polymerization of acrylamide (b) helps cross linkage of acrylamide
 - (c) equalize the surface charge** (d) supply constant power
4. The speed of migration of ions in electric field depends upon:
 - a) Shape and size of molecule
 - b) Magnitude of charge and shape of molecule**
 - c) Magnitude of charge shape and mass of molecule
 - d) Magnitude of charge and mass of molecule

5. The electrophoretic mobility denoted as μ is mathematically expressed as:
 a) VE b) E/V c) 1/EV d) V/E
6. What cannot be a reason for using electrophoresis?
 a) Comparing two sets of DNA
b) Organizing DNA by shape of backbone
 c) Organizing DNA fragments from largest to smallest
 d) Organizing DNA in order we can see
7. The polymerization of the gel used in PAGE occurs between polyacrylamide and
 (a) N, N- acrylamide (b) Bisacrylamide
 (c) N- methyleneacrylamide **(d) N, N- methylenebisacrylamide**
8. SDS (Sodium dodecyl sulphate) use in electrophoretic technique act as _____
 (a) medium (b) **main surface charge** (c) buffer (d) supply current
9. "Molecules with smooth contours have least frictional and electrostatic force than molecules with rough electrophoretic field". So the mobility of smooth contour molecule is
 (a) nil (b) very high (c) **low** (d) high
10. The optimum power requirement for vertical type of electrophoresis
 (a) 0 to 30 volts (b) 90 to 120 volts (c) **30 to 60 volts** (d) 0 to 15 volts
11. PAGE is mainly used for
 (a) lipid isolation (b) vitamin isolation (c) **protein isolation** (d) starch isolation
12. Poly acrylamide is the best supporting medium in electrophoresis _____
 and _____ are its components and arrangements.
 a) SDS is linked with bisacrylamide
 b) agarose is linked with cellulose
c) acrylamide is crosslinked with bisacrylamide
 d) starch is cross linked with acrylamide
13. _____ is a scientific method used to determine the atomic arrangement of a crystalline solid in three dimensional space.
 (a) Electrophoresis (b) **X- ray crystallography** (c) PCR (d) centrifuge
14. The ability to expose photographic films is called
 (a) **Autoradiography** (b) Solid Scintillation (c) liquid Scintillation (d) Geiger – Muller
15. Which factors are affecting electrophoresis mobility ?
 (a) molecule size (b) Shape of protein (c) **a and b** (d) none of the above
16. Which of the following statements is true about migration of biomolecules?
 a. The rate of migration is directly proportional to the resistance of medium
b. Rate of migration is directly proportional to current
 c. Low voltage is used for separation of high mass molecules
 d. Rate of migration is inversely proportional to current

17. Ethidium bromide is a stain that specifically binds to DNA or RNA and appears _____ if viewed under ultraviolet light

- (a) Red (b) Yellow **(c) Orange** (d) Blue

18. Which of the following statements about agarose gel electrophoresis is False?

(a) Electrophoresis in agarose is a common way to separate DNA molecules according to size

(b) Ethidium bromide is used to detect DNA

(c) Under the influence of the electrical field, positively charged DNA will migrate towards the negative charged end of the gel

(d) None of them

19. In an SDS - PAGE

(a) proteins are denatured by the SDS

(b) proteins have the same charge-to-mass ratio

(c) smaller proteins migrate more rapidly through the gel

(d) All of them

20. In isoelectric focusing, proteins are separated on the basis of their

(a) relative content of positively charged residue only

(b) relative content of negatively charged residue only

(c) size

(d) relative content of positively and negatively charged residue

21. Electrophoresis of histones and myoglobin under non-denaturing conditions (pH=7.0) results in

(a) both proteins migrate to the anode

(b) histones migrate to the anode and myoglobin to the cathode

(c) histone migrate to the cathode and myoglobin migrate to the anode

(d) both proteins migrate to the cathode

22. The detector in X-ray diffraction that detects the visible radiation is

(a) Proportional counter

(b) Silicon diode

(c) Golay detector

(d) Scintillation counter

23. Collimators used in XRD are made up of

(a) Thin quartz tube

(b) Thin glass plates

(c) Thin metal plates

(d) All of the above

24. The material used to construct the filter in X-ray diffraction is

(a) Metal with next higher atomic number

(b) Metal with next lower atomic number

(c) Quartz

(d) Beryllium

25. X-ray diffractometers are not used to identify the physical properties of which of the following?

a) Metals

b) Liquids

c) Polymeric materials

d) Solids

Unit- IV

1. The measure of central tendency listed below is

(a) Skewness (b) **Mean** (c) Range (d) Standard deviation

2. The total of all the observations divided by the number of observations is called

(a) Arithmetic mean (b) Geometric mean (c) Median (d) Harmonic mean

3. Which type of average is most affected by extreme values in the data?

(a) Mean (B) Median (C) Mode (D) All of the above

4. The midpoint of the values after they have been ordered from the smallest to the largest or the largest to the smallest is called

(a) Mean (b) **Median** (c) Lower quartile (d) Upper quartile

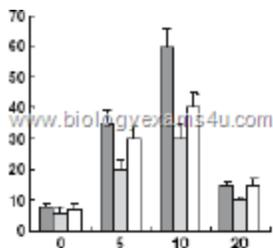
5. If the arithmetic mean of 20 values is 10, then sum of these 20 values is

(a) 10 (b) 20 (c) **200** (d) 20 + 10

6. We must arrange the data before calculating

- (a) Mean (b) **Median** (c) Mode (d) Geometric mean
7. A distribution with two modes is called
 (a) Unimodal (b) **Bimodal** (c) Multimodal (d) Normal
8. Which of the following is correct in a positively skewed distribution?
 (a) Mean = Median = Mode (b) Mean < Median < Mode
 (c) **Mean > Median > Mode** (d) Mean + Median + Mode
9. What is the median of the sample 5, 5, 11, 9, 8, 5, 8?
 (a) 5 (b) 6 (c) **8** (d) 9
10. The range of the scores 29, 3, 143, 27 and 99 is
 (a) **140** (b) 143 (c) 146 (d) 70
11. The observation which occurs most frequently in a sample is the
 (a) Median (b) Mean deviation (c) Standard deviation (d) **Mode**
12. If mean is 25 and standard deviation is 5 then coefficient of variation is
 (a) 100% (b) 25% (c) **20%** (d) 5%
13. The mode of a distribution is 24 and the mean is 60. What is its median?
 (a) **48** (b) 50 (c) 45 (d) 51
14. _____ is used to compare the variation or dispersion in two or more sets of data even though they are measured in different units
 (a) **coefficient of variation** (b) range (c) mean deviation (d) standard deviation
15. Ten families have an average of 2 boys. How many boys do they have together?
 (a) 2 (b) 10 (c) 12 (d) **20**
16. The suitable average for qualitative data is:
 (a) Mean (b) **Median** (c) Mode (d) Geometric mean
17. If mean=50, mode=40 and standard deviation=5, the distribution is:
 (a) **Positively skewed** (b) Negatively skewed (c) Symmetrical (d) None of the above
18. The Coefficient of Skewness is always zero for _____ distribution
 (a) **Symmetrical** (b) Skewed (c) Negative (d) None of these
19. The correlation coefficient is used to determine:
 (a) A specific value of the y-variable given a specific value of the x-variable
 (b) A specific value of the x-variable given a specific value of the y-variable
 (c) **The strength of the relationship between the x and y variables**
 (d) None of these
20. If the coefficient of correlation is positive, then the regression coefficients
 (a) **Both are positive** (b) Both are negative (c) One is positive and another is negative
 (d) None of the above

21. The variance of a set of data is 196. Then the standard deviation of the data is
- (a) ± 14 (b) **14** (c) 96 (d) 98
22. In a study, subjects are randomly assigned to one of the three groups: control, experimental A or experimental B. After treatment, the mean scores for the three groups are compared. The appropriate statistical test for comparing these means is
- (a) The correlation coefficient (b) **Analysis of variance** (c) Chi square (d) T-Test
23. When one regression coefficient is negative, the other would be
- (a) **negative** (b) positive (c) zero (d) None of these
24. The coefficient of correlation
- (a) is the square of the coefficient of determination
(b) **is the square root of the coefficient of determination**
(c) is the same as r-square
(d) can never be negative
25. In one-way ANOVA, which of the following is used within the F-ratio as a measurement of the variance of individual observations?
- (a) **SSE** (b) MSE (c) MSTR (d) None of the above
26. The term regression was first used by
- (a) **Sir Francis Galton** (b) Karl Pearson (c) Spearman (d) None of these
27. Chi-square is used to analyse:
- (a) Scores (b) Ranks (c) **Frequencies** (d) None of these
28. On which of the following does the critical value for a chi-square statistic rely?
- (a) **The degrees of freedom** (b) The sum of the frequencies (c) The row totals
(d) The number of variables
29. Decision value to reject the null hypothesis in case of a right tail test is said to be
- (a) Calculated t must be greater than critical value
(b) Calculated t is less than negative of critical t-value
(c) **Calculated t must be less than critical value**
(d) Calculated t must be less than critical value in absolute form
30. Test to be applied when number of observations are less than 30 and variance is not known, is said to be
- (a) Z-test (b) **T-test** (c) F-test (d) Chi-square test
31. The graph shown below generally represents



- (a) Mean and standard error (b) Mean and mode
(c) Mean and standard deviation (d) Mode and Standard error

32. Chi square test X?

- (a) measure the degree of deviation of the experimental result from the expected result
 (b) to test the closeness of observed and expected frequency
 (c) to test the population variance and sample variance
(d) all of these

33. Find the mode in the following data set [11,12,13,14,14]

- (a)11 (b)12.8 (c)13 **(d)14**

34. Which of the following is not a measure of central tendency?

- (a)Mean (b)Mode **(c)Range** (d)Radian

35. Standard deviation is the square of

- (a) mode** (b) standard error **(c) variance** (d) regression

36. Correlation coefficient is a number between

- (a) +1 and +2 (b) 0 and +1 (c) -1 and 0 **(d) -1 and +1**

37. Chi square is zero when

- (a) expected frequency is lesser than the observed frequency**
(b) expected frequency is equal to the observed frequency
 (c) expected frequency is double that of the observed frequency
 (d) expected frequency is greater than the observed frequency

38. The statistical test can be utilized to validate the statement 'peoples having high cholesterol suffer more from hypertension'

- (a) Student test
 (b) Regression analysis
(c) Pearson correlation coefficient
 (d) ANOVA

39. To determine variation in wing length of butterfly from five different places would be best statistical test

- (a) F test** (b) Student t test (c) Regression analysis (d) Chi- square test

Unit- V

1. 'Research methodology' refers to:

- (a) The sampling technique
 - (b) The tools that the researcher uses
 - (c) The chain of association between the research question and the research design**
 - (d) Qualitative methods.
2. Research is:
- (a) A purposeful, systematic activity**
 - (b) Primarily conducted for purely academic purposes
 - (c) Primarily conducted to answer questions about practical issues
 - (d) A random, unplanned process of discovery
3. The two main styles of research are:
- (a) Data collection and data coding
 - (b) Surveys and questionnaires
 - (c) Sampling and recording
 - d) Qualitative and quantitative**
4. Qualitative research is:
- (a) Not as rigorous as quantitative research
 - (b) Primarily concerned with the collection and analysis of numerical data
 - (c) Primarily concerned with in-depth exploration of phenomena**
 - (d) Primarily concerned with the quality of the research
5. Quantitative research involves:
- (a) Interviewing people to find out their deeply held views about issues
 - (b) Collecting data in numerical form**
 - (c) More rigour than qualitative research
 - (d) Interviewing every member of the target population
6. A qualitative research question:
- (a) Asks a question about some process, or phenomenon to be explored
 - (b) Is generally an open - ended question
 - (c) both a and b are correct**
 - (d) None of the above
7. A research plan_____.
- (a) Should be detailed
 - (b) Should be given to others for review and comments
 - (c) Sets out the rationale for a research study
 - (d) All of the above**
8. According to the text, which of the following orders is the recommended in the flowchart of the development of a research idea?
- (a) Research topic, research problem, research purpose, research question, hypothesis**
 - (b) Research topic, research purpose, research problem, research question, hypothesis
 - (c) Research topic, research problem, research purpose, research question, hypothesis
 - (d) Research topic, hypothesis, research problem, research question, research purpose
9. A review of the literature prior to formulating research questions allows the researcher to do which of the following?

- (a) To become familiar with prior research on the phenomenon of interest
 - (b) To identify potential methodological problems in the research area
 - (c) To develop a list of pertinent problems relative to the phenomenon of interest
 - (d) All of the above**
10. The research participants are described in detail in which section of the research plan?
- (a) Introduction
 - (b) Method**
 - (c) Data analysis
 - (d) Discussion
11. Research that is done to understand an event from the past is known as _____
- (a) Experimental research**
 - (b) historical research**
 - (c) replication
 - (d) archival research
12. _____ research occurs when the researcher manipulates the independent variable.
- (a) causal-comparative research**
 - (b) experimental research**
 - (c) ethnography
 - (d) correlational research
13. The strongest evidence for causality comes from which of the following research methods?
- (a) Experimental**
 - (b) Causal-comparative
 - (c) Correlational
 - (d) Ethnography
14. Which of the following is the best system of organizing research paper?
- (a) MRAD**
 - (b) IMRAD
 - (c) RADMI
 - (d) IMDRA**
15. Eliminate the odd one with reference to search engines
- (a) Google
 - (b) Facebook**
 - (c) Yahoo
 - (d) MSN
16. Statistical tools in research favour
- (a) formulation of research hypothesis
 - (b) collection of data
 - (c) interpretation of data**
 - (d) publication of research article
17. List out the basic research from the following
- (a) Mendel's theory of hereditary
 - (b) Darwin's theory of evolution
 - (c) Newton's theory of gravitational force
 - (d) all the above**
18. Internet is a
- (a) a local computer network
 - (b) a worldwide network of computers
 - (c) an interconnected network of computers
 - (d) a worldwide interconnected network of computers which use a common protocol to communicate with one another**
19. Which of the following is not a facility available in the internet?
- (a) electronic mail
 - (b) remote login
 - (c) file transfer
 - (d) word processing**
20. Each computer connected to the internet must
- (a) be an IBM PC
 - (b) have a unique IP address**
 - (c) be internet compatible
 - (d) have a modem connection
21. World Wide Web
- (a) is another name for internet
 - (b) worldwide connection for computers
 - (c) a collection of linked information residing on computers connected by the internet**
 - (d) a collection of worldwide information

22. Among services available on the World Wide Web are
 (i) Encryption (ii) HTTP (iii) HTML (iv) Firewalls
 (a) i and ii
(b) ii and iii
 (c) iii and iv
 (d) i and iv
23. A world wide web contains web pages
 (a) residing in many computers (b) created using HTML
 (c) with links to other web pages
(d) residing in many computers linked together using HTML
24. A URL specifies the following:
 (i) protocol used (ii) domain name of server hosting web page
 (iii) name of folder with required information
 (iv) name of document formatted using HTML
 (v) the name of ISP
 (a) **i, ii, iii, iv** (b) ii, iii, iv, v (c) i, iii, iv, v (d) i, ii, iii, v
25. A search engine is a program to search
 (a) for information (b) web pages (c) web pages for specified index terms
(d) web pages for information using specified search terms
26. HTML stands for
(a) Hyper Text Making Links (b) **Hyper Text Markup Language**
 (c) Higher Textual Marking of Links (d) Hyper Text Mixer of Links
27. HTML uses
 (a) Pre-specified tags (b) user defined tag
 (c) tags only for linking (d) **fixed tags defined by the language**
29. Computer database searches can be done:
(a) With a computer with CD-ROM drive (b) At the library
 (c) Online (d) **All of the above**
30. Why are ethical issues important in research?
 (a) They will help me pass the assignment
(b) They indicate what the researcher ought to do and how they should treat people
 (c) They help the researcher write up their research
 (d) They indicate that all people are very sensitive
31. Drawing information or content from the work of another without acknowledging the source by citing a reference is considered to be plagiarism in all of the cases except
 (a) Use the exact words of the author
 (b) Reproducing a chart contained in another authors work
(c) When the information describes common knowledge
 (d) When the information comes from an email or phone call

32. When two or more successive footnotes refer to the same work, which one of the following is used?

(a) **ibid**

(b) et.al

(c) op.cit

(d) loc.cit

Section B

Unit- I

1. Define resolving power and state the attributes of resolving power
2. What happens if a centrifuge is unbalanced?
3. Characteristics of a Compound Microscope
4. Magnification of a compound microscope
5. Applications of simple microscope
6. Applications of compound microscope
7. Phase contrast microscope
8. Principle phase contrast microscope
9. Applications of phase contrast microscope
10. Principle of centrifugation
11. Centrifugal force
12. Ultra centrifuge
13. Sedimentation Coefficient

Unit- II

1. Principle of Chromatography
2. TLC
3. HPLC
4. Principle of spectrophotometry
5. AAS
6. FTIR
7. What are the advantages of FTIR?
8. MALDI
9. HPTLC
10. GC-MS
11. Applications of UV-Vis spectrophotometer

Unit- III

1. Principle of electrophoresis
2. Electrophoretic mobility
3. Isoelectric focusing
4. PAGE
6. Principle of AGE
5. Electrophorogram
6. Autoradiography
7. XRD

8. Applications of Autoradiography

Unit- IV

1. What is meant by central tendency
2. Define Mode
3. What is the relation among the mean, median and mode
4. State three advantages of median
5. If the values of mean and median are 40 and 48. Find out the value of mode
6. Calculate the mean number of tillers per plant: 10, 11, 10, 11, 9, 7, 9, 11, 12, 10
7. Find out the median from the data recorded on the number of clusters per plant in a pulse crop: 4.0, 5.7, 3.9, 4.2, 6.6, 7.0, 7.9, 8.0, 9.0, 10.0
8. The data recorded on the number of seeds per pod are given in three sets. Find out the mode.
(i) 8, 9, 11, 10, 10, 7, 6, 12 (ii) 8, 10, 10, 9, 12, 7, 11, 11 (iii) 6, 7, 9, 12, 11, 10, 8, 5
9. What is regression? Give an example
10. Give an example for partial and multiple correlations
11. Significance of Chi- square test

Unit- V

1. Steps of research process
2. Review article
3. Citation
4. Journal
5. Bibliography
6. Peer- review
7. E-journal
8. Plagiarism
9. Oral presentation
10. Self- plagiarism
11. Objectives of literature collection
12. Online publication
13. Differentiate reference and bibliography

Section- C

Unit- I

1. Difference between simple and compound microscope
 2. Briefly explain the principle and light path of phase contrast microscope
 3. Describe the principle and working process of SEM
- How will you operate the pH meter to identify the pH of particular solution?
4. Draw and describe the structure of electrodes in pH meter
 5. Discuss the preparation of buffers and its application
 6. Difference between low and high speed centrifuge
 7. Difference between differential and density gradient centrifugation

8. Applications of analytical ultracentrifuge
9. Enumerate the applications of centrifugation
10. With illustrations discuss the principle and working of electrodes in pH meter
11. Describe the principle and components of visible spectrophotometer
12. Explain the working mechanism of visible spectrophotometer

Unit-II

1. Explain the types of chromatography
2. Write the principles of chromatography
3. Explain the principles and application of HPLC
4. Describe the working mechanism of TLC
5. Explain the mobile phase of chromatography
6. Difference between Gas Chromatography and liquid chromatography
Clarify- why GC-MS is powerful
7. Explain the principles of spectrophotometry
8. Distinguish between UV spectrophotometry and ordinary spectrophotometry
9. Sketch the instrumentation of UV-Visible spectrophotometer and explain the working process.
10. Explain the principle and working mechanism of AAS
11. Write down the working principle and applications of FTIR
12. Difference between TLC and HPTLC
13. Principle of MALDI

Unit-III

1. Define Electrophoresis and explain their basic principles and uses
2. What are the different types of electrophoresis
3. Define electrophoresis. Explain the PAGE
4. Difference between vertical and horizontal electrophoresis
5. Write the application of horizontal & vertical types of PAGE
6. Enumerate the factors affecting electrophoresis
7. Enumerate the factors affecting electrophoretic mobility
8. Critically comment on gel doc
9. Write about autoradiography
10. Mention a few important uses of autoradiography
11. Write the applications of XRD

Unit- IV

1. Write the applications of mean, median and mode
2. From the following table find mode with the help of graphical representation and check your result with mathematical formula

Class	0-10	10-20	20-30	30-40	40-50
-------	------	-------	-------	-------	-------

Frequency	14	23	27	21	25
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3. From the following table find the value of median graphically and check your result with mathematical formula

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	11	20	12	6	5

4. Find the mean, median and mode of a numerical data set
12.6, 13.7, 18.0, 18.0, 18.0, 20.0, 20.0, 41.2, 48.0 and 60.0
5. Explain the merits and demerits of mode
6. Determine the modal value of the given distribution graphically and verify the results by direct calculation.

No. of. grains	100 - 110	110 - 120	120 - 130	130 - 140	140 - 150	150 - 160
No. of. plants	11	40	27	34	12	6

7. Calculate the value of median graphically and verify the results by direct calculation.

Variable	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
Frequency	4	6	10	15	11	7	3

8. Calculate the arithmetic mean.

Plant height(cms)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of. varieties	5	10	25	30	20	10

9. The ratio of the male and female birth is expected to be 1:1. It was found in one village that the male children born were 52 and the female were 48 calculate the χ^2 value and interpret the results.
10. Difference between correlation and regression.

Unit-V

1. Give an account on different systems of citing references.
2. Write notes on need of table in the thesis.
3. How will you prepare photographs for a research report?
4. How will you place the figure in the thesis? Add a note on its importance.
5. Describe the role of figures and photographs in a research report
6. Prepare a sample abstract of a thesis.
7. Prepare a sample acknowledgement page of a thesis
8. Give notes on e- journals
9. Enumerate the ethical issues when you are publishing a research paper
10. Importance of literature collection in researchers
11. List out the guidelines for publishing research papers
12. Discuss the difference between qualitative and quantitative research

13. What are the principles of presentation?
14. Write about self-plagiarism
15. What are the ways to avoid plagiarism?
16. How will you prepare for effective oral presentation?

Section- D

Unit- I

1. Describe the principle, light path and image formations and uses of phase contrast microscope
2. Compare the simple and compound microscope
3. Explain the principle and working mechanism of SEM
4. Write down the principle, working mechanism and applications of pH meter
5. Write about principle, working mechanism and applications differential and density gradient centrifugation
6. Explain different types of centrifuges

Unit- II

1. Describe in detail about spectrophotometer and add a note on its importance in biochemical studies
2. Explain the principle, working mechanism and application of pH meter
3. Write an essay on principle, working mechanism of UV spectroscopy
4. Explain the principles, operation and uses of Atomic absorption spectroscopy
5. What is FTIR? Discuss its principle and applications
6. How will you separate the mixture compounds using column chromatography? List out its applications
7. Explain the principles, operation and uses of MALDI
8. Explain the principles, operation and application of UV-visible spectrophotometer
9. Discuss in detail that HPLC is highly sensitive instrument for separation of components over other chromatography techniques
10. Describe in detail on principles and application of TLC
11. Describe partition chromatography with reference to HPLC and HPTLC
12. Explain in detail about the chromatography with special reference to its type, principles and uses

Unit-III

1. With the help of suitable diagram describe electrophoresis
2. What is electrophoresis? Explain PAGE
3. What is electrophoresis? Explain AGE
4. Write an essay on factors affecting electrophoretic mobility and isoelectric focusing
5. Describe in detail about Autoradiography
6. How will you apply the tracer techniques of autoradiography and XRD?

Unit- IV

1. Calculate the measure of dispersion

X	10	20	30	80	90	100
Frequency	3	7	6	2	8	4

2. Explain the characteristics, merits and demerits of mean

3. Calculate the standard deviation from the following data

Number of seeds per plant	100-200	200-300	300-400	400-500	500-600	600-700
Number of plants	8	18	20	26	30	28

4. Find out which variety is more consistent from the following data recorded on the height of plants of varieties GS – 65 and Ps – 16 of Mungbean.

Variety G – 65	25	50	45	30	70	42	36	48	34	60
Variety Ps - 16	10	70	50	20	95	55	42	60	48	80

5. Calculate the measures of central tendency and dispersion

Waxy endospermic Plants	7	8	9	10	11	12
No. of. Plants	18	13	17	13	15	14

6. Data on inflorescence length (cms.) and the number of clusters per plant are recorded on ten randomly selected plants of *Cymopsis tetragonoloba*. Calculate the **regression coefficient**.

Length of inflorescence (cms.)	9	8	12	7	13	12	17	21	20	19
No. of clusters	9	8	10	9	8	11	12	15	16	15

7. Calculate the **Karl Pearson's coefficient of correlation** for the following data. Interpret your results.

Fertilizer used (metric tons)	15	18	20	24	30	35	40	50
Productivity of land (metric tons)	85	93	95	105	120	130	150	160

8. The following data were recorded on the number of flowers and the number of seeds per plant in one of the varieties of lentil. Calculate the **regression coefficient**.

No. of flowers	22	24	25	11	12	9	13	14	15	16
No. of seeds	40	42	45	66	55	60	70	75	62	70

9. Calculate the Karl Pearson's coefficient of correlation for the following data.

Price(Rs)	8	10	15	17	20	22	24	25
Supply	25	30	32	35	37	40	42	45

10. Dry seeds were irradiated with three different doses of gamma rays. Germination percentage is given below. Analyse your data statistically using F test.

Replicates	10 KR	20 KR	30 KR
1	90	85	75
2	95	80	80
3	90	85	75
4	85	75	60
5	80	70	65

11. In study on mat forming algal communities the association of Pithophora and Oscillatoria was investigated in 200 randomly taken sample. Calculate the nature of association given the level of significance. Contingency table showing the occurrence of two genera in a mat forming algal community expected value are shown within the parentheses.

	Present	Absent
Genus A: Oscillatoria	75	25
Genus B: Pithophora	85	15

Unit- V

- Write briefly about the general format for writing thesis
- Write notes on uses of the following
 - Preparing good research article
 - Quotations
 - Tables and figures
 - Literature survey
- Explain with examples the different methods of citation of references
- Write an essay on e-journals
- Explain about Oral presentation
- Write down the differences between plagiarism and self- plagiarism
- Describe about referencing and bibliography
- Explain about ethical issues related to publishing
- How will you prepare your thesis effectively for research

ST. MARY'S COLLEGE (AUTONOMOUS) – THOOTHUKUDI

M.Sc. Botany – Semester I

Core – IV

Photochemistry and Pharmacognosy

Course Code: 21PBOC14

Section – A

Unit – I

1. Phytochemistry is a study of phytochemicals, which are chemicals derived from
_____ (a) **Plants** (b) Animals (c) Plankton (d) Fungi
2. Many plants produce chemical compounds for defense against
(a) **Herbivores** (b) Carnivores (c) Omnivores (d) Flavonoids
3. Alkaloids are _____ tasting chemicals
(a) Sweet (b) **Bitter** (c) Sour (d) Salty
4. Anthraquinone glycosides are found in _____
(a) *Clove* (b) *Fennel* (c) ***Senna*** (d) *Fenugreek*
5. Biosynthetic pathway of secondary metabolites are
(a) Shikimic acid pathway (b) Acetate mevalonate pathway
(c) Acetate malonate pathway (d) **All the above**
6. Which of the following is a secondary metabolite?
(a) Amino acid (b) Sugars (c) Chlorophyll (d) **Alkaloids**
7. Which of these statements is false – regarding primary metabolites?
(a) They have identifiable functions
(b) They play a role in normal physiological processes
(c) **Secondary metabolites are derived from primary metabolites**
(d) Lipids are primary metabolites
8. Which of these proteins is a secondary metabolite?
(a) **Ricin** (b) Myosin (c) Keratin (d) Elastin
9. A: plant secondary metabolites are classified by their chemical structure and can be derived into four major classes
B: Terpenes, polyketides, phenylpropanoids and alkaloids.
(a) a and b is incorrect (b) a is correct b is incorrect
(c) **a and b both are correct** (d) a is incorrect b is correct
10. Which of these is not a primary metabolite?
(a) starch (b) **Gum** (c) keratin (d) Myosin
11. Which of these is an alkaloid?
(a) Abrin (b) **Morphine** (c) Ricin (d) Anthocyanin
12. Which of these is a secondary metabolite?
(a) **Monoterpenes** (b) Triacylglycerols (c) keratin (d) Myosin
13. Codeine is a _____
(a) Lipids (b) Toxin (c) pigment (d) **Alkaloid**
14. Which of these secondary metabolites is useful for human welfare?
(a) **Curcumin** (b) Abrin (c) Ricin (d) Gums
15. Which of these is a primary metabolite?

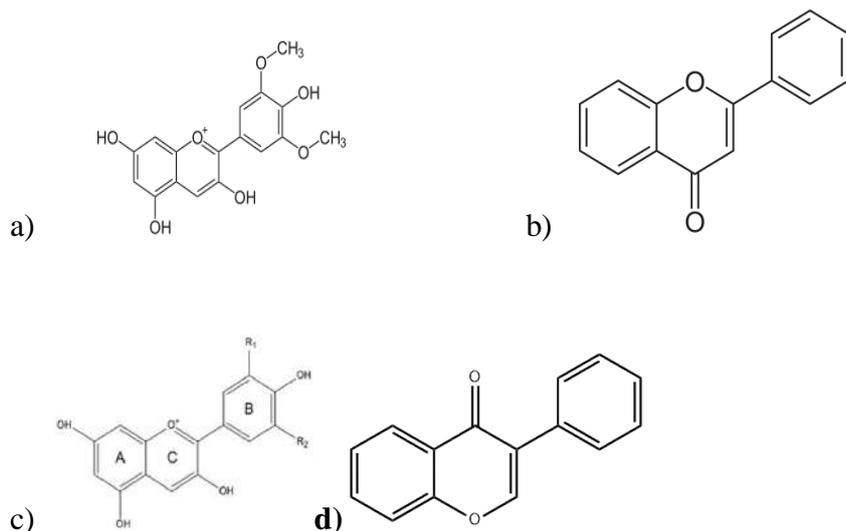
- (a) Diterapene (b) Codeine (c) Anthocyanin (d) **Triacylglycerol**
16. Non sugar part of glycoside is known as _____
 (a) **Aglycon** (b) Glycon (c) Both A and B (d) None of the above
17. Which of the following is not a property of glucosides?
 (a) Colourless (b) **Soluble in ether** (c) Crystalline (d) Amorphous
18. Which of the following is an example of glycoside?
 (a) Guggul (b) Ginger (c) **Senna** (d) Benzoin
19. The sugar group is known as _____
 (a) **Glycone** (b) Aglycone (c) Genin (d) None of the above
20. If the glucose group of a glycoside is glucose, then the molecule is a _____
 (a) Fructoside (b) Glucuronide (c) Primary Glycosides (d) **Glycoside**
21. _____ is formed between -OH group of sugar and -H group of non-sugar
 (a) Glycosidic (b) **Glycosidic linkage** (c) Both A and B (d) None of the above
22. Glycosides are _____ soluble compounds
 (a) **Water** (b) Solvent (c) Organic solvent (d) None of the above
23. Which of the following is an example of cardiac glycoside?
 (a) Senna (b) Liquorice (c) **Digitalis** (d) Qussia Wood
24. Which of the following can be prescribed for congestive heart failure
 (a) **Cardiac glycosides** (b) Laxative glycosides (c) Anti-Ulcer glycosides (d) Bitter Glycosides
25. Terpenoids are
 a) Soluble in organic solvent and usually insoluble in water.
 b) **Insoluble in organic solvent and usually soluble in water.**
 c) Soluble in organic solvent and always soluble in water.
 d) Insoluble in organic solvent and insoluble in water.
26. Molecular formula for Beta-Sitosterol is
 (a) **C₂₉H₅₀O** (b) CH₇₆H₅₂O₄₆ (c) C₁₈H₂₅N₅ (d) C₆H₅OH
27. Glycyrrhizin is extracted from the _____ of the *Glycyrrhiza glabra*.
 (a) **Roots** (b) Bark (c) Leaf (d) Stem
28. _____ are a chemical compounds consisting of 1 or more hydroxyl groups bonded directly to an aromatic hydrocarbon group.
 (a) Terpenoids (b) Alkaloids (c) **Phenols** (d) Flavonoids
29. What is the reactant X and Y that will react with benzene to give phenol?
 (a) **X is oleum and Y is Molten sodium hydroxide followed by H⁺**
 (b) X is oleum and Y is HCl
 (c) X is oleum and Y is NH₃
 (d) X is oleum and Y is water
30. The pharmacological properties of Coumarin includes
 (a) Anti-inflammatory (b) Anticoagulant (c) Antibacterial (d) **All the above**
31. Which of the following is not the properties of Tannins?
 (a) Amorphous substance (b) Astringent taste (c) They are soluble in water (d) **None of the above**
32. Condensed tannins are called as

- (a) Hydrolysable tannins (b) **Non hydrolysable tannins** (c) Pseudotannins
(d) Prototannins
33. Tannic acid is an antidote in _____ poisoning
(a) Iodine (b) Cyanide (c) **Alkaloid**(d) Arsenin
34. Which of the following is an organic compounds that have three 6 sided carbon rings and one 5 sided carbon ring?
(a)**Steroids** (b) Coumarin (c) Flavonoid (d) Alkaloid
35. Steroidal saponins are biosynthesized via
(a) Shikimic acid pathway (b) **Mevalonic acid pathway**
(c) Aceto-Acetate pathway (d) Calvin's Cycle
36. Which alkaloid is used for anticancer property?
(a) Reserpine (b) **Vincristine**(c) Morphine (d) Emetine
37. Wagner test is used to detect _____
(a) Steroids (b) **Alkaloid** (c) Glycosides (d) Terpenes
38. One of the following general characteristics is not true for alkaloids
(a) Nitrogen in the heterocyclic nucleus (b) **pK as less than 7** (c) Good solubility in organic solvents (d) Optically active
39. Aloin from aloe contain which type of Glycoside?
(a) S – Glycoside (b) N – Glycoside (c) O – Glycoside (d) **C – Glycoside**
40. Which alkaloid called as amino alkaloid?
(a) True alkaloid (b) Pseudo alkaloid (c)**Protoalkaloid** (d) All of the above
41. Saponin glycoside shows one of the following property
(a) Laxative (b) Astringent (c) **Foaming** (d) Anticonvulsant
42. Which drug is under the chemical class of cyanogenetic glycoside?
(a) **Bitter almond** (b) Black mustard (c) Digitalis (d) Rhubarb
43. Senna mainly contains
(a) **O – Glycosides** (b) N – Glycosides (c) C – Glycosides (d) S – Glycosides
44. Which is not the characteristic feature of alkaloids?
(a) Complex molecular structure and nitrogen in the molecule (b) Basic in Nature
(c) Biosynthetically derived (d) Acidic in nature only
45. True alkaloids are always present in plants as
(a) Salts of inorganic acid (b) Salts of organic acid (c) Salts of meconic acid (d)
Salts of benzoic acid
46. Gold beater skin test is used for identification of
(a) Alkaloids (b) Glycosides (c) **Tannins** (d) Resins
47. Secondary metabolite is a source for _____
(a) Drugs (b) Fragrances (c) Dyes (d) **All**
48. Which one of the following is not a secondary metabolite?
(a) **Proteins** (b) Alkaloids (c) Terpenes (d) Terpinoides
49. _____ is the source for production of secondary metabolites.
(a) **Primary metabolites** (b) DNA (c) RNA (d) Carbohydrates
50. Secondary metabolites are used by plant cells for _____
(a) Production of nucleic acids (b) **For making plasma membrane** (c)
Morphological differentiation (d) All

51. Which of the following is not a property of glycoside?
 (a) Colourless (b) **Soluble in water** (c) Crystalline (d) Amorphous
52. Glycosides are condensation products of
 (a) **Glycone + Aglycone** (b) Protein + Aglycone (c) Sugar + Protein (d) Fats + Aglycone
53. Which of the following is property of glycosides
 (a) Colourless (b) Crystalline (c) Amorphous (d) **All of the above**
54. The sugar attached to a sulfur atom of aglycone is called as
 (a) O – Glycosides (b) **S – Glycosides** (c) N – Glycosides (d) C – Glycosides
55. The sugar part linked with nitrogen atom of amino group of aglycone is called as
 (a) O – Glycosides (b) S – Glycosides (c) **N – Glycosides** (d) C – Glycosides
56. _____ is visually identified secondary metabolite
 (a) Digitoxin (b) Digoxin (c) Quinine (d) **Beta carotene**
57. Condensed tannins are called as
 (a) Hydrolysable tannins (b) **Non hydrolysable**(c) Pseudotannins (d) Prototannins
58. Which of the following is a naturally occurring phenols
 (a) **Piceid** (b) Flavones (c) Isoflavones (d) Flavanols

Unit – II

1. Flavanoids are a group of
 (a) **Plant metabolites** (b) Glycolysis (c) Carboxyl (d) Methyl
2. Flavonoids are polyphenolic molecules containing _____ carbon atoms
 (a) 14 (b) **15** (c) 16 (d) 17
3. Flavonoids are responsible for the colour of
 (a) Flowers (b) Fruits (c) Leaves (d) **All the above**
4. Flavonoids named from the Latin word flavus meaning _____
 (a) **Yellow** (b) Green (c) Brown (d) Blue
5. Flavonoids are having polar nature and is soluble in
 (a) Methanol (b) Water (c) **Option A&B** (d) None of the above
6. Plant Pigments are _____ and _____ in colour
 (a) **Yellow & Red** (b) Green & Red (c) Brown & Yellow (d) Green & Brown
7. Flavonoids in animal models, can decrease the signs of experimental _____ deficiency
 (a) Vitamin A (b) Vitamin B (c) **Vitamin C** (d) Vitamin D
8. Which of the following is not a flavonoid group
 (a) Flavones (b) Flavonols (c) Flavonones (d) **Ketones**
9. Flavonoids play a variety of biological activities in
 (a) Plants (b) Animals (c) Bacteria (d) **All the above**
10. Flavonoids are classified into _____ groups.
 (a) Five (b) **Six** (c) Eight (d) Two
11. Which one of the following is an isoflavonols?



12. A: Red wine is richer in flavonoids than white wine.
 B: Many flavonoids, when extracted and purified, have been shown to have
 Been shown to have medicinal activity.
 (a) A and B both are correct (b) A is incorrect B is correct (c) **A is correct B is incorrect** (d) A and B both are incorrect
13. Flavonoids are synthesized through _____ pathway?
 (a) **Phenylpropanoid pathway** (b) Acetyl coA pathway (c) Malvonic acid pathway (d) None of the above
14. The chemical structure of flavonoids consists of two aromatic rings connected by a bridge consisting of ___ carbon atoms forming an oxygenated heterocycle.
 (a) Two (b) Three (c) Five (d) Seven
15. What is the structure of Flavonoids?
 (a) C3-C3-C2 (b) **C6-C3-C6** (c) C2-C-C6 (d) C6-C12-C3
16. Flavonoids are _____
 (a) Polar (b) Non Polar (c) **Semi / Medium polar** (d) None of the Above
17. Which one of the following is the flavonoid rich foods?
 (a) Parsley (b) Blueberries (c) Citrus (d) **All the above**
18. Blueberries are the dietary source of
 (a) **Anthocyanidins** (b) Hesperetin (c) Quercetin (d) Tangeritin
19. Find out the therapeutic applications of flavonoids
 (a) Asthma (b) Inflammation (c) Fibromyalgia (d) **All the above**
20. Which flavonoid has an anticancer property?
 (a) Anthocyanidin (b) Hesperetin (c) **Quercetin** (d) Tangeritin
21. What determines the division of flavonoids into subgroup
 (a) **The carbon of C ring on which the B ring is attached and the degree of unsaturation of C ring** (b) The number of hydroxyl group (c) Antioxidant properties (d) Assignment to group is random
22. What are flavonoids?
 (a) Inorganic compounds (b) **Organic compounds based on benzopyrene skeleton** (c) Enzymes (d) None of the above

23. In fruits and vegetables, flavonoids usually found in the form of
 (a) **Glycosides** (b) Acylated (c) Methylated (d) Sulfate
24. Flavonoids are potent antioxidants, depends on their (i) Structural characteristics
 (ii) Pattern of glycosylation
 (a) i) is correct and ii) is wrong (b) **Both i) & ii) are correct**
 (c) i) is wrong & ii) is correct (d) Both i) & ii) are wrong
25. Resin are classified into following sub class except-----
 (a) Acid (b) Ester (c) Resin alcohol (d) **Resin Ether**
26. Myrrh contains _____ acid
 (a) **Comiphoric Acid** (b) Abiotic Acid (c) Benzoic Acid (d) Acetic Acid
27. Homogenous mixture of resins and oil are called as-----
 (a) **Oleoresins** (b) Oleogum (c) Glycoresin (d) Balsam
28. Balsam of Peru resin is used for-----
 (a) Preparation for scabies (b) Treatment of wounds (c) Strong cathartic
 (d) **Both A and B**
29. Which resin is used as stimulant and antiseptic agents?
 (a) **Storax** (b) Asofoetida (c) Lac (d) All of the above
30. If the resin contain benzoic acids are called as-----
 (a) Colophony (b) **Balsam** (c) Sandarac (d) Copaiba
31. Which resin is used for antiseptic treatment?
 (a) **Myrrh** (b) Colophony (c) Storax (d) Cannabis
32. Resins are insoluble in_____
 (a) Alcohol (b) Volatile oil (c) **Water** (d) Fixed oil
33. Glycoresins are made up of
 (a) **Resins+Sugar** (b) Resins+Volatile oil (c) Resins +Gum (d) Resins+ Fixed oil
34. Cannabis resin is used for_____
 (a) Narcotic, sedative & analgesic (b) Psychotropic properties
 (c) Drug (d) **All of the above**
35. Oleo gum resins are a mixture of
 (a) **Volatile oil + gum + resin** (b) Fixed oil + gum + resin (c) Fats + gum + resin (d)
 Gum + resin
36. Which sentence is true about resins?
 (a) Resin are only solid in nature (b) They are soluble in water (c) **They are usually occur in schizogenous or schizolysigenous cavity or duct** (d) They are insoluble in alcohol
37. Resins are used for the production of
 (a) Varnishes (b) Adhesives (c) Food glazing agent (d) **All of the above**
38. Gum resins are more used for
 (a) **Therapeutic purpose** (b) Cleaning purpose (c) Cosmetic purpose (d) None of the above
39. Resins are
 (a) Liquid in nature (b) **Semisolid in nature** (c) Gaseous in nature (d) None of the above
40. Which one is the hard transparent resin?

- (a) Copals (b) Dammar (c) Mastic (d) **All of the above**
41. Resins are electrically
(a) Highly conductive (b) **Nonconductive** (c) Partially conductive (d) None of the above
42. Tolu balsam is otherwise known as
(a) Thomas balsam (b) Opobalsam (c) Resin Tolu (d) **All of the above**
43. Tolu balsam is obtained from
(a) *Toluifera balsamum* (b) *Myroxylon balsamum* (c) **Both A & B** (d) None of the above
44. Flavonoids are found in
(a) Fruit (b) Wine (c) Tea (d) **All of the above**
45. Flavonoids have ____ activities.
(a) Antioxidative (b) Antimutagenic (c) Antibacterial (d) **Both A & B**
46. Which one is the subgroup of flavonoids?
(a) Flavones (b) Flavonols (c) Chalcones (d) **All of the above**
47. Flavonoids play an important role in
(a) Against frost hardiness (b) Drought resistance (c) In freezing tolerance
(d) **All of the above**
48. Flavones are widely present in
(a) Leaf (b) Bark (c) Flower (d) **Both A & C**
49. The major source of flavones is
(a) **Mint** (b) Carrot (c) Chilli (d) Tulsi
50. Flavanones are generally present in
(a) **Citrus plant** (b) Leguminous plant (c) Crop varieties (d) None of the above
51. Flavanones are otherwise called as
(a) Monohydroflavones (b) Tetrahydroflavones
(c) **Dihydroflavones** (d) Polyhydroflavones
52. Isoflavonoids are present in
(a) Citrus plant (b) **Leguminous plant** (c) Crop varieties (d) None of the above
53. Which one of the following is an open chain flavonoid?
(a) **Chalcones** (b) Flavanone (c) Flavones (d) Neoflavonoid
54. _____ is the source of rutin
(a) **Grape seed** (b) Soya bean (c) Cucumber (d) Milk
55. Rutin comes under which class of flavonoids?
(a) Flavone (b) **Flavonols** (c) Isoflavone (d) Coumarin
56. Which secondary metabolite is directly associated with human health?
(a) Terpenoids (b) Alkaloids (c) **Flavonoids** (d) Resins
57. Which of the following are free radicals?
(a) **Hydrogen peroxide** (b) Singlet Oxygen (c) Sodium hydroxide (d) Glucose

Unit – III

1. Decoction procedure is suitable for extracting
(a) Water soluble (b) Heat stable constituents (c) Water insoluble (d) **Both A&B**
2. Solvent extraction is _____ analytical technique.

- (a) **Separating** (b) Qualitative (c) Quantitative (d) Identification
3. Solvent extraction is governed by which law?
 (a) Boyle's law (b) Ostwald dilution law (c) **Nernst distribution law** (d) Beer's law
4. Who discovered distillation?
 (a) Lyman Craig (b) **Jabir Ibn Hayyan** (c) Kanichi Nunogaki (d) Franz Ritter Von Soxhlet
5. Which gas is used in the super critical fluid extraction?
 (a) O₂ (b) carbon monoxide (c) **CO₂** (d) None of the above
6. Who discovered counter current extraction?
 (a) Kanichi Nunogaki (b) Jabir Ibn Hayyan
 (c) **Lyman Craig** (d) Baron Charles cagniard de la Tour
7. What is the temperature of super critical fluid?
 (a) 65°C (b) 657.8K (c) **647.14K** (d) 35°C
8. A: Carbon dioxide is the most widely used supercritical fluid.
 B: This is because CO₂ is cheap, chemically inert, non-toxic, non-flammable and readily available at high purities and at low costs.
 (a) Both A and B is incorrect (b) A is correct B is wrong (c) A is incorrect B is correct (d) **Both A and B is correct.**
9. Oil which does not belong to alcohol class
 (a) Nutmeg (b) Sandalwood (c) **Lemon grass** (d) Lavender
10. The main constituents of lemongrass oil
 (a) Myrcene (b) **Citral** (c) Terpinol (d) Limonene
11. Which sentence is false about lemongrass?
 (a) It contains not less than 75% of aldehydes calculated as citral (b) It is also known as Malabar (c) It is tropical perennial aromatic plant (d) **It has total ash value NMT 16%**
12. Eucalyptus belongs to family
 (a) Liliaceae (b) **Myrtaceae** (c) Solanaceae (d) None of the above
13. Which of the following terpenes is not present in eucalyptus oil.
 (a) Phalldrene (b) Camphene (c) **Rutin** (d) Pinene
14. Which one is the chemical constituents of vetiver oil?
 (a) Cadinene (b) Vetiverol (c) Khusimol (d) **All of the above**
15. What chemical is found in Clove oil?
 (a) **Eugenol** (b) Magnesium oxide (c) Zinc oxide (d) Both A and b
16. _____ is used as anti-inflammatory and antifungal
 (a) Eucalyptus oil (b) Vetiver oil (c) **Clove oil** (d) None of the above
17. Clove oil is extracted from cloves by _____
 (a) Heating (b) Boiling (c) Direct Heating (d) **Steam distillation**
18. Which of the following is used in the preparation of dental products
 (a) **Clove** (b) Mentha (c) Cinnamon Fennel
19. Chemical constituent present in clove is
 (a) Menthol (b) **Eugenol** (c) Cinnamaldehyde (d) Phenolic ether
20. Lemon grass oil is obtained from

- (a) *Cymbopogon flexuosus* (b) *Cinnamomum camphora* (c) *Eucalyptus globules*
 (d) *Chenopodium ambrosioides*
21. Eucalyptus belong to family
 (a) Lilliaceae (b) **Myrtaceae** (c) Solanaceae (d) None of the above
 22. Which of the following terpenes not present in eucalyptus
 (a) Phellandrenem (b) Camphene (c) **Rutin** (d) Pinene
 23. Which of the following is not a property of volatile oil
 (a) **Obtained by extraction** (b) Obtained by distillation (c) Do not leave spot on evaporation (d) Has high refractive index
 24. What is maceration extraction?
 (a) **Immersing a plant in a liquid** (b) Separate compounds based on their relative solubility (c) Separate components at lower temperature (d) Separated through evaporation
 25. What solvents are used to extract essential oils?
 (a) **Petroleum ether** (b) Ammonia (c) Water (d) Distilled water
 26. Vetiver oil comes under which family?
 (a) Malvaceae (b) **Poaceae** (c) Rubiaceae (d) Rutaceae
 27. Biological source of vetiver is
 (a) Leaf (b) **Root** (c) Both A and B (d) None of the above
 28. Botanical name of vetiver is
 (a) *Oryza sativa* ***Vetivera zizanioides*** *Eucalyptus globulus* *Cymbopogon flexuosus*
 29. Eucalyptus oil otherwise known as
 (a) Cochin oil (b) **Blue mallee oil** (c) Khus oil (d) Vetiver oil
 31. Biological source of the clove is
 (a) **Dried Flower bud** (b) Leaf (c) Stem (d) Root
 32. The scientific name of the clove is
 (a) *Piper nigrum* (b) ***Syzygium aromaticum*** (c) *Cymbopogon flexuosus* (d) *Eucalyptus globulus*
 33. *Syzygium aromaticum* comes under which family?
 (a) Poaceae (b) **Myrtaceae** (c) Solanaceae (d) Piperaceae

Unit IV

1. Pharmacognosy is systematic study of these crude drugs obtained from
 (a) Plant (b) Animal (c) Minerals (d) **all of these**
2. Who coined the term pharmacognosy?
 (a) **Prof. John Schimidt** (b) Linneaus (c) Charles Darwin (d) Theophrastus
3. Pharmacognosy includes knowledge about safe use of
 (a) herbal drugs including toxicity (b) side effects (c) drug interaction (d) **all of these**
4. ----- is a term that describes medical treatments that are used instead of traditional (mainstream) therapies.
 (a) **alternative medicine** (b) herbal medicine (c) both (a) and (b) (d) ayurveda
5. The word Ayurveda means
 (a) Life of Medicine (b) Medicine (c) Science (d) **Life of Science**

6. Unani Medicine originated in the -----
(a) Asian world (b) **Arab World** (c) African World (d) European World
7. Where you find Siddha Literature
(a) Kerala (b) Karnataka (c) **Tamil Nadu** (d) Andhra Pradesh
8. ---- is a nature-based system that treats holistically as well as individually, by way of stimulating one's own immunity capable to fight an illness.
(a) Ayurveda (b) **Homeopathy** (c) Siddha (d) Accupuncture
9. UpvasChikitsa (Fasting Therapy), AaharChikitsa (Diet Therapy), MittiChikitsa (Mud Therapy), etc., are the therapies. Which is done by ----- system of medicine.
(a) **Naturopathy** (b) Ayurveda (c) Unani (d) Siddha
10. Example of unorganized drugs are
(a) Agar (b) leaves (c) resins (d) **both (a) and (c)**
11. The crude drugs are grouped according to therapeutic action of their chief active constituent or therapeutic uses is called
(a) Chemical classification (b) taxonomical classification (c) **Pharmacological classification** (d) morphological classification
12. Fresh medicinal plant materials should be stored at appropriate low temperatures, ideally at
(a) **2-8°C** (b) 10- 11°C (c) 12- 14°C (d) 25- 20°C
13. Generally, the drugs are adulterated by substitution with substandard commercial varieties, inferior drugs or artificially manufactured commodities.
Pueraria tuberosa, its substitute is.....
(a) *Calophyllum inophyllum* (b) ***Ipomoea digitata*** (c) *Mucuna pruriens* (d) *Parmelia perlata*
14. Pharmacognostic evaluation helps to screen
(a) commercial varieties (b) substitutes (c) adulterants (d) **all of these**
15. The science that which deals with the drug and their action on human body is called
(a) Physiology (b) **Pathology** (c) Pharmacology (d) Microbiology

Unit V

1. The main reasons behind the need for evaluation of crude drugs are
(a) biochemical variation in the drug (b) effect of treatment and storage of drugs (c) adulterations and substitutions (d) **all of these**
2. The study of drugs using organs of senses is known as
(a) **Organoleptic Evaluation** (b) Microscopical Evaluation (c) Chemical Evaluation (d) Physical Evaluation
3. Microscopic evaluation allows more detailed examination of a drug and it can be used to identify the organised drugs by their -----
(a) **Organs of senses** (b) histological characters (c) moisture content (d) viscosity
4. The biological source of senna is dried leaflets of *Cassia senna* L.
(a) Dried stem (b) **dried leave lets** (c) dried fruits (c) none
5. Common adulterants of senna are
(a) Dog senna (b) palthe senna (c) mecca or Arabian senna (d) **all of these**
6. Senna is used to treat which syndrome?
(a) Acquired immune deficiency syndrome (b) **Irritable bowel syndrome**
(c) Ackerman syndrome (d) Cohen syndrome
7. Aloe used as an ingredient in the formulation of
(a) Lotion (b) Beverages (c) desserts (d) **all of these**

8. Which of the following is an adulterant of aloe?
(a) Malic acid (b) Glucose (c) Indigo dye (d) **Both a and b**
9. What is the biological source of digitalis?
(a) Seeds (b) **Leaves** (c) Roots (d) Bark
10. What is the main property of digitalis?
(a) Antiseptic (b) Anti-inflammatory (c) **Cardio tonic** (d) All of the above
11. What is the main chemical constituent of digitalis?
(a) Verodoxin (b) Odoroside H (c) Saponin (d) **Purpurea A and B**
12. Which of the following is not a use of Licorice ?
(a) Flavouring agent (b) Peptic Ulcer (c) Expectorant (d) **Anti Parkinson's**
13. Which Chemical Constitution is responsible for yellow colour of Licorice ?
(a) **Liquiritin** (b) Iso Liquiritin (c) **a and b** (d) none
14. Which sentence is false about Licorice ?
(a) It belongs to family leguminosae.
(b) It is used in peptic Ulcer.
(c) Russian Licorice is purplish in appearance.
(d) **Licorice is bitter in taste.**
15. Which of the following compound is 50 times sweeter than sucrose ?
(a) Saccharine (b) Liquiritin (c) **Glycyrrhizine** (d) Asparagin
16. **Which Licorice species has a bears violet flower ?**
(a) G. glabra var. gladulifera (b) **G. glabra var. violaceae** (c) G. glabra var. typica
(d) G. glabra var. spanish
17. Which sentence is false about coriander ?
(a) Coriander is also known as cilantro. (b) The main Constitution of coriander is coriandrol. (c) The drug consists of the whole cremocarp, which is sub-globular in shape.
(d) **Coriander is used in treatment of sexual disorders.**
18. In coriander which Chemical Constitution has bad odour ?
(a) **n-decanal** (b) Linalool (c) Vitamin A (d) Pinene
19. **Which of the following is adulterant of coriander ?**
(a) Orange seeds (b) **Bombay Ellipsoidal** (c) Ghoda sowa (d) Dark variety
20. The best varieties of Fennel contain ----of volatile oil.
(a) **4 to 5%** (b) 6-7 % (c) 1-2% (d) 10 %
21. Cinnamon oil + FeCl₃=
(a) Blue Colour (b) Yellow colour (c) Red colour (d) **Green colour**
22. Cinnamon oil is used for
(a) Anti bacterial (b) Carminative (c) Urinary tract infection (d) **All of these**
23. Colour of cinnamon oil is
(a) Orange to red colour (b) Red to orange colour (c) Green to brown colour
(d) **Yellow to red colour**
24. Synonym of cinnamon
(a) Florets (b) **Dalchini** (c) Cortex limonis (d) Limonene
25. What is the biological source of stramonium?
(a) Leaves (b) Flowers (c) Root (d) **Both a and b**
26. What is the common adulterant of stramonium?
(a) Methylene blue dye (b) Indigo dye (c) Essential oil (d) **Tropane alkaloids**
27. Predict the incorrect statements from the following with respect to the morphology of vinca
I. Vinca is a subshrub.
II. Flowers of vinca are diclinous.
III. Leaves are needle shaped.
IV. Fruits are divergent follicle.
(a) I and IV
(b) **II and III**

- (c) I and III
(d) II and IV
28. Which body function is improved by black pepper?
(a) Respiration (b) Reproduction (c) **Digestion** (d) Urinary system
29. Types of roots present in pepper plant?
(a) **Aerial roots** (b) Haustorial roots (c) Epiphytic roots (d) None of the above
30. Molecular formula of piperine?
(a) $C_{10}H_{15}NO_3$
(b) **$C_{17}H_{19}NO_3$**
(c) $C_{15}H_{15}NO_3$
(d) $C_2H_5NO_3$
31. Castor oil is the fixed oil obtained by cold expression of the seeds of
(a) ***Ricinus communis***
(b) *Liquorice*
(c) *Manihot esculenta*
(d) *Codiaeum variegatum*
32. Which acid is responsible for laxative property?
(a) **Ricinoleic** (b) isoricinoleic (c) dihydroxy stearic (d) steric
33. The chemical used to test castor oil is
(a) Methanol (b) **Petroleum** (c) chloroform (d) Ethanol
34. **Neem oil**, also known as
(a) **margosa oil** (b) roseberry oil (c) camomile oil (d) vanilla oil
35. The ingestion of neem oil is potentially toxic and can cause
(a) metabolic acidosis (b) kidney failure (c) encephalopathy (d) **all of these**
36. In sesame oil, unsaponifiable portion of oil is
(a) Sesamol (b) lignin (c) both (a) and (b) (d) none
37. Acid value of sesame oil is
(a) 6 (b) 5 (d) 10 (c) 2

Section - B

Unit - I

1. What are glycosides with examples?
2. Differentiate primary and secondary metabolites
3. Write the classification of based on glycosidic Linkage group.
4. What are secondary metabolites?
5. What are the major pharmacological effects of cardiac glycosides?
6. Define Phytochemistry.
7. Define Histochemistry.
8. What are primary metabolites?
9. Comment on β -Sitosterol.
10. Write the uses of Glycyrrhizin.
11. What are terpenoids?
12. Write notes on Coumarins.
13. What are Tannins?
14. What are Steroids give two examples?
15. Write notes on alkaloids.

Unit – II

1. Note on Bio-flavonoids.

2. What are resins? Give two examples.
3. Classify flavonoids.
4. Write the properties of flavonoids.
5. Write the natural sources of flavonoids
6. Write note on cannabis.
7. Write the uses Turpentine.
8. Write note on Myrrh.
9. Write any two uses of Asafetida
10. Write note on balsam.

Unit – III

1. What is extraction method explain?
2. Write the extraction method of Lemon grass oil
3. List any two utilization of lemon grass oil
4. Mention the properties of Eucalyptus oil
5. What are volatile oil?
6. Write the sources of volatile oil.
7. List out the chemical constituents of Clove.
8. List out the chemical constituents of vetiver.
9. Write the properties of Lemon grass.
10. Write note on Counter-current Extraction

Unit IV

1. Define Pharmacognosy
2. Write any two scope of herbal medicine?
3. List out any four application of herbal medicine?
4. Give example of Organized drugs.
5. What is an organized drugs?
6. Write any five advantages of morphological classification of crude drugs?
7. List out the disadvantages of chemical classification of crude drugs.
8. Define Chemo-taxonomical classification.
9. Mention any four ways of drying medicinal plants
10. Write any two methods of preservation of medicinal plants?
11. What is adulteration?
12. Give two examples of adulteration by addition of synthetic principles.
13. What is Pharmacognostic evaluation?
14. What is meant by Pharmacognostic features?
15. Which are two main diagnostic features for leafy drugs?
16. What are the requirements for storage of crude drugs?

Unit V

1. Why the evaluation of crude drugs needed?
2. What is organoleptic evaluation of crude drugs?
3. Define Microscopic evaluation of crude drugs
4. What is the use of finding ash value of crude drugs?
5. What is Vein-islet number?

6. List out any five chemical constituents of senna.
7. Mention any four common adulterants of senna.
8. Write the common names of *Aloe* and mention which family it belongs.
9. What is the biological sources of Digitalis?
10. Write about identification test of liquorice.
11. List out the synonyms of Fennel.
12. Describe Cinnamon Bark.
13. Mention any four uses of castor oil?
14. What is Ricinoleic acid?
15. Mention the standards of seasome oil.

Section - C

Unit – I

1. Discuss Preliminary phytochemical screening of phytoconstituents.
2. Define and classify glycosides.
3. Add a note on lactones and Bitter glycosides.
4. Short note on steroidal glyco -alkaloids.
5. Write about Isothiocyanate glycosides.
6. Write note on Ginseng
7. Write about cyanogenetic glycosides.
8. Define Tannins. Explain their properties
9. Classify and Discuss Tannins with examples
10. Define Tannins. Explain their properties

Unit – II

1. Write the importance of flavonoids.
2. How does flavonoids help the human body? Discuss.
3. Write the properties of flavonoids.
4. Why do plants make flavonoids? Explain.
5. Write about balsam resin.
6. Classify and discuss flavonoids.
7. Distinguish synthetic and natural resins.
8. Write the properties and uses of oleoresin.
9. What are colophony? Write its characters.
10. Write note on podophyllum.

Unit – III

1. Discuss about Super Critical fluid extraction and its application.
2. Mention the different methods of extraction? Discuss in detail maceration and percolation methodology for natural drugs.
3. Discuss in detail Decoction and soxlet extraction
4. Write the source, constituents, and properties of volatile oil.
5. Write the extraction procedure and utilization of Lemon grass oil.
6. Write the extraction procedure and utilization of Vetiver oil.
7. Write the extraction procedure and utilization of Clove oil.

8. Write the extraction procedure and utilization of Eucalyptus oil
9. What is the main problem in global trade of medicinal plants?
10. Define IPR. List out TRIPS agreement related to IPR.

Unit IV

1. Define Herbal Medicine? Write briefly the scope and applications of herbal medicine.
2. Write notes of Morphological classification of Crude drugs.
3. Write about the chemotaxonomic classifications of crude drugs with examples.
4. List out the advantages and disadvantages of therapeutic classification of crude drugs.
5. How the crude drugs should be collected according to WHO's guidelines?
6. Describe the different type of crude drug adulteration.
7. Write notes on synergy and polyvalent action of secondary metabolites.

Unit V

1. Describe the different methods used for chemical evaluation of crude drugs?
2. How physical standards of crude drugs are determined? Explain briefly
3. What are chemical constituents present in Aloe and list out its medicinal uses?
4. Enumerate the chemical constituents and medicinal uses of Fennel.
5. List out the medicinal uses of *Vinca*.
6. Write notes on Toxicity of neem oil.
7. Write notes on chemical constituents and medicinal uses of coriander

Section – D

Unit – I

1. What are glycosides? Discuss cardiac glycosides in detail.
2. Define glycosides. Discuss about cyanogenetic glycosides.
3. What are saponins? Explain the properties and chemistry. Discuss liquorice in detail.
4. Define and classify alkaloids with examples
5. What are alkaloids? Explain their general properties and chemical classification of alkaloids.

Unit – II

1. Explain the chemistry of flavonoids. Discuss Bio-flavonoids.
2. Write note on natural sources and therapeutic applications of flavonoids
3. What are flavonoids? Explain their general properties and chemical classification of alkaloids.
4. What are resins? Write their medicinal uses.
5. Define and write the property of flavonoids.

Unit – III

1. What is extraction? Mention the different methods of extraction? Discuss about Super Critical fluid extraction and its application.
2. Explain different methods of extractions of crude drugs.
3. Explain in brief the analysis of clove oil
4. Explain in brief the analysis of Cinnamon oil

5. Explain in brief the analysis of lemon grass oil.
6. Write the distillation methods of extraction of volatile oils.
7. Discuss mechanical methods of extraction of essential oils.
8. Write the production of clove oil
9. Briefly explain extraction of vetiver oil.
10. Write an essay on Intellectual property rights and trade of medicinal plants.

Unit IV

1. Write an essay on different type of system of medicine .
2. With suitable examples explain the therapeutic and chemical classification of crude drugs.
3. Write an essay on advantages and disadvantages of morphological and chemotaxonomic classifications of crude drugs.
4. Write elaborately about collection and processing of crude drugs.
5. Describe different types of adulteration in crude drugs with examples.
6. Write an essay on Pharmacognostical standards.

Unit V

1. Write an essay on Physico-chemical evaluation of crude drugs.
2. Discuss Microscopic evaluation of crude drugs.
3. Write an essay on Botanical name, family, useful part, chemical constituents, adulterants and uses of Digitalis
4. Discuss the chemical constituents, adulterants and uses of Aloe.
5. Discuss the chemical constituents and medicinal uses of the alkaloid plants those you have studied in the syllabus.
6. Write an essay on sources, chemical constituents and uses of sesame oil.

ST. MARY'S COLLEGE (AUTONOMOUS) – THOOTHUKUDI
I M.Sc. Botany - Semester II

Core V

Plant Diversity II

Course Code:21PBOC21

Section A

UNIT I

1. Which of the following is regarded as the age of pteridophytes?
(a) **Early Paleozoic** (b) Middle Paleozoic (c) Late Paleozoic (d) All of the above
2. A plant in the division LycopHYta differs from one in the division Psilophyta in having
(a) oogamy (b) true stems (c) **true roots and leaves** (d) a gametophyte stage
3. Which of the following is a member of Ligulopsida?
(a) *Pteridium* (b) ***Selaginella*** (c) *Equisetum* (d) *Lycopodium*
4. Pteridophyte Phylogeny Group, or PPG classification was proposed by
(a) Smith (b) **Eric**s (c) Zimmerman (d) Linnaeus
5. The single-nerved ultimate terminal portion (at base or apex) of a dichotomising axis is termed as _____.
Leaf (b) **Telome** (c) Stem (d) Twig
6. Telome theory was proposed by
(a) Eames (b) **Zimmerman** (c) Mehra (d) Sahni
7. Find out the incorrect statement pertinent to stele
(a) **protostele is the most advanced stele** (b) medullated protostele is siphonostele
(c) individual unit of dictyostele is meristele (d) protostele with star shaped xylem is actinostele.
8. The primitive type of stele is a
(a) **protostele** (b) dictyostele (c) amphiphloeic siphonostele (d) solenostele.
9. Amphiphloeic siphonostele has
(a) phloem towards innerside of xylem (b) phloem surrounded by xylem
(c) **xylem on both sides surrounded by phloem** (d) phloem outside the xylem.
10. A stele without pith is
(a) solenostele (b) siphonostele (c) **haplostele** (d) amphiphloeic siphonostele.
11. Heterospory is found in
(a) *Selaginella* (b) *Marsilea* (c) **both a and b** (d) *Lycopodium*
12. Heterospory means

- (a) **presence of micro and megaspores** (b) presence of microspores
(c) presence of megaspores (d) absence of megaspores
13. Microspores are produced in the
(a) **microsporangium** (b) megasporangium (c) microgametophyte (d) sporangium
14. Megasporangia are produced in the
(a) **megasporophyll** (b) microsporophyll (c) sporophyll (d) sporangia
15. The stele consists of star shaped xylem is
(a) **actinostele** (b) plectostele (c) protostele (d) haplostele.
16. Stellar theory was proposed by
(a) Sachs (b) **Van Tieghum and Douliot** (c) Foster and Gifford (d) Chang.
17. _____ is the feature of *Selaginella* bringing closer towards seed habit
(a) presence of alternation of generations (b) **presence of two different types of spores**
(c) presence of ligule (d) presence of only one type of spore
18. In leptosporangiate type of sporangial development the sporangium develops from
(a) **single superficial cells** (b) two cells (c) three cells (d) a group of cells
19. The spores of fern plant germinate to form
(a) thick walled zygospore (b) an embryo (c) a new fern plant (d) **prothallus**
20. Spore producing organ in *Psilotum* is known as
(a) strobilus (b) sporangium (c) **synangium** (d) sorus
21. The elementary process of the telome concept is
(a) curvation (b) **reduction** (c) overtopping (d) all the above
22. The telome theory pertains to the explanation of the _____.
(a) formation of fossils and process of fossilization
(b) **origin of modern vascular plant characteristics from primitive Rhynia-like morphology**
(c) cyclical nature of periods of glaciation during geologic time
(d) processes of food and water transport in plants
23. According to the telome Theory, monopodial branching was derived from dichotomous branching by _____ of telomes.
(a) **overtopping** (b) planation (c) syngeneses (d) undercutting
24. In the Telome Theory, the sporophyll was derived from dichotomous branching by _____ of telomes.
(a) reduction

- (b) overtopping, reduction, and planation
- (c) planation, syngensis, and regression
- (d) **syngensis, overproduction, and recurvation**

25. Identify the theory pertinent to the origin of vascular cryptogams.

- (a) Anthocerotean theory (b) Strobilus theory (c) Protocorm theory (d) **All the above**

UNIT: II

1. *Psilotum* consists of
 - (a) **Root and stem** (b) Root and leaves (c) Stem and leaves (d) Root, stem and leaves
2. The common character shared by *Rhynia* and *Psilotum* is
 - (a) Scale leaves (b) Photosynthetic stem (c) **Rhizoids** (d) sporangia
3. *Psilotum* belongs to the order
 - (a) Psilophytales (b) **Psilotales** (c) Lycopodiales (d) Equisetales
4. In *Psilotum*, actinostele is present in the
 - (a) Rhizome (b) Basal portion of the stem (c) Middle portion of the stele (d) **Apical region of the aerial shoot**
5. *Psilotum* differs from *Tmesipteris* in the
 - (a) The structure of sex organs (b) Prothallus (c) The presence of rhizoids in both (d) **the structure of synangium**
6. The synangium in *Tmesipteris* is
 - (a) One lobed (b) **two lobed** (c) three lobed (d) four lobed
7. The presence of a fungus is essential for the development of prothallus in
 - (a) *Psilotum* (b) **Tmesipteris** (c) *Lycopodium* (d) *Selaginella*
8. Protocorm formation occurs in
 - (a) **Lycopodium** (b) *Selaginella* (c) *Equisetum* (d) *Marsilea*
9. *Lycopodium* produces spermatozoids with
 - (a) **Two flagella** (b) four flagella (c) many flagella (d) no flagella
10. *Lycopodium* is commonly called as
 - (a) Horse tail (b) **club moss** (c) Quillwort (d) Stonewort
11. Where is *Phylloglossum* found naturally?
 - (a) India (b) England (c) Russia (d) **Tasmania**
12. In *Phylloglossum*, the sporophylls are arranged on the axis
 - (a) Alternately (b) opposite to each other (c) **Without any definite pattern** (d) sometimes alternately and sometimes opposite

13. Homosporous condition is present in
 (a) **Lycopodium** (b) *Selaginella* (c) *Cycas* (d) *Marsilea*
14. How many types of prothalli are found in different types of *Lycopodium*?
 (a) 1 (b) 2 (c) 3 (d) **4**
15. Three chambered sporangium is present in
 (a) *Lycopodium* (b) *Selaginella* (c) ***Psilotum*** (d) *Equisetum*
16. In *Lycopodium* stem the stele is
 (a) solenostele (b) siphonostele (c) dictyostele (d) **protostele**
17. In leptosporangiate type of sporangial development the sporangium develops from
 (a) **single superficial cells** (b) two cells (c) three cells (d) a group of cells
18. The spores with elaters are found in
 (a) *Adiantum* (b) ***Equisetum*** (c) *Lycopodium* (d) *Marsilea*
19. Spores of Pteridophytes are
 (a) **haploid** (b) diploid (c) triploid (d) tetraploid
20. In which of the following roots are absent
 (a) *Lycopodium* (b) *Selaginella* (c) *Equisetum* (d) ***Psilotum***
21. *Isoetes* is
 (a) unisporous (b) bisporous (c) **heterosporous** (d) homosporous
22. In *Equisetum* the sporangia are developed on
 (a) **Sporangiophores** (b) vegetative leaves
 (c) lower surface of sporophyll (d) upper surface of sporophyll
23. The spores of fern plant germinate to form
 (a) thick walled zygospore (b) an embryo (c) a new fern plant (d) **prothallus**
24. Spore producing organ in *Psilotum* is known as
 (a) strobilus (b) sporangium (c) **synangium** (d) sorus
25. Protocorm formation occurs in
 (a) *Psilotum* (b) *Isoetes* (c) *Selaginella* (d) ***Lycopodium***
26. Which of the following is commonly called as quillwort?
 (a) *Psilotum* (b) ***Isoetes*** (c) *Selaginella* (d) *Lycopodium*
27. Trabeculae in *Selaginella* is modification of
 (a) Pericycle (b) **endodermis** (c) pericycle and endodermis (d) cortex
28. In which of the following the carinal canal is present in the stem
 (a) *Selaginella* (b) ***Equisetum*** (c) *Marsilea* (d) *Adiantum*
29. Secondary growth is observed in the stem of

- (a) **Botrychium** (b) *Lycopodium* (c) *Equisetum* (d) *Marsilea*
30. Development of sporangium in *Ophioglossum*
 (a) leptosporangiate (b) **eusporangiate**
 (c) leptosporangiate and eusporangiate (d) heterosporangiate
31. Choose the correct answer
 (a) Haplostele – *Equisetum* (b) Plectostele – *Psilotum*
 (c) **Amphiphloic siphonostele** – *Marsilea* (d) Dictyostele – *Selaginella*
32. Amphiphloic siphonostele is found in the rhizome of
 (a) *Selaginella* (b) *Lycopodium* (c) *Equisetum* (d) ***Marsilea***
33. Maiden hair fern is the name given to
 (a) *Pteris* (b) ***Adiantum*** (c) *Selaginella* (d) *Lycopodium*
34. Multiflagellate sperms are found in
 (a) *Selaginella* (b) *Lycopodium* (c) ***Equisetum*** (d) *Psilotum*
35. Ligule is present on the upper side of the leaves of
 (a) ***Selaginella*** (b) *Lycopodium* (c) *Equisetum* (d) *Pteris*
36. The stem of *Lycopodium clavatum* possesses
 (a) **plectostele** (b) actinostele (c) mixed protostele (d) dictyostele
37. Coenosorus is present in
 (a) *Selaginella* (b) *Lycopodium* (c) *Marsilea* (d) ***Pteris***
38. The sorus present in *Pteris*
 (a) discontinuous and circular (b) **continuous and linear**
 (c) discontinuous and reniform (d) discontinuous and vermiform
39. A plant in the division Lycopphyta differs from one in the division Psilophyta in having
 (a) oogamy (b) true stems (c) **true roots and leaves** (d) a gametophyte stage
40. Club moss is the common name of
 (a) *Selaginella* (b) ***Lycopodium*** (c) *Equisetum* (d) *Psilotum*
41. Secondary growth occurs in
 (a) *Selaginella* (b) *Lycopodium* (c) *Equisetum* (d) ***Isoetes***
42. In *Isoetes*
 (a) **all the leaves are sporophylls** (b) the outer leaves are sporophylls
 (c) the inner leaves are sporophylls (d) there are no sporophylls
43. Rhizophore is found in
 (a) ***Selaginella*** (b) *Ophioglossum* (c) *Equisetum* (d) *Isoetes*
44. In *Selaginella*, meiosis occurs during

- (a) Gamete formation (b) **Spore formation**
 (c) Zygote germination (d) Sporophyll formation
45. The basal portion of a mature ligule of *selaginellais* known as
 (a) glossopodial sheath (b) **glossopodium** (c) sporangium (d) disc
46. *Equisetum* is commonly called as
 (a) **horse tail** (b) adder's tongue (c) maiden hair fern (d) club moss
47. _____ is a eusporangiate fern
 (a) *Selaginella* (b) ***Ophioglossum*** (c) *Equisetum* (d) *Isoetes*
48. Meristemes are found in
 (a) *Psilotum* rhizome (b) *Lycopodium* stem (c) **fern rhizome** (d)
Selaginella rhizophore

UNIT: III

1. In *Cycas* the pollen grains are shed at the
 (a) 4-celled stage (b) **3-celled stage** (c) 2-celled stage (d) 1-celled stage
2. Each stamen in *Cycas* is a representation of _____
 (a) **microsporophyll** (b) microsporangium (c) megasporophyll (d) megasporangium
3. Algal zone is characteristic of _____
 (a) roots of *Pinus* (b) stem of *Cycas* (c) **coralloid roots of *Cycas*** (d) stems of *Pinus*
4. Root cap and root hairs are absent in _____ of *Cycas*
 (a) **coralloid roots** (b) tap root (c) fibrous root (d) none of the above
5. An autotrophic, prokaryotic and nitrogen-fixing symbiont is present in
 (a) *Cicer* (b) ***Cycas*** (c) *Sequoia* (d) *Pinus*
6. _____ serves as a connecting link between the angiosperms and gymnosperms
 (a) **Gnetales** (b) Coniferales (c) Ginkgoales (d) Cycadales
7. Though *Cycas* has an embryo with two cotyledons, it is not grouped under dicotyledonous plants as
 (a) ovules are naked (b) possesses compound leaves
 (c) has megasporophyll (d) resembles a palm tree
8. In gymnosperms, the ovules typically are
 (a) bitegmic and anatropous (b) bitegmic and orthotropous
 (c) **unitegmic and orthotropous** (d) unitegmic and anatropous
9. Tallest known gymnosperm is
 (a) *Pinus* (b) *Ginkgo* (c) ***Sequoia*** (d) *Ephedra*

10. Inverted omega-shaped organization of vascular bundles is seen in
 (a) *Cycas* root (b) *Cycas* stem (c) *Cycas* leaflet (d) ***Cycas* rachis**
11. Endosperm in gymnosperm is formed
 (a) at the time of fertilization (b) **before fertilization**
 (c) after fertilization (d) along with the development of embryo
12. Winged seeds are present in
 (a) *Cycas*(b) *Gnetum* (c) *Ephedra*(d) ***Welwitschia***
13. Fruits are not formed in Gymnosperms because
 (a) the process of fertilization does not take place in them (b) they are not pollinated
 (c) they are seedless plants (d) **they have no ovary**
14. Venation in *Ginkgo biloba* leaf is
 (a) **open dichotomy**(b) dichotomy (c) reticulate (d) pinnate
15. Vessels are present in
 (a) ***Gnetum*** (b) *Ginkgo*(c) *Cupressus* (d) *Cycas*
16. This serves as a connecting tool between gymnosperms and angiosperms
 (a)***Gnetales*** (b)*Coniferales*(c) *Ginkgoales* (d) *Cycadales*
17. *Taxus*, a genus of coniferous trees is well known for the drug _____ which is used as a anticancer compound
 (a) **taxol** (b) phenol (c) flavonoids (d) tannin
18. _____ extracted from *Cycas* trees are used as the antidote for snake bites.
 (a) **Gum** (b) primary metabolites
 (c) secondary metabolities (d) None of the above
19. Plant body is sporophytic, and the sporophyte is differentiated into roots, stem and leaves in both _____
 (a) algae and bryophytes (b) **gymnosperms and pteridophytes**
 (c) gymnosperms and bryophytes (d) all the above
20. Phloem cells of gymnosperms and pteridophytes lacks _____
 (a) resin duct (b) oil cells (c) **companion cells** (d) all the above
21. *Welwitschia* resembles *Gnetum* and shows which of the following character.
 (a) Vessels in their xylem (b) Broad medullary rays in their xylem;
 (c) Dioecious nature of their plants(d) all the above
22. Which is called as joint pine?
 (a) ***Ephedra*** (b) *Cycus* (c) *Pinus* (d) *Gnetum*
23. Polination in *Ephedra* is _____

- (a) **anemophilous** (b) zoophilous
(c) entomophilic (d) none of the above

UNIT IV

In *Podocarpus* the ovuliferous scale is folded around the ovule and form an extra envelope called

- (a) aril (b) perianth (c) **epimatium** (d) integument

The gymnosperm resembles with angiosperm in having

- (a) Ciliated sperm (b) presence of ovary (c) **presence of seed** (d) presence of fruit

Gymnosperms differ from angiosperms in

- (a) Showing heterospory (b) **having naked ovule** (c) having seeds (d) have no ovary

UNIT: V

1. To which of the following the genus *Williamsonia* belongs?

- (a) Cycadales (b) Coniferales (c) Cycadales (d) **Bennittiales**

2. Which of the following statements hold true for fossilization?

- a) Only small animals are more likely to become fossils
b) Fossilization is more likely to occur on mountains rather than forests
c) Every organism that dies becomes a fossil

d) None of the above

3. _____ literally means transformation of the organic tissues into stone.

- (a) Compressions (b) Casts (c) Molds (d) **Petrifactions**

4. *Cordaites* belongs to _____ period

- (a) **Pennsylvanian Subperiod** (b) Triassic period (c) Jurassic (d) both b & c

5. *Williamsonia* resembled _____ in appearance.

- (a) *Cycas* (b) *Pinus* (c) *Marchantia* (d) none of the above

6. _____ is considered as a missing link between the hornworts and the vascular plants

- (a) ***Horneophyton*** (b) *Sphenophyllum* (c) *Calamites*. (d) *Cordaites*.

7. The leaves of _____ were triangular in shape.

- (a) *Horneophyton* (b) ***Sphenophyllum*** (c) *Calamites*. (d) *Cordaites*.

8. _____ are calcium-rich permineralised life forms

- (a) incrustation (b) casts (c) **Coal balls** (d) None of the above

9. Formal geologic time begins at the start of the _____ and continues to the present day.

- (a) Pennsylvanian Subperiod (b) Triassic period (c) Jurassic (d) **Archean Eon**

10. Find out the correct order

- (a) eons, eras, periods, epochs and ages (b) eons, periods, epochs, eras and ages
(c) eons, epochs, eras, periods and ages (d) eons, eras, periods, ages and epochs

Section B

UNIT I

1. Define stele
2. What is protostele?
3. Draw and label the parts of plectostele
4. Write notes on Church's hypothesis.
5. What is heterospory?
6. Write any two general characters of pteridophytes
7. Mention any two economic importance of pteridophytes
8. Mention the general characteristics of Eligulopsida
9. What are the types of siphonostele?
10. Define Apospory
11. Define Overtopping
12. Define Planation
13. Write notes on anthithetic theory of alternation of generation.
14. Mention about the distribution of pteridophytes in India.
15. Write about the homosporous life cycle of pteridophytes.
16. Write about the heterosporous life cycle of pteridophytes.

UNIT II

1. Vallecular canal
2. Prothallus
3. Quillworts
4. Synangia
5. Polystele
6. Polycyclic stele
7. Carinal canal
8. Spike
9. Adder's tongue fern
10. Mixed sorus

11. Indusium
12. Coenosorus
13. Sporangiphore
14. Ligule
15. Cone
16. Prothallus
17. Blepharoplasts

UNIT III

1. Write about the distribution of Cycadaceae
2. How does fertilization occur in *Cycas*?
3. Draw the structure of *Ginkgo* branch and label the parts.
4. Command on male strobili of *Ginkgo*
5. Write short notes on Cupressaceae
6. Give any two economic importance of Cupressaceae
7. Pollination in Podocarpaceae
8. Draw the structure of archegonia of Podocarpaceae and label the parts
9. Write notes on pollination of Araucariaceae
10. Command on cones of Araucariaceae

UNIT IV

- 1) Which plant is called living fossil? Why?
- 2) Distinguish between manoxylic and pynoxylic wood.
- 3) Name some drug-yielding taxon of gymnosperms.
- 4) Enlist any four economically important Gymnosperms with its use.
- 5) Draw the habit of *Welwitschia* and label the parts.
- 6) Command on male strobilus of *Welwitschia*
- 7) Command on the root system of *Ephedra*.
- 8) Give two resemblances between gymnosperms and pteridophytes.
- 9) Give two differences between gymnosperms and Angiosperms.

UNIT V

- 1) Define geological time scale
- 2) What is mean by fossilization?

- 3) Define petrification.
- 4) What are coal balls?
- 5) Which period is called the age of ferns? Explain.
- 6) What is paleobotany?
- 7) Describe the morphology of *Calamites*.
- 8) Give some examples for fossil Pteridophytes.
- 9) Give some examples for fossil Gymnosperms.
- 10) Differentiate casts and molds

Section C

UNIT I

1. Outline the classification of Pteridophytes by Eric.
2. Mention any five economic importance of Pteridophytes
3. Explain the different types of steles seen in the pteridophyte plants you have studied.
4. Distinguish between protostele and dictyostele.
5. Write about the origin of seed habit in Pteridophytes.
6. What are the different types of protostele?
7. Define heterospory. Explain with an example.
8. Write notes on the medicinally important pteridophytes.
9. Explain siphonostele with examples.
10. Differentiate protostele from solenostele.
11. "Pteridophytes are potential biofertilizers as well as troublesome weeds" Explain.

UNIT II

1. Describe the structure of sorus in *Pteris* .
2. Write notes on indusium.
3. Give a brief account on morphological characters of Ophioglossales.
4. Describe the anatomy of *Lycopodium* stem with suitable examples.
5. Briefly explain the cone structure in Selaginellales.
6. Write notes on sporophylls of Isoetales.
7. Differentiate between sorus and synangium in Pteridophytes

8. Give a brief account on the life cycle of a heterosporouspteridophyte.
9. With a suitable example explain the life cycle of a homosporouspteridophyte.
10. Write notes on maturation of sporangia in Filicales

UNIT III

- 1) Give any five general characteristic features of Gymnosperms
- 2) Write a note on the coralloid root of *Cycas*.
- 3) State the geographical distribution of *Cycas* species in India.
- 4) Embryogeny of Cycadaceae
- 5) Seed Formation and Germination in Cycadaceae
- 6) Economic Importance of Cycadaceae
- 7) General Characteristics of Ginkgoaceae
- 8) Command on the reproductive structure of *Ginkgo*
- 9) Describe the morphological features of Araucariaceae
- 10) Explain the structure of *Araucaria* leaf with diagram
- 11) Write about the male cone of Podocarpaceae
- 12) Discuss the distribution and morphology of Podocarpaceae
- 13) Discuss the anatomical features of Cupressaceae stem
- 14) Describe the pollination and embryo development in Cupressaceae

UNIT IV

- 1) Briefly write the internal structure of *Ephedra* leaf
- 2) Describe the pollination and embryo development of Ephedraceae
- 3) Describe the external features of male and female cones of *Gnetum*.
- 4) Describe the process of secondary thickening in the stem of *Gnetum*.
- 5) Describe the structure of *Gnetum* leaf.
- 6) Draw and describe the structure of *Gnetum* ovule
- 7) List the angiospermic characters of *Gnetum*
- 8) Describe the vegetative Structure of *Welwitschia*
- 9) Resemblances between *Welwitschia* and *Gnetum*
- 10) Enlist the economic importance of Gymnosperms

UNIT V

- 1) Write brief notes on geological time scale.
- 2) Enlist the applications of fossil study in Botany.

- 3) Command on Compressions, incrustation, casts and molds
- 4) Command on petrifications, coal balls and compactions
- 5) Enlist the general characters of fossil Pteridophytes
- 6) Command on *Sphenophyllum*
- 7) Command on *Calamites*
- 8) Write about *Williamsonia*
- 9) What are Cordaites? Write notes about it.

Section D

UNIT I

1. Explain heterospory and seed habit in Pteridophytes.
2. Write the classification of Pteridophytes by Eric.
3. Trace the stelar evolution in Pteridophytes.
4. Write an essay on the economic importance of Pteridophytes.
5. Write notes on
 - (a) food value of Pteridophytes
 - (b) protostele.
6. Write notes on
 - (a) medicinal importance of Pteridophytes.
 - (b) solenostele.
7. Describe different types of prothallus in pteridophytes you have studied .
8. What is alternation of generation? Explain the life cycle of any one homosporous pteridophyte.
9. Explain the application of Telome concept in the interpretation of origin of microphyll and megaphyll.
10. Describe the variation in the sorus of ferns and explain the evolutionary trends.
11. Write an essay on stelar evolution in Pteridophytes.
12. Write a brief essay on the origin of alternation of generation.

UNIT II

1. Discuss the structure and development of sporangia in filicales.
2. Give a comparative account of the spore producing organs of *Psilotum*, *Selaginella* and *Equisetum*.
3. Describe the life history of *Isoetes* pointing out the features of special interest.

4. What is heterospory? Explain the life cycle of a heterosporous Pteridophyte.
5. Write an essay on the salient features of Pteridophytes.
6. Describe the external and internal structure of *Equisetum* stem.

UNIT III

- 1) Give the classification of gymnosperm according to K.R. Sporne
- 2) Enlist the general characteristic features of Gymnosperms
- 3) Describe life cycle of *Cycas*
- 4) Discuss structures of root, stem and leaves of *Cycas* with labelled diagrams.
- 5) Describe the reproduction in Ginkgoaceae
- 6) Anatomical structure of Ginkgoaceae
- 7) Male and female gametophyte of *Ginkgo*
- 8) Life cycle of Cupressaceae
- 9) Describe the reproduction of Cupressaceae
- 10) Explain the anatomical features of Podocarpaceae with labelled diagram
- 11) Life cycle of Podocarpaceae
- 12) Describe the morphology and anatomical features for leaf and stem of *Araucaria*
- 13) Command on reproductive structure and reproduction of Araucariaceae with suitable diagrams

UNIT IV

- 1) Describe life cycle of *Ephedra*.
- 2) Describe the morphology and internal structure of reproductive organs of *Ephedra*
- 3) Briefly explain the anatomical features of vegetative parts of *Ephedra*
- 4) What are the various anatomical characters seen in old stem of *Gnetum*
- 5) Describe the vegetative features of *Gnetum*
- 6) Reproduction in *Gnetum*
- 7) Explain the distribution and morphological features of Welwitschiaceae
- 8) Describe the anatomical structure and reproduction of Welwitschiaceae
- 9) Enlist the affinities of Gymnosperms with Angiosperms and Pteridophytes
- 10) Explain the economic importance and medicinal values of Gymnosperms

UNIT V

- 1) Geological time scale and its importance
- 2) What is fossilization? Discuss the fossil types

- 3) Write about early vascular plant *Horneophyton* and its geological occurrence, geographical distribution and characteristic features.
- 4) Discuss about *Sphenophyllum*
- 5) Discuss about *Calamites*.
- 6) Command on fossil gymnosperms with special reference to *Williamsonia*
- 7) Write about *Cordaites*.

Section - A

Unit I

1. What is the average pH value of seawater?
(a) 3.8 to 4.2 (b) 5.6 to 6.4 (c) **7.5 to 8.4** (d) 11.2 to 12.8
2. Two gases dissolved in seawater are of metabolic importance: _____ and _____.
(a) **CO₂, O₂** (b) H₂, N₂ (c) CO, O₂ (d) CO, NO
3. One of the most important roles of bacteria in marine food webs is:
(a) Causing fish diseases
(b) **Recycling of nutrients**
(c) Being the main food source for jellyfish
(d) Being the main food source for copepods and euphausiids
4. Some bacteria, such as cyanobacteria, are -----
(a) Carnivores (b) Herbivores
(c) Omnivores (d) **Primary producers**
5. Most of the salt dissolved in seawater is:
(a) Calcium carbonate (CaCO₃) (b) Iron oxide (Fe₂O₃)
(c) **Sodium chloride (NaCl)** (d) Ammonium nitrate (NH₄NO₃)
6. Which ocean zone contains over 75% of the total volume of the world's oceans?
(a) Bathyal zone (b) Neritic zone (c) Photic zone (d) **Abyssal zone**
7. Seawater in the vicinity of a major phytoplankton bloom is characterized by...
(a) low CO₂ and high nutrient content (B) low O₂ and high nutrient content.
(c) **high O₂ and low nutrient content** (D) high CO₂ and low nutrient content
8. Which feature is at the greatest depth in the ocean?
(a) **Abyssal plain** (b) Continental shelf
(c) Submarine canyon (d) Continental rise
9. Chlorinity of sea water is related to the total amount of what substance dissolved in the water?
(a) oxygen (b) organic matter (c) **salts** (d) pollution

10. When carbon dioxide dissolves in water, the water becomes slightly more:
(a) acidic; its pH is higher (b) **acidic; its pH is lower**
(c) alkaline; its pH is higher (d) alkaline; its pH is lower
11. Oceans cover about _____ of the earth's surface.
(a) 50% (b) 60% (c) **70%** (d) 80%
12. The ocean zone that covers the continental shelf is the
(a) estuary (b) **coastal zone** (c) littoral zone (d) benthic zone
13. The open sea contains _____% of the surface area of the oceans and _____% of its plant and animal life.
(a) 95 . . . 5 (b) **90 . . . 10** (c) 90 . . . 25 (d) 80 . . . 25
14. Which of the following choices is false? Oceans are important because they
(a) regulate climates.
(b) provide a source of many natural resources, such as minerals and fossil fuels.
(c) **are one of the most highly productive ecosystems in the world on a unit area basis.**
(d) participate in the biogeochemical cycles.
15. Organisms living in coastal areas must adapt to what changes?
(a) **water level and degree of salinity** (b) water level and amount of sunlight
(c) temperature and availability of oxygen (d) temperature and availability of nutrients
16. The yellow-green color of coastal waters as compared to the blue color of the open ocean is a result of what?
(a) A lower salinity (b) **A high concentration of organic materials**
(c) A higher copper content of sediment (d) A low copper content of sediment
17. What is the name for the submerged edges of continents with gradual slopes?
(a) **Continental shelves** (b) Abyssal plain
(c) Submarine canyon (d) Continental rise
18. The properties that must be known to determine the density of sea water.
(a) **pressure, salinity and temperature** (b) pressure, salinity and oxygen
(c) carbondioxide, salinity and oxygen (d) pressure, salinity and nitrogen
19. What type of shore is most biologically diverse?
(a) Sandy beach (b) Mud flat (c) Salt marsh (d) **Rocky shore**
20. What characterizes the aphotic zone of the ocean?
(a) **not enough sunlight for photosynthesis to occur**

- (b) enough sunlight for photosynthesis to occur
- (c) not enough CO₂ for photosynthesis to occur
- (d) none of the above

21. Which of the following is the correct order of zones going from the shore to the deep ocean?

- (a) sublittoral, hadal, bathyal, abyssal
- (b) hadal, sublittoral, bathyal, abyssal
- (c) **sublittoral, bathyal, abyssal, hadal**
- (d) bathyal, sublittoral, abyssal, hadal

22. The deep-water areas of the open ocean are called the

- (a) **abyssal zone**
- (b) Hypolimnion
- (c) Neritic zone
- (d) Intertidal zone

23. The zone of lighted ocean where marine autotrophs are able to thrive is called:

- (a) the disphotic zone
- (b) **the euphotic zone**
- (c) the aphotic zone
- (d) the mesopelagic zone

24. The open ocean environment, in general

- (a) pelagic
- (b) benthic
- (c) neritic
- (d) oceanic

25. The open ocean environment, over the continental shelves.

- (a) pelagic
- (b) benthic
- (c) **neritic**
- (d) oceanic
- (e) hadal

UNIT- II

1. The smallest size of plankton are the

- (a) nanoplankton
- (b) **ultraplankton**
- (c) microplankton
- (d) miniplankton

2. In sampling plankton it is important to

- (a) tow the net as fast as possible to sample large volumes of water in short period
- (b) **carefully document the depth of the net**
- (c) use a constant size mesh for zooplankton and phytoplankton
- (d) all of the above

3. Red tides are produced by certain species of

- (a) Mollusca
- (b) diatoms
- (c) pteropods
- (d) **dinoflagellates**

4. The first trophic level of the sea is made up of

- (a) meroplankton
- (b) fish
- (c) jellyfish
- (d) **diatoms**

5. In your explorations as a marine biologist, you find a new species of algae floating on the surface of a coastal zone. You would most likely classify this species as

(a) **phytoplankton** (b) zooplankton (c) benthos (d) nekton

6. Phytoplankton are_____.

- (a) **microscopic ocean plants** (b) plants on the seashore
(c) small floating sand grains (d) marine animals that are good swimmers

7. Scientists can observe primary productivity in the ocean from space by measuring the

- (a) temperature of the surface water (b) depth of the euphotic zone
(c) **amount of chlorophyll in surface waters** (d) salinity of surface waters

8. Which is not true about seaweeds?

- (a) They lack real roots, stems, or leaves
(b) **All seaweeds are single celled organisms**
(c) There are brown, red, and green types
(d) They provide food for many types of marine animals

9. Sargassum weed is a type of_____.

- (a) tree (b) flower (c) **brown seaweed** (d) green seaweed

10. Some seaweeds are attached to the ocean floor by a_____.

- (a) **holdfast** (b) stem (c) root (d) special glue

11. Dinoflagellates

- (a) have no mobility of their own (b) have cell walls made of silica
(c) migrate vertically in response to sunlight (d) **all of the above**

12. Organisms of the intertidal zone

- (a) are constantly being swept away.
(b) are exposed to constant salinity levels.
(c) **are exposed to both air and underwater conditions.**
(d) must avoid drowning at high tide.

13. Which of the following correctly lists types of organisms in aquatic ecosystems from shallowest to deepest?

- (a) **plankton, nekton, benthos** (b) plankton, benthos, nekton
(c) benthos, plankton, nekton (d) benthos, nekton, plankton

UNIT- III

1. Which of the following are economically important phycolloids derived from macroalgae?
(a) agar **(b)carrageenan** (c)kelp (d) both (a)and (b)
2. Alginic acid occur in the cell walls of
(a) *Sargassum* (b) *Turbinaria* (c) *Cystophyllum* (d) **all of above.**
3. The botanical name of dulse is
(a) ***Rhodymeniapalmate*** (b)*Sargassum* (c) *Laminaria* (d) none of the above.
4. One of the antibiotic obtained from an alga is
(a) **Chlorellin** (b) Streptomycin (c) Tetramycin (d) none of these.
5. Vitamins rich natural resource is
(a) *Gracilaria* (b) *Ulva* (c) *Hypnea* (d) **all the above.**
6. *Chlorella* is a best research tool because of its
(a) rapid growth (b) simple structure (c) short life span (d) **all the above.**
7. Following seaweed is best exploited for extraction of iodine
(a) **Kelps** (b) Sea grasses (c) Diatoms (d) Dinoflagellates
8. Alginates are
(a) proteins (b) **carbohydrates** (c) fats (d) lipids.
9. The botanical name of sea lettuce
(a) *Rhodymenia palmate* (b)*Sargassum wightii* (c) *Laminaria pinnata*
(d) ***Ulva lactuca***
10. A phycolloid used as culture medium in the laboratory
(a) **agar** (b) algin (c) caragenean (d) none of the above
11. A phycolloid occurring in the cell walls of brown algae
(a) agar (b) **algin** (c) caragenean (d) none of the above
12. The common source of carragenin is
(a) ***Chondrus*** (b) *Lithothamnion* (c) *Laminaria* (d) *Ulva*
13. Diatomite is otherwise known as
(a) agar (b) algin (c) caragenean (d) **kisalgour**
14. Carrageenan is obtained from
(a) ***Hypnea***(b) *Ulva*(c) *Padina*(d) none of the above.
15. Diatoms

- (a) are single-celled phytoplankton (b) have radial symmetry
 (c) have pillbox shaped frustules (d) **all of the above**
16. Diatoms with bilateral symmetry are called _____ diatoms.
 (a) centric (b) autotrophic (c) **pennate** (d) oblate
17. Diatoms are able to stay afloat in the photic zone because
 (a) they have low density tissue that balances the high density frustule
 (b) they produce oil as a storage product
 (c) they have a pair of flagella for limited mobility
 (d) **both (a) and (b) are correct**

UNIT- IV

1. In Tamil Nadu industrially important sea weeds are cultivated at
 (a) **Mandapam** (b) Coimbatore (c) Trichy (d) none of the above.
2. Culture of living organisms in the liquid medium is called
 (a) **aquaculture** (b) algal culture (c) sericulture (d) agriculture
3. Pure algal cultures are employed to study
 (a) the growth pattern and morphology (b) method of reproduction
 (c) cytological and physiological characteristics (d) **all the above**
4. Seaweed culture is widely done in
 (a) China (b) Japan (c) Korea (d) **all the above**
5. Medium which is best for the algal culture
 (a) **Chu 10 medium** (b) MS medium (c) White's medium (d) none of the above.
6. Method of mass culture of algae
 (a) bubbling method (b) stirring culture (c) shaking method (d) **all of the above.**
7. Commonly cultivating seaweed of Tamil Nadu
 (a) **Gracilaria** (b) *Laminaria* (c) *Porphyra* (d) none of these.
8. Minamata disease is caused by
 (a) **mercury poisoning** (b) cadmium poisoning
 (c) cobalt poisoning (d) chlorine poisoning.
9. Red tide is caused by
 (a) Dinoflagellates (b) **Diatoms** (c) *Chlorella* (d) *Gracilaria*.

10. Genetically modified microorganism used in abatement of oil pollution
(a) *Pseudomonas putida* (b) *Xanthomonas citri*
(c) *Bacillus subtilis* (d) none of the above.
11. Algal bloom causes
(a) reduce DO (b) reduce BOD (c) reduced COD (d) **all the above.**
12. Thermal pollution causes
(a) **heat shock to marine biota** (b) heat shock to fisher folk
(c) alter ocean current (d) alter waves and tides.
13. What sea has a name based on the seasonal blooms of algae that color the surface of the water?
(a) **Red Sea** (b) brown sea (c) dead sea (d) black sea
14. One class of pollutants that can cause excessive growth of algae is
(a) radioactive substances (b) oxygen-demanding wastes
(c) **inorganic plant nutrients** (d) organic chemicals.
15. Thermal pollution
(a) raises the solubility of oxygen in water
(b) lowers the respiratory rates of aquatic organisms
(c) nurtures spawning fish
(d) **can kill organisms adapted to a particular temperature range by thermal shock.**
16. Which of the following is false?
(a) Oil evaporates and undergoes decomposition
(b) **The environment recovers more slowly from crude oil spills than from refined oil spills**
(c) Recovery from oil spills is faster in warm water than in cold water
(d) Estuaries and salt marshes suffer the most damage from oil pollution and cannot be effectively cleaned up.
17. Water pollution from oil can be prevented by
(a) instituting a national energy policy based on decreased reliance on fossil fuels
(b) prohibiting oil drilling in ecologically sensitive areas
(c) requiring double hulls on oil tankers
(d) **All of the above**

UNIT- V

1. Vivipary is an adaptative feature of
(a) *Avicennia* (b) ***Rhizophora*** (c) *Salicornia* (d) *Suaeda*.
2. Pneumatophores are
(a) positively geotropic (b) negatively phototropic
(c) **positively phototropic** (d) chemotropic
- 3 Major mangrove strand of Tamil Nadu
(a) **Pitchavaram** (b) Punakayal (c) Ramanathapuram (d) none of the above.
4. Find out the true mangrove from the following
(a) *Suaeda* (b) ***Rhizophora*** (c) *Cressa* (d) *Salicornia*
5. Generally mangroves escape high salinity by
(a) ultra-filtration mechanism in the root (b) salt glands
(c) **both (a) and (b)** (d) none of these
6. Mangroves are ecologically highly influential since they harbour
(a) biodiversity (b) prevent shore line erosion
(c) supply lively hood (d) **all of the above**
7. Mangroves live in
(a) physically dry soil (b) physiological dry soil
(c) rocky crevices (d) none of the above.
8. Mangroves maintain high osmotic potential than surroundings by
(a) **accumulating salts** (b) accumulation of vitamins
(c) secondary metabolites (d) none of the above.
9. Xerophytic character seen in *Avicennia*
(a) sunken stomata (b) thick epidermal cells
(c) water storing tissues (d) **all of these**
10. Mangrove swamps serve all of the following functions except
(a) erosion protection for the coastline.
(b) prevention of typhoon and hurricane damage.
(c) entrapment of sediment washed off the land.

(d) salt mining.

11. A mangrove that has prop-like roots is the_____.
- (a) **black mangrove** (b) red mangrove (c) white mangrove (d) buttonwood
12. The symbiotic dinoflagellate that lives within coral tissue is called:
- (a) kelp (b) Riftia (c) **zooxanthellae** (d) polyp.
13. The commensal algae that live in the tissues of the coral polyps:
- (a) provide carbon dioxide and phosphates for the polyps
(b) feed on the tissues of the polyps and are dangerous parasites
(c) are the main cause of coral bleaching, and are threatening the reefs of the world
(d) **provide additional nourishment and oxygen to the polyps through photosynthesis.**
14. Coral reefs are found only in areas:
- (a) of deep water below 200 meters (660 feet) (b) of cold water or in cold currents.
(c) **tropical latitudes with warm temperatures and slightly higher salinity**
(d) near rivers of stream deltas.
15. According to Darwin, the last stage in the cycle of reef formation is:
- (a) the fringing reef (b) **the atoll** (c) the algal rim (d) the barrier reef.
16. Life in productive tropical reefs is characterized by:
- (a) **extreme competition for food, territory, and reproductive opportunities**
(b) very few species, but large numbers of each species
(c) large adults in each species that reproduce late in life
(d) organisms with extremely long lifespans.
17. Which one of the following is a coral reef forming organism
- (a) Zoochlorellae (b) **Chlorella** (c) *Chlamydomonas* (d) none of the above.
18. A coastal body of water connected to the ocean and supplied with fresh water from a river is an _____
- (a) Shelf (b) Inlet (c) **Estuary** (d) Atoll
19. Atolls are
- (a) **coral reefs** (b) mangroves (c) sea grass beds (d) none of the above.
20. Rain forest of ocean
- (a) **Coral reefs** (b) sea grass bed (c) mangroves (d) salt marshes.

21. What is the term for landforms that are produced by the growth of coral reefs around the shores of islands that have subsided over the centuries?
- (a) polyps **(b) atolls** (c) barrier reef (d) buttress reef
22. How are coral reefs formed?
- (a). Movements of the Earth's crust due to plate tectonics
(b) Tiny plants related to diatoms that deposit the mineral silica
(c) Tiny animals related to sea anemones that deposit the mineral calcium carbonate
23. What is the main mineral in a coral reef?
- (a) Halite (b) **Calcite** (c) Gypsum (d) Feldspar
24. Individual coral animals are called:
- (a) anemones (b) ctenophores **(c) polyps** (d) zooxanthellae
25. The optimal water temperature for coral is:
- (a) 16-18^o C (b) 18-21^o C (c) 21-23^o C **(d) 23-25^o C**
26. All of the following threaten the survival of coral reefs except
- (a) increased ultraviolet light from stratospheric ozone depletion.
(b) eroded soil from deforestation and poor land management
(c) chemical pollution
(d) predation by sharks.
27. What part of a coral reef is above a depth of 20 meters?
- (a) **Buttress zone** (b) Supralittoral zone (c) Hermatypic zone (d) Bathyal zone
28. What is the type of exoskeleton formed by corals?
- (a) Hydrogen Calcite (b) **Calcium Carbonate** (c) Limestone (d) Phosphate
29. Thriving coral reefs require
- (a) cloudy water (b) cool water
(c) dissolved oxygen and nutrients (d) salinity that fluctuates with the tides.
30. All of the following threaten the survival of coral reefs except
- (a) increased ultraviolet light from stratospheric ozone depletion
(b) eroded soil from deforestation and poor land management
(c) chemical pollution
d) predation by sharks

31. Which environment has historically been the most stable?

- (a) desert (b) **coral reef** (c) tundra (d) tropical rain forest

Section - B

Unit I

1. Spring tide
2. neritic province
3. Oceanic province
4. euphotic zone
5. disphotic zone
6. aphotic zone
7. epipelagic zone
8. mesopelagic zone
9. bathypelagic zone
10. bioluminescence
11. littoral zone
12. sublittoral zone
13. bathyal zone
14. abyssal zone
15. hadal zone
16. decomposers
17. Salinity
18. Continental shelf
19. Upwelling
20. neap tide
21. seawater density
22. seawater pressure

Unit II

1. Phytoplankton
2. Zooplankton
3. Bacterioplankton

4. holoplankton
5. macroplankton
6. microplankton
7. nanoplankton
8. picoplankton
9. plankton net.
10. Preservation of phytoplankton
11. Gross primary production
12. Factors affecting primary production
13. Adaptations of planktons for floating life
14. Characters of marine bacteria
15. Geochemical activity
16. Nitrification
17. Ammonification
18. Denitrification
19. Bacteria involved in N_2 fixation
20. Threats of seaweeds.
21. Grazing food chain.
22. Detritus food chain.
23. Energy balance sheet.
24. Sea grasses.
25. Sea weeds.

Unit III

1. Carrageenan
2. Alginic acid
3. Chlorellin
4. Kelps
5. Alginates
6. nori
7. SLF
8. algae in reclamation of soil

9. kombu
10. algae as fodder
11. Diatomite
12. any four properties of agar
13. any four properties of alginic acid
14. kieselguhr
15. any four uses of agar
16. any four uses of alginic acid
17. any four uses of diatomaceous earth
18. Halosphaera
19. Phaeocystis
20. Silico-flagellates
21. Coccoliths

Unit IV

1. Minamata disease
2. Any two sources of marine heavy metal pollution
3. Any two control measures of marine heavy metal pollution
4. Any two sources of marine oil pollution
5. Any two control measures of marine oil pollution
6. Marine algal blooms
7. *Pseudomonas putida*
8. Oil degrading bacteria
9. GMO for pollution abatement
10. Marine biotoxin
11. Saxitoxins
12. Neurotoxic shellfish poisoning
13. Domoic acid

Unit V

1. Atoll
2. Vivipary

3. Pneumatophores
4. Pitchavaram
5. any two morphological adaptations of mangroves
6. mangrove fauna
7. Prop root
8. Coral reef
9. Conservation of coral reef
10. Conservation of island

Section C

UNIT -I

1. Give an account of Spatial classification of the marine environment
2. Discuss the role of salinity in the marine environment.
3. Write an essay on the fauna of rocky shores.
4. Describe the adaptations of deep sea organisms.
5. Discuss “Sea is a Biological Environment
6. Write about the physical properties of the seawater.
7. Write about the zonation’s in the sea.
8. What are benthic forms? Briefly describe their structure.
9. Give an account on the chemical properties of the sea water.
10. Describe abyssal life of a sea.
11. On the availability of light how the marine environment is classified

UNITII

1. Describe the methods for measuring primary productivity in the sea.
2. Describe any one of the methods of sampling phytoplanktons.
3. Describe the structural adaptations seen in phytoplanktonic diatoms and dinoflagellates.
4. Explain the methods that are adopted to estimate phytoplanktonic production.
5. Define primary production. What are the factors that affect primary production?
6. Write notes on plankton net.
7. Give an account on the collection of phytoplankton.
8. Write notes on preservation of phytoplankton

9. What is the role of marine bacteria in the sea?
10. What is the role of marine fungi in the sea?
11. Write the importance of carbon cycle.
12. What factor contribute the carbon cycle?
13. What is the importance of nitrogen cycle?

UNIT- III

1. How will you get sodium alginate? Write its uses.
2. Describe briefly the agar yielding marine algae.
4. Give an account of antibiotics and vitamins from algae.
5. Describe the process of extraction of agar.
6. Write notes on carrageenophytes.
7. Write briefly about the extraction of carrageenan.
8. Write notes on importance of agar.
9. Discuss the significance of marine natural products.
11. Explain the importance of seaweeds.
12. Write notes about utilization of marine algae as human food?
13. What are the algae used as fodder? Explain.

UNIT -IV

1. Explain the commercial cultivation of *Gracilaria*.
2. Write notes on thermal pollution.
3. Give an account on oil pollution.
4. Write notes on radioactive pollution
5. Write an essay on marine toxins.
6. Write about the marine pollution and its effects on marine life forms with special reference to heavy metal pollution.
7. Explain the role of microorganisms in the removal of oil pollutants in marine habitat
8. Give account of the sources and treatment of oil pollution in sea
9. Write an essay on thermal pollution in the sea.

UNIT -V

1. What are the morphological adaptations seen in mangroves?
2. How mangroves are adopted anatomically to their environment.

3. What is the role of pneumatophore in marine environment?
4. What is the role of mangroves in prawn culture?
5. How mangroves protect the environment.
6. Write notes on mangrove forest in Tamilnadu .
7. Write notes on
 - a) vivipary
 - b) physiological adaptations of mangroves.
8. List any 5 taxa of mangrove vegetation..
9. Describe the distribution of mangrove ecosystems in India.
10. Differentiate salt marshes from mangroves
11. Write notes on the conservation of mangrove ecosystem.
12. Define coral reefs. Add a note on the need for their conservation.
13. Give an account of the special features of coral reefs.
14. Write an essay on the ecology of coral reefs.

Section - D

UNIT –I

1. Write an essay on chemical characteristics of seawater.
2. Write an essay on the classification of marine habitat.
3. Write notes on
 - i. rocky shore
 - ii. physical properties of seawater.
4. Write about the characteristics and adaptations of benthic and pelagic life in the sea.
5. What are the characteristic features of abyssal zone and add a note on the adaptations found in them?
6. “The intertidal zone represents one of the most stressful environments in terms of changing environmental conditions”.
7. Explain the comment using specific examples of stress and how organisms are able to survive in the intertidal zone.

UNIT – II

1. Write an essay on the economic importance of marine bacteria.
2. Write an essay on the methods of collection, isolation and preservation of planktons

3. Give an account of the characteristics of phytoplankton. Add a note on their role in the ecosystem of the sea.
4. Write an essay on the role of marine bacteria in the economy of sea.
5. Give an account on planktons and their adaptations for floating life.
6. Write an essay on the phosphorus cycle.
7. Write an essay on the Carbon cycle.
8. Write an essay on the Nitrogen cycle.
9. Write an essay on the sulphur cycle.
10. Write an essay on the sea weeds.
11. Write an essay on the sea grass.

UNIT - III

1. Write an essay about agricultural uses of marine algae.
2. Give an account on the preparations, properties and uses of agar-agar.
3. Give an account on the preparations, properties and uses of algin.
4. What are carrageenophytes? How carrageenan is extracted from marine algae.
5. Write notes on
 - i. uses of carrageenan
 - ii. vitamins from algae
 - iii. agarophytes..
6. Write an essay on the role of algae in agriculture.
7. Give an account on algae as food and fodder.

UNIT - IV

1. What are the steps involved in commercial production of Porphyra? Explain.
2. Write an essay on seaweed cultivation.
3. Discuss the adverse effects of radioactive pollution on marine environment.
4. Write about the effects of oil-spill on marine based industries. Add note on their remedial measures.
5. Write an essay on the role of GMOs on pollution abatement.
6. What are the sources of thermal pollution and its effects on environment? Add note on its control.
7. Write an essay on marine pollution.

8. What are algal blooms and how they are caused? Add a note on its harmful effects.

UNIT –V

1. Protection and regeneration of mangroves are necessary - Discuss.
2. Write notes on
 - (a) vivipary
 - (b) *Avicennia*
 - (c) Pitchavaram.
3. Write an essay on salt marshes
4. How mangroves are adapted to their environment.
5. What are mangroves? Explain the environmental conditions of mangrove formation.
6. Write an essay on the role of mangroves in protecting the environment.
7. Give an account on mangroves of Tamil Nadu.
8. Write an essay on mangrove dwelling animals
9. Write an essay on the conservation of mangroves.
10. Give an account on coral reefs.

ST.MARY'S COLLEGE (Autonomous) - THOOTHUKUDI- 628 001
I M. Sc. Botany Semester - II
Core VII – Developmental Botany - Sub. Code: 21PBOC23

UNIT I

1. Reproductive shoot apex differs from vegetative shoot apex in being
 - (a) broad
 - (b) without cyclicity
 - (c) little activity on the flanks
 - (d) **all the above**
2. Epidermis is produced from
 - (a) procambium
 - (b) **protoderm**
 - (c) phellogen
 - (d) ground meristem
3. The central region of root apex containing less active active cell is known as
 - (a) periblem
 - (b) plerome
 - (c) **quiescent region**
 - (d) dermatogens
4. The meristem derived from the promeristem is called
 - (a) lateral meristem
 - (c) intercalary meristem
 - (b) **primary meristem**
 - (d) apical meristem
5. The meristematic cells have
 - (a) thin walls
 - (b) absence of vacuoles
 - (c) prominent nuclei
 - (d) **all the above**
6. Who is the father of modern embryogenesis
 - (a) **Karl Ernst von Barer**
 - (b) Marcello Malpighi
 - (b) Clowes
 - (d) Schmidt
7. Who is the father of Indian plant embryology
 - (a) Karl Ernst von Barer
 - (c) Marcello Malpighi
 - (c) **Panchanan Maheshwari**
 - (d) Schmidt
8. The associated formation of functionally organised structure known as _____
 - (a) morphogenesis
 - (b) differentiation
 - (c) **organogenesis**
 - (d) histogenesis
9. plerome is a histogen that gives rise to
 - (a) pericycle
 - (b) vascular bundle
 - (c) pith
 - (d) **all of the above**
10. In case tunica is multilayered, which is likely to happen
 - (a) all layers take part in formation of multi-layered epidermis
 - (b) all the layers produce cortex
 - (c) outermost layer forms hypodermis, middle layer, cortex and inner layer endodermis
 - (d) **only the outermost layer forms the epidermis**
11. Tunica is
 - (a) mass meristem
 - (b) internal mass of meristem
 - (c) **mantle of meristem**
 - (d) central of meristem
12. Corpus is
 - (a) mass meristem
 - (b) **internal part of meristem**
 - (b) mantle of meristem
 - (d) central part of meristem

13. What type of division takes place to form octant to globular embryo
 (a) **transverse** (b) longitudinal
 (c) periclinal (d) vertical
14. Which four cells of the octant form the two cotyledon
 (a) **four cells of terminal octant** (b) two cell of the centre
 (c) four cell of micropylar octant (d) none
15. In which side the basal cell of the embryo is located
 (a) **micropyle end** (b) suspensor
 (c) chalaza end (d) hypophysis
16. The term quiescent centre or zone was proposed by
 (a) Schmidt (b) **Clowes**
 (c) Foster (d) Nageli

Section B

1. Define embryogenesis
2. Write short notes on meristem
3. Define morphogenesis
4. Define organogenesis
5. Define histogenesis
6. What are meristemoids?
7. What is differentiation?
8. Write short notes on plerome
9. What is zygotic stage?
10. Define torpedo stage
11. Define morphogens
12. Define quiescent center
13. Write notes on GURKE
14. Write notes on FACKEL
15. What is tunica
16. What is corpus
17. Define phyllotaxy
18. What is procambium?
19. Illustrate the PIN1 dependent movement of IAA during early stages of embryogenesis

Section C

1. Explain the basic concept of development
2. Explain the stages of embryogenesis with neat labelled sketches
3. Apical-basal polarity is established early in embryogenesis - Justify
4. Explain the origins of polarity
5. Explain radial patterning guides formation of tissue layers
6. Explain the position dependent signalling process of hormones
7. Explain meristematic tissues as foundations for indeterminate growth
8. Explain the development zones in root tip with diagram

9. Explain the root initial cells in root apical meristem and illustrate it
10. Explain the role of auxin the formation and maintenance of RAM
11. Explain why cytokinin is required for normal root development
12. Explain the role of gene and transcription factors in shoot apical meristem
13. What are the factors involved in auxin movement and responses influence SAM formation?
14. Explain the localized zones of auxin accumulation and how they promote leaf initiation

Section D

1. Write an essay on embryogenesis
2. Explain the different stages of sporophytic development
3. Briefly explain the role of auxin in embryogenesis
4. Explain different stages of embryogenesis with illustration.
5. Give an account of organisation of root apical meristem
6. Give a brief and crucial account on shoot apical meristem
7. Differentiate root and shoot apical meristem
8. Explain the role of gene and transcription factors in SAM formation

UNIT II

1. The plant whose seed are known to have the longest viability period is

(a) <i>Carica papaya</i>	(b) <i>Triticum vulgare</i>
(c) <i>Nelumbo nucifera</i>	(d) <i>Zizyphus mauritiana</i>
3. Gibberellins can facilitate seed germination due to their influence on

(a) rate of cell division
(b) absorption of water through the hard seed coat
(c) synthesis of abscisic acid
(d) production of hydrolyzing enzymes
4. Amyloplasts that function as gravity sensors are called

(a) statoliths	(b) statocytes	(c) lithocytes	(d) graviplast
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5. Which of the following gene controls the distribution of auxin in the roots?

(a) AP2	(b) LEAFY	(c) PIN	(d) IAA
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6. If cotyledons are brought above the soil, the germination is

(a) hypogeal	(b) vivipaary
(c) epigeal	(d) none of these
2. The plant whose seeds are known to have the longest viability period is

(a) <i>Carica papaya</i>	(b) <i>Zizyphus mauritiana</i>
(c) <i>Nelumbo nucifera</i>	(d) <i>Triticum vulgare</i>
3. Removal of seed coat in dormant seeds by mechanical methods is called

(a) emasculation	(b) scarification
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- (c) vernalization (d) Stratification
4. Protective layer of radicle during seed germination and endosperm formation is
 (a) coleoptile (b) scutellum
 (c) **coleorrhiza** (d) plumule
5. When seed germinates while the fruit is attached to the parent plant is called
 (a) apomixes (c) parthenogenesis
 (b) parthenocarp (d) **vivipary**
6. The remains of nucellus present in the seed constitute
 (a) Endosperm (c) **perisperm**
 (b) endocarp (d) aril
7. Aleurone layer is
 (a) outer layer of scutellum
 (b) layer of pericarp specialised in absorption of water
 (c) layer present in ovule that guides pollen tube
 (d) **layer present just outside endosperm and having protein grains**
8. Coleorrhiza is
 (a) **covering of radicle**
 (b) plumule and rudimentary sheath
 (c) covering of plumule
 (d) radical and root cap
9. Which of the following has shortest longevity of seeds?
 (a) *Oryza sativa* (c) *Lupinus*
 (b) *Hevea brasiliensis* (d) *Nelumbo*
10. Non endospermic seeds are found in
 (a) Barley (c) **Bean**
 (b) Castor (d) Wheat
10. Early response gene
 (a) **GA-MYB** (c) DELLA
 (b) GID1 (d) a-amylase gene
11. Late response gene
 (a) GA-MYB (c) DELLA
 (b) GID1 (d) **a-amylase gene**
12. Gibberellins can facilitate seed germination due to their influence on
 (a) Synthesis of abscisic acid

- (b) Rate of cell division
- (c) **Production of hydrolysing enzymes**
- (d) Absorption of water through the hard seed coat.
13. An enzyme which can stimulate the germination of barley seeds is
- (a) Invertase (c) Protease
- (b) Lipase (d) **α -amylase**
14. During the germination of seeds, the seed coat ruptures due to
- (a) **massive imbibition of water**
- (b) differentiation of cotyledons
- (c) a sudden increase in cell division
- (d) massive glycolysis in cotyledons and endosperm.
15. Seed dormancy allows the plant
- (a) develop healthy seeds (c) **overcome unfavourable climatic conditions**
- (b) reduce viability (d) prevent deterioration seeds
16. The protective covering over radical during the germination of seeds is
- (a) Coleoptile (c) Suspensor
- (b) Epithelium (d) **Coleorhiza**
17. Which of these compounds can induce seed dormancy?
- (a) Potassium nitrate (c) Gibberellins
- (b) **ABA** (d) Ethylene
18. Which of the following is not a germination stimulating compound?
- (a) KNO_3 (c) **Parasorbic acid**
- (b) Thiourea (d) Ethylene
19. When growth rate of a plant is plotted against time, a curve is obtained which is
- (a) **S-Shaped** (c) Hyperbolic
- (b) N-Shaped (d) None of the above
20. Phototropic movements of stem and roots are due to
- (a) Action of gravity © Differential action of hormones
- (b) **Action of light** (e) Epinasty and hyponasty
21. Seeds are positively photoblastic in
- (a) Lettuce (c) Tomato
- (b) Shepherd's purse (d) **All the above**
22. Thigmotropism is best exhibited by

- (a) Root apex
(b) Tendrils
- (c) Thorns
 (d) Lamina
23. The most effective wavelength in inducing phototropic movements is
 (a) Red and far red
 (b) Blue and red
 (c) **Blue and violet**
 (d) Green and yellow
24. Pneumatophores show
 (a) Positive geotropism
 (b) Negative geotropism
 (c) Plageotropism
 (d) **Negative geotropism**
25. Growth of pollen tube towards embryo sac is
 (a) Geotropism
 (b) Thigmotropism
 (c) **Chemotropism**
 (d) All of these
26. Which one of the following would be an example of chemotropic movement?
 (a) Movement of moss antherozoid in response to cane sugar secreted by archegonia
 (b) Movement of fern antherozoid in response to malic acid
 (c) **Growth of pollen tube on the stigma**
 (d) Growth of pollen grain inside the anther
27. Thigmotropism is the response of the plant to
 (a) Gravity
 (b) Water
 (c) Light
 (d) **Contact**

Section B

1. Write short note on dormancy of seeds
2. What is precocious germination
3. Write notes on photoblastic
4. Define scarification
5. Define stratification
6. What is phytochrome
7. What is karrikinolide
8. Write notes on sigmoid curve
9. Define statoliths
10. Define trichoblasts
11. Define expansins
12. What is xylogen
13. Explain chemiotrophism

14. Differentiate etiolate and de-etiolate
15. What is gravitropic setpoint angle
16. What is testa?
17. Differentiate coleoptile and coleorhiza
18. Differentiate primary dormancy from secondary dormancy
19. What is precocious germination?
20. Write shortly on seedling growth

Section C

1. Write notes on physiological and morphological causes of embryo dormancy
2. Explain how dormancy can be imposed on the embryo by the surrounding tissues?
3. Explain methods to break seed dormancy
4. Explain embryo dormancy
5. Explain mobilization of stored reserves during germination
6. Explain briefly growth curve
7. Explain seedling growth and Estimation.
8. Explain GA-MYB is a positive regular
9. Describe polar auxin transport in plant
10. Explain *Zinnia* suspension cultured cells
11. Differentiate geotropism and thigmotropism.
12. What are aleurone grains?

Section D

1. Explain the structure of seed
2. Write notes on causes of seed dormancy
3. What is seed dormancy? Give a brief account on its causes and methods to break dormancy.
4. Explain the role of ABA:GA ratio in determining seed dormancy
5. Explain how stored reserves are mobilized in seeds
6. Give an account of Seed germination.
7. Discuss the role of phototropism in lateral redistribution of auxin

8. Explain the role of auxin in gravitropism
9. Explain plant growth in response to directional stimuli
10. Give a brief and critical account of photomorphogenesis in plants
11. Elucidate root growth and differentiation in plant.
12. Explain vascular tissue differentiation and the role of hormones in normal vascular development
13. Explain root growth and differentiation and add notes on lateral root growths.

Unit III
Section A

1. _____ plays an important role in the formation of tension wood
 - (a) **Ethylene**
 - (b) Auxin
 - (c) Gibberellin
 - (d) Cytokinin
2. Which mother cells are involved in periclinal division
 - (a) Xylem mother cell
 - (b) Phloem mother cell
 - (c) Vascular bundles
 - (d) **Xylem or phloem mother cell**
3. Which hormone used for stem cell maintenance
 - (a) Auxin
 - (b) Gibberellin
 - (c) **Cytokinin**
 - (d) Ethylene
4. Arrangement of veins and the veinlets in the lamina of leaf is termed as
 - (a) **Venation**
 - (b) Vernation
 - (c) Phyllotaxy
 - (d) Leaf trace
5. _____ genes promote adaxial identity and repress the KNOX1 gene
 - (a) **ARP**
 - (b) MYB
 - (c) PHAN
 - (d) AS1
6. _____ genes are required for the de-repression of KNOX1 genes
 - (a) MYB
 - (b) PHAN
 - (c) AS1
 - (d) **CUC**
7. Shoot architecture in seed plants is characterized by multiple repetitions of a basic module called

- (a) **Phytomer**
 - (b) Node
 - (c) Internode
 - (d) Hypocotyl
8. GL1 encodes a _____ transcription factor
- (a) **MYB**
 - (b) PHAN
 - (c) AS1
 - (d) CUC
9. GL3 encodes a _____ like transcription factor
- (a) MYB
 - (b) PHAN
 - (c) **bHLH**
 - (d) CUC

Section B

1. Define phyllome
2. What are foliage leaves?
3. Differentiate phyllode and cladode
4. What is trichome?
5. What are bulliform cells?
6. What are pavement cells?
7. What are lithocysts?
8. Define leaf trace
9. Write short notes on the process of vein formation
10. Write short notes on Phloem loading
11. Define mesophyll tissue
12. Define phyllotaxy
13. Define lamina ridges
14. Write short notes on the role of jasmonic acid in trichome development

Section C

1. Explain the types of epidermal cells
2. Explain role of hormones in vegetative growth
3. Briefly explain venation pattern in leaves
4. Explain the role of hormones in leaf trace development
5. Write notes on abnormal secondary growth.
6. Give a brief note on mycorrhizal network in root system
7. Difference between cork cambium and vascular cambium

Section D

1. Explain differentiation of epidermal tissue
2. Briefly explain root system architecture
3. Write an essay on shoot branching and architecture
4. Give a brief differentiation on root and shoot architecture.

5. Explain the secondary growth in stem and root of dicotyledon

UNIT IV

1. The transition to flowering involves major changes in the pattern of morphogenesis and cell differentiation at the

- (a) **shoot apical meristem** (b) root apical meristem
(c) flank meristem (d) all the above

2. Species that exhibit an absolute requirement for a specific set of environmental cues in order to flower, flowering is considered to be _____ response.

- (a) facultative (b) quantitative
(c) **obligate or qualitative** (d) all the above

3. If flowering is promoted by certain environmental cues but will eventually occur in the absence of such cues, the flowering response is _____

- (a) **facultative or quantitative** (b) qualitative
(c) obligate (d) all the above

4. The transition from one phase to another is called _____.

- (a) facultative (b) qualitative (c) quantitative (d) **phase change**

5. Conditions that retard growth, tend to prolong the juvenile phase or even cause reversion to juvenility of adult shoots

- (a) mineral deficiencies (b) low light, low temperature
(c) water stress, defoliation (d) **all the above**

6. _____ has been implicated in phase transitions in *Arabidopsis*.

- (a) **miR156 and miR172** (b) FL
(c) FLC (d) CO

7. _____ supply as a source of energy and raw material can affect the size of the apex.

- (a) protein (b) florigen (c) **carbohydrate** (d) sun light

8. A major class of conserved molecules that control phase transitions in plants is the _____.

- (a) *flc* (b) **microRNAs** (c) *co* (d) *fl*

9. Environmental signals are termed as _____

- (a) **zeitgebers** (b) statoliths (c) pro-ubisch bodies (d) statocytes

10. The rhythms are generated internally, they normally require

- (a) exposure to light or a change in pH
(b) exposure to dark or a change in temperature
(c) exposure to dark or a change in pH

(d) **exposure to light or a change in temperature**

11. The feature that enables the clock to keep time at different temperatures is called
- (a) zeitgebers (b) light compensation
(c) **temperature compensation** (d) photoperiod
12. The photoperiod-regulated processes that occur in the leaves resulting in the transmission of a floral stimulus to the shoot apex are referred to collectively as
- (a) vernalization (b) **photoperiodic induction**
(c) circadian rhythms (d) biological clock
13. A feature that underscores the importance of the dark period is that it can be made ineffective by interruption with a short exposure to light, called
- (a) **night break** (b) photoperiodic induction
(c) circadian rhythms (d) biological clock
14. Gene that acts as a repressor of flowering has been identified as
- (a) FT (b) *ft*
(c) **FLOWERING LOCUS C (FLC)** (d) *flc*
15. _____ is the flowering repressor that is responsible for the vernalization requirement in *Arabidopsis*.
- (a) FT (b) *ft* (c) **FLC** (d) *flc*
16. _____ metabolism in the plant is strongly affected by day length.
- (a) **gibberellin** (b) auxin (c) cytokinin (d) ethylene
17. Gibberellin appears to promote flowering in *Arabidopsis* by activating expression of the _____ gene.
- (a) *leafy* (b) **LEAFY**
(c) FLC (d) *flc*
18. Homeotic genes, which contain homeobox sequences, most plant homeotic genes belong to a class of related sequences known as _____
- (a) *leafy* (b) **MADS box genes**
(c) FLC (d) *flc*
19. The transition to flowering involves major changes in the pattern of morphogenesis and cell differentiation at the _____
- (a) **shoot apical meristem** (b) root apical meristem
(c) internode (d) intercalary meristem
20. Floral meristems can usually distinguished from vegetative meristems by their _____
- (a) indeterminate growth (b) decrease in frequency of cell division

(c) smaller size

(d) **larger size**

21. _____ genes encode transcription factors necessary for the initial induction of floral organ identity genes

(a) **floral meristem identity**

(b) floral organ identity genes

(c) *flor* mutant

(d) *Lfy* and *fd* double mutant

22. Failure of the scion to flower would indicate that the _____ has not yet attained competence

(a) primary meristem

(b) intercalary meristem

(c) root apical meristem

(d) **shoot apical meristem**

23. If the *Lolium* shoot apical meristem is excised 28 hours after the beginning of the long day and cultured in vitro, it will produce normal inflorescences in culture, but only if the hormone _____ is present in the medium.

(a) auxin

(b) **gibberellic acid**

(c) IBA

(d) IAA

Section B

1. What is floral evocation?

2. Define autonomous regulation

3. What are the three different phases of plant development?

4. What is phase change?

5. What is temperature compensation?

6. What are day neutral plants?

7. What is night break?

8. What is photoperiodic induction?

9. Define clock hypothesis

10. What is the role of blue-light photoreceptor in some LDPs

11. Plants exhibit several adaptations for avoiding the ambiguity of the day-length signal –

Justify

12. Define vernalization

13. What is devernalization?

14. What is epigenetic changes?

15. What is florigen?

16. What is floral meristem?

17. Define homeotic mutations

18. List the genes regulate floral development

19. What are MADS box genes?

Section C

1. Phase changes can be influenced by nutrients, gibberellins, and other signals - Justify
2. Explain the role of leaf in perception of the photoperiodic signal
3. Explain phytochrome is the primary photoreceptor in photoperiodism
4. Explain circadian rhythms: the clock within
5. Explain photoperiodism
6. Role of Phytochromes and cryptochromes in circadian rhythms
7. Explain how night breaks can cancel the effect of the dark period
8. Explain the effect of vernalization on shoot apical meristem
9. What are the different types of floral organs are initiated as separate whorls
10. Write the distinguishing characters of floral meristem from floral meristem
11. Explain the role of hormonal signals in floral evocation
12. Explain gender expression in flowers
13. Explain the genetic control of floral symmetry.

Section D

1. How do plants keep track of the seasons of the year and the time of day?
2. Which environmental signals influence flowering, and how are those signals perceived?
3. How are environmental signals transduced to bring about the developmental changes associated with flowering?
4. Explain vernalization?
5. Explain the translocation of florigen in phloem
6. How do floral meristem identity genes regulate meristem function
7. Explain the ABC model in the determination of floral organ identity
8. Floral asymmetry in flowers is regulated by gene expression – Justify
9. Explain the physiological and molecular control of floral organ development.
10. Explain the role of hormonal signals in floral organ development.

UNIT V

1. _____ helps in the dehiscence of anthers at maturity
 - (a) **presence of fibrous bands and hygroscopic nature of endothelial cells**
 - (b) presence of fibrous bands and hygroscopic nature of middle layers

- (c) presence of tapetum
- (d) presence of endothecium

Tapetum attains maximum development at the - stage of tetrad

2. Cells of _____ in anther wall are ephemeral
 - (a) epidermis
 - (b) **middle layers**
 - (c) tapetum
 - (d) endothecium
3. Tapetum attains maximum development at the stage of ____
 - (a) **tetrad**
 - (b) sporogenous
 - (c) pollen
 - (d) all the above
4. Aggregate of four micro spores are referred to as _____
 - (a) microspore tetrad
 - (b) sporogenous
 - (c) pollen
 - (d) all the above
5. Each pollen mother cell by meiotic division gives rise to a group of four _____
 - (a) **haploid microspores**
 - (b) diploid microspores
 - (c) diploid tetrads
 - (d) all the above
6. Callose play an effective role in the laying down of the very first pattern of _____
 - (a) intine
 - (b) endoexine
 - (c) **exine**
 - (d) all the above
7. Microspores represent the beginning of _____
 - (a) **male gametophytic generation**
 - (b) female gametophytic generation
 - (c) male sporophytic generation
 - (d) female sporophytic generation
8. Microspores after release from the tetrads are referred to as pollen grains
 - (a) tetrad
 - (b) sporogenous
 - (c) **pollen grains**
 - (d) all the above
9. The surface of mature pollen grains shows curious sculpturing pattern except one or more loci the pollen wall is very thin called
 - (a) **germ pores**
 - (b) sporogenous
 - (c) callose plugs
 - (d) pollen tube
10. Palynologists refer germ pores as
 - (a) **apertures**
 - (b) sporogenous
 - (c) callose plugs
 - (d) pollen tube
11. The female gametophyte also called
 - (a) apertures
 - (b) **embryo sac**
 - (c) callose plugs
 - (d) pollen tube
12. The nucellus may project into the micropyle or beyond forming a
 - (a) nucellus
 - (b) **nucellar beak**
 - (c) endosperm
 - (d) tapetum
13. The persistent nucellus is called
 - (a) nucellus
 - (b) nucellar beak
 - (c) endosperm
 - (d) **perisperm**
14. _____ refers to a group of cells present below the embryo sac and above the vascular supply to the funiculus
 - (a) nucellus
 - (b) nucellar beak
 - (c) **hypostase**
 - (d) epistase

Section B

1. What is gametogenesis?
2. Define microsporogenesis
3. What is pollen tetrad?
4. What is tapetum?
5. Define microsporogenesis
6. What are pro-ubisch bodies?
7. What is sporopollenin?
8. What is endomitosis?
9. Define polyteny?
10. List out the functions of tapetum
11. What is pollen kitt?
12. Explain on the germination of pollen grains
13. What is obturator?
14. Differentiate endothecium from endothelial cells
15. Differentiate unitegmic and bitegmic ovules
16. What is micropyle?
17. What is tenuinucellate ovule?
18. What is filliform apparatus?
19. What are transfer cells?
20. List out the functions of synergids
21. Define self-incompatibility
22. What is epistase?

Section C

1. Explain the different phases of events that occur during formation of sperms.
2. List out the different types of ovule
3. What is the role of nucellus in embryo development
4. Explain the development of nucellus
5. What are the causes of self-incompatibility ?
6. What is tapetum? What are the different types of tapetum based on its behaviour
7. Explain the structure of female gametophyte
8. Describe the genes regulating megagametogenesis
9. Explain fertilization and the sequence of events that takes place in the formation of embryo sac.

10. Describe the various changes during development of seed

11. Explain the development of fruit

Section D

1. Explain megasporogenesis

2. Explain the development of female gametophyte

3. Explain the role of genes in regulating megagametogenesis

4. What are different types of self-incompatibility?

5. Differentiate gametophytic and sporophyte self-incompatibility

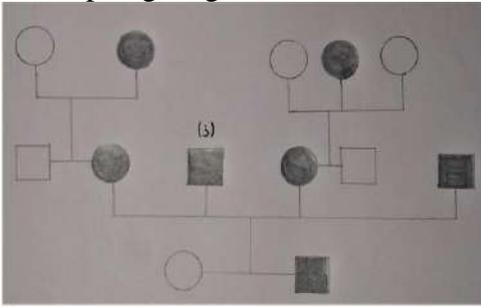
6. Explain the genetic basis of self-incompatibility

Section A

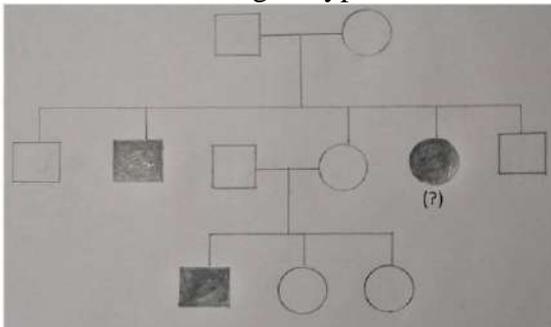
Unit I

- Who is known as the Father of Genetics?
 - Erich Tschemark
 - Carl Correns
 - Gregor Johann Mendel**
 - Hugo de Vries
 - Mendel discovered factors which remain its identity in a hybrid, these factors are
_____ol type="a"> - Genes**
 - Alleles
 - DNA
 - Chromosomes
- Which of the following specimen was chosen by Mendel for his experiment?
 - Drosophila
 - Fly
 - Rat
 - Pisum sativum***
- Mark the INCORRECT statement about *Pisum sativum*?
 - Long life cycle**
 - Easy hybridization
 - Bisexual flower
 - Well-defined discrete characters
- What is an allele?
 - Characteristics of an organism
 - Alternate forms of genes**
 - Homologous chromosomes
 - Pair of centrioles
- Out of the following, which law is also known as the law of purity of gametes?
 - Law of co-dominance
 - Law of independent assortment
 - Law of segregation**
 - Law of dominance
- Name the cross by which law of independent assortment inferred.
 - Dihybrid cross**
 - Monohybrid cross
 - Test cross
 - Back cross
- A Y linked gene _____ol type="a">- Is expressed only when homozygous
- Is present near the telomere of long arm in human
- Is carried by mother
- Expressed only in men**

9. Genes which are present in the homologous region of X and Y chromosomes are called _____
- Autosomal
 - Sex linked
 - Partially sex linked**
 - Unlinked
10. Y linked inheritance is _____ inheritance.
- Criss cross
 - Straight**
 - Loop
 - Jumping
11. By which of the following methods, a pattern of inheritance can be traced in a family?
- Pedigree analysis**
 - Chromosomal analysis
 - Nuclear analysis
 - Cytoplasm analysis
12. In the pedigree given below, what does the indicated allele represent?



- Dominant allele**
 - Recessive allele
 - Moderate allele
 - Half allele
13. What should be the genotype of the indicated member?

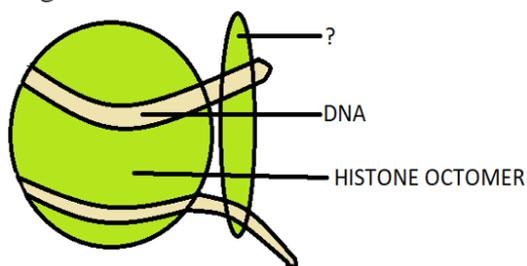


- AA
 - Aa
 - XY
 - aa**
14. Which of the following diseases is sex linked?
- (a) Colour blindness**
 - Malignancy
 - Hepatitis
 - Lukemia
15. The inheritance of new combinations of alleles in children results from:

- (a) puberty
 - (b) recombination**
 - (c) linkage (d) none
16. Linked genes are
- (a) located on different chromosomes of the same size and shape
 - (b) located on the same chromosome**
 - (c) rarely inherited together
 - (d) none
17. *Crossing-over of parts of chromosomes:*
- (a) has no effect on genetic linkage
 - (b) usually decreases the number of genetic combinations in a population
 - (c) can increase the number of genetic combinations in a population**
 - (d) None
18. Which of the following is the most likely explanation for a high rate of crossing-over between two genes?
- (a) The two genes are far apart on the same chromosome.**
 - (b) The two genes are both located near the centromere.
 - (c) The two genes are sex-linked.
 - (d) The two genes code for the same protein
19. The map of the chromosome which shows identifiable sites is called_____
- a) Gene expression
 - b) Genome sequencing
 - c) Chromosome walking
 - d) Genome map**
20. What is the unit of a genetic map?
- a) Centimeter
 - b) Nanometer
 - c) Angstrom
 - d) Centimorgan**
21. Name the mapping technique used to determine the position of restriction sites in a DNA molecule.
- a) Genetic map
 - b) Restriction mapping**
 - c) Biochemical markers
 - d) DNA markers
22. If the percentage of crossing over between two genes is 10, then the distance between two genes will be
- (a) 5 morganoide
 - (b) 10 centimorgans**
 - (c) 20 centimorgans
 - (d) 40 map units
23. Crossing over occurs between
- (a) Non-sister chromatids of non-homologous chromosome at zygotene stage of prophase-I
 - (b) Non-sister chromatids of homologous chromosome at pachytene stage of prophase-I**
 - (c) Non-sister chromatids of non-homologous chromosomes at pachytene stage of prophase I
 - (d) Non-sister chromatids of homologous chromosome at zygotene stage of prophase I

Unit II

- The least level of chromosome organization is
(a) 30nm fibre (b) solenoid (c) **nucleosome** (d) none of the above
- A chromosome with a very short arm and a very long arm is referred to as
(a) Metacentric (b) telocentric (c) **Acrocentric** (d) Sub-metacentric
- A chromosome is the thickest during
(a) anaphase(b) prophase(c) interphase(d) **metaphase**
- The DNA threads which appear inside the nucleus at the time of cell division?
a) Spindle fibers b) Centrioles c) Asters **d) Chromosomes**
- Which of the following is not a major class of chromatin proteins?
a) Histones b) Topoisomerases c) SMC proteins **d) Cohesins**
- Which of the following plays a substantial role in linking together sister chromatids immediately after replication?
a) Cohesins b) Condensins c) Histones d) Topoisomerases
- Which of the following are essential to the condensation of chromosomes as cells enter mitosis?
a) Cohesins **b) Condensins** c) Histones d) Topoisomerases
- Which of the following histones bind to linker DNA?
a) H1 b) H2A c) H2B d) H3
- Which of the following has beads on a string structure?
a) Chromosomes b) Chromatin **c) Nucleosomes** d) Heterochromatin
- Which of the following histones shows more sequence similarity among eukaryotic species?
a) H1 b) H2A c) H2B **d) H3**
- The sister chromatids separate at _____
a) Prophaseb) Metaphasec) Telophased) **Anaphase**
- Cellular DNA is uncondensed throughout _____
a) Prophase **b) Interphase** c) Telophase d) Anaphase
- How many bp are present in a typical nucleosome?
a) 200 bpb) 100 bpc) 300 bpd) 90 bp
- When the negatively charged DNA combines with the positively charged histone octamer, which of the following is formed?
a) Nucleusb) Nucleoidc) **Nucleosome**d) none
- What are the additional set of proteins which are required for the packaging of chromatin at the higher levels known as?
a) Histone proteinsb) Non-Histone proteinsc) Histone chromosomal proteins
d) Non-Histone chromosomal proteins
- The DNA helical structure is linked to which type of histone protein in the following diagram?



a) H2A histones b) **H1 histones** c) H2B histones d) H3 histones

17. C-value in genome represents _____
a) Genetic disorders b) Phenotypic variation c) **Amount of DNA present in the genomed** d) Qualitative traits
18. Name the phenomenon which shows the lack of correlation in genome size and genetic complexity.
a) Histogram b) Karyogram c) Dendrogram d) **C-value paradox**
19. How does genome complexity of denatured DNA measure?
a) Giemsa staining b) Reverse chromatography c) Denaturation kinetics
d) **Renaturation kinetics**
20. Which of the following equation shows DNA renaturation reaction?
a) Sec 60 b) **Cot_{1/2}** c) Tan 30 d) Cot 40
21. Name the sequences which are present in more than one copy in a haploid genome?
a) Nonrepetitive DNA b) Highly repetitive DNA c) **Repetitive DNA**
d) Minisatellite
22. Which of the following is correctly matched
(a) Beadle and tatum ——— non-correlation between genome size and complexity
(b) **C-value** ——— **Amount of DNA in genome**
(c) C-value paradox ——— - transposons
(d) McClintock ——— one gene-one peptide hypothesis
23. Replication dependent histones are synthesized during which phase
(a) G1 phase
(b) **S phase**
(c) G2 phase
(d) M phase
24. Nucleosome as structural unit of chromosome was described by
(a) **R. Korenberg**
(b) Johanssen
(c) Benzer
(d) Watson and Crick
25. When a gene for a given trait comes in alternative versions that specify different forms of the trait (for example, purple-flower and white-flower versions of a flower color gene), the versions of the gene are called
a) loci. b) supergenes. c) chromosomes. d) **alleles.**
26. The extent of chromosome coiling in non – dividing cells is _____
a) Supercoiled b) **Euchromatin** c) Condensed d) Heterochromatin
27. The part that plays a critical role in even distribution of parental DNA during division is _____
a) Telomere b) **Centromere** c) Spindle fibre d) Centrioles
28. With respect to centromere which of the following is wrong?
a) Constricted chromosomal region b) Holds the sister chromatids together
c) Attaches to spindle fibres d) **Facilitates even distribution**
29. Centromeric DNA was initially defined in _____
a) Bacteria b) Fungus c) **Yeast** d) Human
30. Which alternate form of histone is seen in centromeric histones of humans?
a) H2A. z b) SMC protein c) H1 d) **CENP-A**
31. Telomere is not related to _____
a) Maintenance b) Chromosome degradation c) **Division** d) Replication

32. Which of the following nucleotides is rich I telomere of an organism?
 a) A, Tb) T, Gc) **G, Cd) C, A**
33. With respect to microsatellite DNA which of the following is correct?
 a) Tandem repeatsb) Dinucleotide repeats
 c) **100 bp units**d) Inaccurate duplicating
34. Satellite DNA is important because it:
 (a) **shows high degree of polymorphism in population and also the same degree of polymorphism in an individual, which is heritable from parents to children**
 (b) does not code for proteins and is same in all members of the population
 (c) codes for enzymes needed for DNA replication
 (d) codes for proteins needed in cell cycle
35. Which of the following is not true about inversion?
 a) Inverted chromosomes are generally viable
 b) Inversion can cause chromosome breakage
 c) **Two DNA strands with an inverted segment will not pair**
 d) Inversion including centromere is known as paracentric
36. Any change during cell division that results in loss or gain of one or more chromosomes is known as
 (a) **Aneuploidy** (b) euploidy (c) monoploidy (d) hypoploidy
37. A mutant rice is
 (a) **Aneuploidy** (b) allopolyploid (c) **autoallopolyploid** (d) segmental polyploidy
38. The gene that controls the rate of mutation of another gene is
 (a) **Mutator gene** (b) inducer gene (c) mutable gene (d) regulator gene
39. Which of the following is not a type of translocation?
 a) Simpleb) Reciprocale) **Tandem** d) Intercalary
40. In translocating gene fragment which part is responsible for translocation?
 a) **The LTR**b) The transcribed genec) The non-coding part of gene
 d) The surrounding sequences
41. Translocation in plants was discovered by _____
 a) Sternb) **Barbara McClintok**c) Sutton and Boveri
 d) Morgan
42. Which of the following is a result of reciprocal translocation?
 a) **Burkitt's lymphoma**
 b) Trychothiodystrophy
 c) Thalassemia
 d) Cockayne's syndrome
43. What is polyploidy?
 (a) a chromosome which has replicated many times, without mitosis occurring (b) **an extra set of chromosomes** (c) a chromosomal inversion that includes the centromere (d) xtra copies of a gene on a chromosome
44. Aneuploidy represents
 a) **increase or decrease number of chromosome**
 b) increase in multiple sets of chromosome
 c) deletion of some parts of chromosome
 d) addition of some parts of chromosome
45. Main cause of down syndrome is which of the following
 a) **trisomy of 21nd chromosome**
 b) tetrasomy of 21nd chromosome

- c) trisomy of 22nd chromosome
 - c) tetrasomy of 22nd chromosome
46. Line up pairs of chromosomes from longest to shortest to make a/an _____.
 a) G-band b) C-band c) Giemsa stain d) **karyotype**
47. Which of the following chromosomal aberration shows pseudodominance?
 a) **Deletion**
 b) Duplication
 c) Inversions
 d) Translocation

Unit III

1. Which of the following does not belong to the Hardy Weinberg principle?
 a) Frequency remained fixed through generations
 b) Used algebraic equations
 c) **Allele frequency varies from species**
 d) Gene pool remains a constant
2. It is known that the total sum of all the frequencies of the allele is _____.
 a) **one**
 b) two
 c) three
 d) four
3. Which of the following represents the Hardy Weinberg equation?
 a) $p^2 + q^2 = 1$
 b) **$p^2 + 2pq + q^2 = 1$**
 c) $p^2 + q^2 = 0$ d) $(p^2 + q^2)^2 = 1$
4. The notation p and q of the Hardy Weinberg equation represent _____ of a diploid organism.
 a) frequency of allele p
 b) frequency of only allele A
 c) frequency of the only allele a
 d) **frequency of allele A and a**
5. How many factors affect the Hardy Weinberg principle?
 a) Six
 b) Four
 c) Seven
 d) **Five**
6. Which of the following does not belong to factors affecting the Hardy Weinberg principle?
 a) Gene migration
 b) Genetic drift
 c) **Genetic drop**
 d) Mutation
7. The process when some species migrate from the original to a new place, which in turn changes the allele frequency is called _____.
 a) Gene drift
 b) **Gene migration**
 c) Gene travel
 d) Genetic recombination
8. Gene drift occurs when gene migration occurs _____.
 a) **by chance**

- b) spontaneously
 - c) slowly
 - d) due to disaster
9. Which is the correct statement regarding Founder effect?
- a) Named after the scientist John Founder
 - b) No large change in frequency
 - c) The old population become founders
 - d) **Formation of new species**
10. What results in the formation of new phenotypes?
- a) **Pre-existing helpful mutations**
 - b) Post-existing helpful mutations
 - c) Pre-existing disadvantageous mutations
 - d) Post-existing advantageous mutations
11. This condition is essential for a population to be in the Hardy-Weinberg equilibrium
- (a) random mating
 - (b) no mutations
 - (c) large population
 - (d) **all of these**
12. This statement describes the Hardy-Weinberg law the best
- (a) it is impossible to predict expected allele frequencies mathematically
 - (b) in large populations, dominant alleles become more prevalent
 - (c) allele frequency changes over a period of time in a large population
 - (d) **mechanism of inheritance in a large population does not change allele frequency**
13. This is true of the population which are included in Hardy-Weinberg equilibrium
- (a) entities migrate constantly
 - (b) populations should be limited and small
 - (c) **mating is random**
 - (d) process of natural selection is occurring
14. A selection differential is a measure of:
- a) the selection pressure operating on a genotype
 - b) **he selection pressure operating on a phenotype**
 - c) the selection pressure operating on a population
 - d) the selection pressure operating on an allele
15. A founder effect creates a gene pool that differs from a parent population because:
- a) the small number of colonizing individuals quickly lose rare alleles
 - b) **the small number of colonizing individuals are unlikely to be representative of the parent population**
 - c) c) the small number of colonizing individuals are not joined by later migrants
 - d) d) the small number of colonizing individuals are poorly adapted to the new habita
16. Sampling of a gene pool occurs in sexual reproduction because:
- a) **not all of the gametes form zygotes**
 - b) not all of the alleles find their way into gametes
 - c) meiosis does not produce perfect copies of the parental genotype
 - d) recombination causes genes to be shuffled
17. A selection response will measure:
- a) the response of a genotype to a particular environment
 - b) **the response in the phenotype to a particular selection differential**

- c) the response in the gene pool to selection against a particular genotype
d) the response amongst colonizers to a new habitat
18. Gene pool consist of _____?
a) Modern cultivars
b) Advanced breeding materials
c) Land race
d) **All the above**
19. Evolution can result from:
a) non-random mating
b) random mating
c) consanguineous mating
d) **both a) and c)**
20. The net effect of negative assortative mating is an increase in the frequency of:
a) **heterozygotes (Aa)**
b) dominant homozygotes (AA)
c) recessive homozygotes (aa)
d) all homozygotes (AA and aa)
21. The genotypic and gene frequency remain the same after generation after generation of random mating is a law presented by
a) Mendel b) Lamarck c) Darwin d) **Hardy-Weinberg**
22. A system of mating where each male has equal opportunity of mating with any female in the group
a) Tandem mating b) **Random mating**
c) Selective mating d) Inbreeding
23. An X linked recessive gene would appear to _____
a) Be expressed in both males and females equally
b) **Skip generations**
c) Be lethal
d) Gradually degrade
24. Genes which are present in the homologous region of X and Y chromosomes are called _____
a) Autosomal
b) Sex linked
c) **Partially sex linked**
d) Unlinked
25. Which of the following is wrong?
a) Y chromosome lacks dosage compensation
b) X linked genes are inherited as criss cross
c) **Y linked gene like haemophilia passes from father to son**
d) X linked recessive genes are carried by females
26. What is the effect produced when a bee carries pollen from one population to another?
a) founder effect
b) **gene flow**
c) assortative mating
d) diversifying selection

Unit IV

1. The first bioinformatics database was created by
 - (a) Richard Durbin
 - (b) Dayhoff**
 - (c) Michael J.Dunn
 - (d) Pearson
2. Information of all known nucleotide sequences are available on
 - (a) EMBL
 - (b) DDBT
 - (c) NCBI's Gene Bank
 - (d) All of these**
3. Gene Bank and SWISSPORT are example of
 - (a) Protein database**
 - (b) DNA database
 - (c) RNA database
 - (d) none of these
4. 'FASTA' was published by
 - (a) Joseph Sambrook
 - (b) Pearson and Lipman
 - (c) Sanger
 - (d) Altschul et al**
5. Which one of the following is a primary protein database?
 - (a) SWISS-PROT.**
 - (b) EMBL.
 - (c) DDBJ.
 - (d) NCBI.
6. _____ is a primary protein structure database.
 - (a) PDB**
 - (b) PubChem

(c) Chem Bank.

(d) SCOP.

7. _____ is a similarity search tool.

(a) **BLAST**

(b) CLUSTALW

(c) CLUSTALX

(d) Jpred

8. _____ compares protein sequence against protein databases.

(a) **blastp**

(b) blastn

(c) blastx

(d) tblastx

9. Which of the following is an example of Homology and similarity tool?

(a) **BLAST**

(b) RasMol

(c) EMBOSS

(d) PROSPECT

10. In which year did the SWISSPROT protein sequence database begin?

(a) **1987**

(b) 1997

(c) 1982

(d) 1999

11. The identification of drugs through the genomic study is called _____.

(a) Genomics

(b) **Pharmacogenomics**

(c) Pharmacogenetics

(d) Cheminformatics

12. Which of the following are not the application of bioinformatics?

(a) Drug designing

- (b) Data storage and management
- (c) Understand the relationships between organisms
- (d) **None of the above**

13. The term Bioinformatics was coined by

- (a) J.D Watson
- (b) **Pauline Hogeweg**
- (c) Margaret Dayhoff
- (d) Frederic Sanger

14. Which of the following is not a benefit of BLAST?

- (a) Speed
- (b) Statistical rigor
- (c) **Handling of gaps**
- (d) More sensitive

15. Which of the following is untrue about SCOP?

- a) It is constructed almost entirely based on manual examination of protein structures
- b) **The SCOP families consist of proteins having low sequence identity (>30%)**
- c) It is a database for comparing and classifying protein structures
- d) The proteins are grouped into hierarchies of classes, folds, superfamilies, and families

16. PROSITE was created in

- a) **1988**
- (b) 1980
- (c) 1986
- (d) 2000

17. Jpred predicts the secondary structures using a neural network called

- (a) Wikipedia
- (b) **Jnet**
- (c) www.
- (d) http.

18. Which alignment contains more than two sequences?

(a) **Multiple sequence**

(b) Pairwise sequence

(c) Global

(d) Local.

19. Which alignment is useful to detect the highly similar sequences?

(a) Pairwise sequence

(b) Local

(c) **Global**

(d) Multiple sequence.

20. Which alignment is useful to detect the highly conserved regions?

(a) **Local**

(b) Global

(c) Pairwise sequence

(d) Multiple sequence.

21. Which algorithm is used by local alignment?

(a) Needleman and Wunsch

(b) PAM

(c) **Smith-Waterman**

(d) All the above.

22. Which algorithm is used by global alignment?

(a) **Needleman and Wunsch**

(b) Smith-Waterman

(c) BLAST

(d) PAM.

UNIT V

1. Pick the incorrect statement concerning the terminologies of phylogenetics

(a) branches are the lines in the tree

(b) tips of the branches have long lost sequences or species

(c) node indicate inferred ancestor of extant taxa

(d) connecting point joining two adjacent branches is a node

2. This is incorrect about the merits of molecular data for Phylogenetics study

(a) sampling bias is involved

(b) with the help of molecular data more robust and clear-cut phylogenetic tree can be constructed

(c) much easier to obtain in comparison to fossil records

(d) more in number compared to fossil records

3. Phylogenetic analysis of a set of sequences that aligns is straightforward because the positions that correspond in the sequences can be readily identified in a of the sequences.

a) very well, multiple sequence alignment

b) in a haphazard manner, multiple sequence alignment

c) in a distorted way, multiple sequence alignment

d) very well, self alignment

4 For sequences that have a phylogenetic analysis is

a) diverged considerably, more challenging

b) not diverged, more challenging

c) diverged considerably, less challenging d) diverged considerably, a less work to do

5. A phylogenetic tree is a diagram that shows the

a) evolutionary relationships

b) mutation

c) connection

d) distance

6. _____ represents a branching point from the ancestral population.

a) evolution

b) node

c) clade

d) none of the above

7. _____ is a piece of a phylogeny that includes an ancestral lineage and all the descendants of that ancestor.

a) node

b) clade

c) leaf

d) none of the above

8. _____ is a scaled phylogenetic tree in which the branch lengths are proportional to the amount of evolutionary divergence.

a) evolution

b) phylogram

c) cladogram

d) all the above

9. In phylogenetic analysis, it is also important to test whether two competing tree topologies can be distinguished and whether one tree is significantly better than the other.

a) True

b) False

10. The term "phylogeny" derives from the German Phylogenie, introduced by Haeckel in?

a) 1853

b) 1859

c) 1863

d) 1866

11. Phylogenetic diagram can be rooted or unrooted.

a) True

b) False

_____ indicates the hypothetical common ancestor, or ancestral lineage, of the 12. A tree.

a) unrooted tree diagram

b) rooted tree diagram

c) Both A and B

d) None of the above

13. A phylogenetic tree also known as?

a) Phylogeny

b) Evolutionary tree

c) Both A and B

d) None of the above

14. Which of the following is incorrect regarding the terminologies of phylogenetics?
- a) The connecting point where two adjacent branches join is called a node
 - b) At the tips of the branches are long lost species or sequences**
 - c) Node represents an inferred ancestor of extant taxa
 - d) The lines in the tree are called branches
15. _____ is computer software for conducting statistical analysis of molecular evolution and for constructing phylogenetic trees.
- a) MEGA**
 - b) NCBI
 - c) EMBL
 - d) DDBJ

Section B

UNIT I

1. What is genetics?
2. Where did Mendel's work get published?
3. What is test cross?
4. What are homologous chromosomes?
5. What is hemizygous condition?
6. Give an example for X-linkage
7. Give an example for Y-linkage
8. What are dominant genes and recessive genes?
9. List out any two classical experiments in *Drosophila*.
10. What is chromosome mapping?
11. What is genetic recombination?
12. List out any two significance of genetic recombination?
13. What is pedigree analysis?

Unit II

1. What are the two main components of eukaryotic chromosomes?
2. What is the chemical composition of eukaryotic chromosomes?
3. What is nucleosome assembly?
4. What are the 3 types of genes?
5. What is the classical concept of gene?
6. What is the main function of the gene?
7. What are characteristics of genes?
8. What are three features of gene concept?
9. What is cot value paradox?

10. What is the C-value in genetics?
11. What is C-value in genome size?
12. What is the basic structure of eukaryotic chromosomes?
13. Why do eukaryotes have linear chromosomes?
14. Why do eukaryotes have more DNA than prokaryotes?
15. What are the three levels of DNA packaging?
16. What is the chemical composition of eukaryotic chromosomes?
17. What is satellite DNA and repetitive DNA?
18. Are telomeres satellite DNA? Mention the reason.
19. What causes structural aberrations in chromosomes?
20. What are the 4 types of chromosomal aberrations?
21. What is polyploidy and mention its types?
22. What are the four types of aneuploidy?
23. What is the difference between Autopolyploid and Allopolyploid?
24. What are the consequences of polyploidy?
25. How does polyploidy affect evolution?
26. What is the advantage of polyploidy in plants?
27. What are 4 types of chromosome structural changes?
28. What are the different syndromes of chromosomal abnormalities?
29. What are the five common chromosomal disorders?
30. What is Jacobsen syndrome?
31. What are the 4 most common banding techniques in karyotyping?
32. What is G and R banding?

UNIT III

1. What is the main purpose of population genetics?
2. What is population genetics in evolution?
3. Mention any two difference between gene frequency and genotype frequency?
4. What is meant by gene frequency?
5. What is a gene pool and why is it important?

6. List out the different types of mating systems?
7. Does random mating change allele frequencies?
8. Why is random mating important to Hardy-Weinberg?
9. What are the 5 principles of the Hardy-Weinberg equilibrium?
10. What are the 5 mechanisms of evolution?
11. What is the Hardy-Weinberg principle and what is it used for?
12. How do you calculate random mating?
13. When does non-random mating occur?
14. How do you calculate carrier frequency in genetics?
15. What are the 5 modes of inheritance?
16. What is a recessive mode of inheritance?
17. Define gene panel.
18. What are two examples of non-random mating?
19. What is non-random mating?
20. What is the purpose of positive assortative mating?
21. What is the significance and negative effect of non-random mating?

Unit IV

Define/Comment/Write Notes on

1. Bioinformatics
2. Data base
3. NCBI
4. EMBL
5. DDBJ
6. Sequin
7. BLAST
8. Multiple sequence alignment
9. CLUSTALW
10. CLUSTAL omega
11. Gen Bank

12. Relational file
13. Accession number
14. SRS
15. EMBL
16. BLAST
17. MSA
18. Sequence alignment

UNIT V

1. Phylogenetics Trees
2. Root in pylogenetic tree
3. Branches pylogenetic tree
4. Node pylogenetic tree
5. Leaf pylogenetic tree
6. Clade
7. lineage sorting
8. orthology
9. paralogy
10. xenology
11. basal lineage
12. crown vs. stem groups,
13. Phylogram
14. Cladogram.
15. Tree building software
16. ClustalW,
17. Tree building software Mega
18. Phylip
19. Phylodraw,
20. Phyml
21. RaxML

22. Treeview

Section C

UNIT I

1. Write notes on sex linked inheritance.
2. How can chi-square be used in genetics?
3. Why probability is important for genetics?
4. How do you explain pedigree analysis?
5. What is the role of pedigree analysis in genetics?
6. What is done in genetic Counselling?
7. How the chromosomal basis of inheritance was demonstrated?
8. What is the role of crossing over in linkage and recombination?
9. Why are Drosophila used in genetic experiments? 10. Write notes on classical experiments in Drosophila?
11. How do you calculate map distance between genes and centromere?
12. How do you find the genetic distance of a two point cross?
13. Why is Neurospora used in genetics? Explain.

UNIT II

1. Write brief notes on chemical composition and packaging of eukaryotic chromosomes.
2. Discuss on concept of gene.
3. What is C-Value paradox? And notes on its significance.
4. What is cot value and what does it measure? Explain.
5. Explain the chemical composition of eukaryotic chromosomes.
6. Write brief notes on the steps of DNA packaging?
7. Discuss the ultra-structure of centromere and telomere.
8. What is satellite DNA and repetitive DNA? And add a notes on its function.
9. What causes structural aberrations in chromosomes? And the different types of chromosome aberrations.
10. What are Autopolyploids explain why Autopolyploids are usually sterile whereas Allopolyploids are often fertile discuss the role of Allopolyploids in evolution?
11. How does polyploidy cause genetic variation? Explain
12. Write brief notes on evolution of hexaploid wheat.

13. What are structural changes in chromosome? And add notes on the differences between deletion, translocation, inversion and duplication?

14. Discuss the chromosomal aberration related syndromes.

15. Write a brief notes on chromosome banding.

UNIT III

1. Give an account on population genetics and its significance.

2. Describe gene frequencies.

3. What is the difference between gene frequency and genotype frequency? Explain

4. Explain the gene pool types and its significance. . Write notes on principles of the Hardy-Weinberg equilibrium?

6. Give an account on applications of Hardy-Weinberg principles.

7. How do you test random mating? Explain

8. Give an account on the test for sex-linked trait.

9. Describe the test for carrier gene frequency.

10. How do you test the mode of inheritance? Explain.

11. Define multiple gene test and give a detailed account of its significance.

12. Describe non-random mating

13. Write notes on (a) Positive non-random mating (b) Negative non-random mating.

UNIT IV

1. Discuss NCBI

2. Discuss about DDBJ? Write its role in Bioinformatics

3. How will you submit the biological data to the databases using sequin

4. Write an essay on multiple sequence alignment

5. What is protein database? Discuss any two Protein databases

6. Discuss UniProtKB/Swiss-Prot and PIR

7. Write an detailed account on SCOP and CATH

8. Write about protein visualization tools with one example

9. Explain the following: PROSITE, BLOCKS and CADD

10. Write an essay on JPred and mention the codes used. Add notes on its uses

11. Write notes on 3DPSSM, Modeller, ITASSER and Procheck.

UNIT V

1. What is phylogenetic trees? Write the important features of it.
2. Explain the following phylogenetics terminologies: Trees, Root, branches, Node, Leaf, Clade
3. Explain: orthology, paralogy, xenology
4. Explain multiple sequence alignment with example and list out the uses
5. Write the role of CLUSTAL in tree construction
6. Briefly explain about Mega, Phylip
7. How will you use Phylodraw and Phym1 for tree construction
8. Write notes on RaxML
9. Write notes on Treeview

Section D

UNIT I

1. Write an essay on sex linked inheritance.
2. How Chi-square test and probability theory is used in genetics? Explain.
3. Discuss pedigree analysis.
4. What is genetic counselling? Explain the methods and significance of genetic counselling.
5. Write an essay on chromosome basis of inheritance.
6. Will linked genes always be inherited together? Explain. 7. What is the result of crossover and recombination? Explain.
8. Discuss in detail about Classical experiments in Drosophila.
9. Write an essay on recombination frequency and gene mapping.
10. Write an essay on genetic recombination and gene mapping in Neurospora.

UNIT II

1. Illustrate the chemical composition and packaging of eukaryotic chromosomes.
2. Describe the concept of gene.
3. Narrate the three levels of DNA packaging.
4. Illustrate the Ultra structure of centromere and telomere.
5. Give an account of repeated nucleotide sequences and satellite DNA.
6. Critically analyse the different types of structural aberrations in chromosomes.
7. Outline the cytological study and identification of autopolyploids and allopolyploids.
8. Give an account on genetic consequences of ploidy alteration.
9. Write an essay on evolution of hexaploid wheat.
10. Describe the different types of structural alteration in chromosomes.

11. Write a detailed account of chromosome banding:

UNIT III

1. Write an essay on history of population genetics and its significance.
2. Give a detailed account on gene frequencies.
3. Explain gene frequency and genotype frequency?
4. Discuss the gene pool types and its significance.
5. Write an essay on principles of the Hardy-Weinberg equilibrium?
6. Discuss the applications of Hardy-Weinberg principles.
7. Give an account on test for random mating?
8. Write an essay on test for sex-linked trait.
9. Outline the test for carrier gene frequency.
10. How do you test the mode of inheritance? Explain.
11. What is multiple gene test? and give a detailed account of its significance.
12. Write an essay on non-random mating
13. Give an account on (a) Positive non-random mating (b) Negative non-random mating.

UNIT IV

1. Discuss NCBI
2. Discuss about DDBJ? Write its role in Bioinformatics
3. How will you submit the biological data to the databases using sequin
4. Write an essay on multiple sequence alignment
5. What is protein database? Discuss any two Protein databases
6. Discuss UniProtKB/Swiss-Prot and PIR
7. Write an detailed account on SCOP and CATH
8. Write about protein visualization tools with one example
9. Explain the following: PROSITE, BLOCKS and CADD
10. Write an essay on JPred and mention the codes used. Add notes on its uses
11. Write notes on 3DPSSM, Modeller, ITASSER and Procheck.

UNIT V

1. What is phylogenetic trees? Mention the steps involved in the construction of it.
2. Discuss the different terminologies used in phylogenetic trees
3. Write about the tree building software with examples
4. Explain multiple sequence alignment with example and list out the uses
5. Write an essay on constructing phylogenetic tree using CLUSTAL
6. Write an essay on constructing phylogenetic tree using Mega, Phylip

7. Discuss about Phyml and RaxML

Section A

Unit I

1. Carbohydrates are organic compounds made up of
(a) carbon and hydrogen (b) **carbon, hydrogen and oxygen**
(c) carbon, hydrogen, oxygen and nitrogen (d) carbon and oxygen
2. Monosaccharides are
(a) aldoses (b) ketones (c) **both (a) and (b)**(d) none of these
3. The most common monomer of starch is
(a) xylose (b) **glucose** (c) cellobiose(d) ribose
4. Minimum number of carbon in a monosaccharide is
(a)1 (b)2 (c) **3** (d)4
5. All of the following are disaccharides except
(a) maltose (b) **cellulose** (c) cellubiose (d) lactose
6. Table sugar is a disaccharide, made up of
(a) **glucose and fructose** (b) glucose and galactose
(c) 2 moles of glucose (d) glucose and mannose
7. Carbohydrates occur naturally in
(a) **D-form** (b) C-form (c) Both (a) and (b) (d) α -form
8. Which of the following polysaccharides are found in a typical plant cell wall?
(a)**cellulose, hemicellulose and pectin** (b) cellulose, starch and pectin
(c) cellulose, hemicellulose and chitin (d)all of these
9. Starch is a homopolysaccharide, consisting of
(a) amylose and N-acetyl glucosamine (b) **amylose and amylopectin**
(c) amylose and pectin (d) amylopectin and chitin
10. Cellulose is made up of repeating units of
(a)**D glucose with β 1-4 linkage** (b) D glucose with β 1-2 linkage
(c) D glucose α 1-4 linkage (d) D glucose α 1-2 linkage

11. In maltose, 2 moles of glucose are bonded by
(a) β 1-4 linkage (b) β 1-6 linkage (c) **α 1-4 linkage** (d) α 1-2 linkage
12. Following are the characteristic features of milk sugar except
(a) disaccharide (b) **made up of glucose and lactose** (c) sweet in taste (d) glucose and galactose
13. The main site for gluconeogenesis is
(a) kidney (b) **liver** (c) brain (d) muscle
13. Cellulose fibers resemble with the protein structure in the form of
(a) **β - sheets** (b) α - helices (c) β - turns (d) none of these
14. Give the uses of polysaccharide cellulose, starch and hemicellulose in the right order:
(a) **structure, storage, structure** (b) structure, structure, storage
(c) All storage (d) storage, structure, storage
15. What biochemical test is used for testing the sugar level in blood?
(a) **Benedict's test** (b) Biuret test (c) Ninhydrin test (d) all of these.
16. If you remove all of the functional groups from an organic molecule so that it has only carbon and hydrogen atoms, the molecule becomes
(a) carbohydrate (b) protein (c) lipid (d) **hydrocarbon**
17. With respect to galactose, glucose is
(a) **a stereoisomer** (b) a structural isomer (c) not an isomer (d) unrelated except that they are both sugars
18. Glucose is a
(a) protein (b) disaccharide (c) nucleic acid (d) **monosaccharide**
19. Animals store glucose in the form of
(a) amylose (b) **glycogen** (c) glycerol (d) guanine
20. In the formation of a macromolecule, what type of reaction would join two subunits together?
(a) hydrophobic reaction (b) hydrolysis reaction
(c) **dehydration reaction** (d) denaturation reaction
21. Why is cellulose so difficult for most animals to digest?
(a) **they don't have the proper enzyme to break the bonds between subunits**
(b) cellulose is made up of chitin, which is indigestible
(c) the bonds holding cellulose subunits together are extremely stronger
(d) there are many hydrogen bonds holding the subunits together

22. Which of the following is not a disaccharide?
 (a) sucrose (b) maltose (c) lactose (d) **amylose**
23. The empirical formula for carbohydrates is
 (a) $(\text{CHO})_2$ (b) $(\text{CH}_2\text{O})_n$ (c) $2(\text{CHO})_n$ (d) $(\text{C}_2\text{HO})_n$
23. Molecules that have the same chemical formula but have different molecular structures are called
 (a) isotopes (b) ions (c) structural isotopes (d) **isomers**
24. Amino acids found in proteins generally belong to -----
 (a) D - series (b) **L - series** (c) α - series (d) all of these
25. Which of the following amino acids possess two asymmetric carbon atoms and thus have 4 optical isomers?
 (a) **threonine and isoleucine** (b) threonine and methionine
 (c) isoleucine and methionine (d) glycine and proline
26. Which of the following non-protein aminoacids play metabolic roles?
 (a) L –ornithine (b) L –CitruLine (c) L – alanine (d) **all of these**
27. Proteins have four basic structural levels of organization and were first defined by
 (a) Irving Geis (b) Watson and Crick (c) **Linderstrom - Lang** (d) Ramachandran
28. Based on the nature of hydrogen bonding (whether intra-molecular or inter-molecular) there are two regular types of secondary structure in protein. They are
 (a) **α – helix and β pleated sheet** (b) α – helix and γ pleated sheet
 (c) α – helix and α pleated sheet (d) none of these
29. The protein believed to be responsible for degenerative disease is called as
 (a) **prion** (b) virion (c) kuru (d) chaperonins
30. Protein folding and assembly *in vivo* sometimes requires the aid of a special proteins
 (a) **molecular chaperones** (b) molecular scissors (c) molecular markers (d) lygases
31. Which of the following is an example for globular protein
 (a) **antibody** (b) collagen (c) elastin (d) fibroin
32. Following are the characteristics of protein except
 (a) colloidal nature (b) coagulation (c) amphoteric nature (d) **non-functional**
33. Denaturation of proteins lead to following changes

- (a) decrease in their solubility (b) cessation of their biological activity
 (c) decrease in size and shape of the molecule **(d) all of these**
34. Reaction between glutamic acid and sodium hydroxide gives mono sodium glutamate, which is commonly called
 (a) glutamates **(b) ajinomoto**(c) taste maker(d) none of these
35. The result of reaction between aminoacid and benzaldehyde is
 (a) phosgene (b) ethylester **(c) Schiff's base** (d) benzylamino purine
36. The amino group of tyrosine is derived from
 (a) α -ketoglutarate **(b) glutamate** (c) aspartate (d) isocitrate
37. Which of the following are carrier proteins?
(a) myoglobin, hemoglobin (b) collagen, fibroin
 (c) casein myosin (d) insulin and ovalbumin
38. Proteins which are generally insoluble in water except
 (a) keratin (b) prolamine **(c) protamines** (d) glutelins
39. At isoelectric point proteins exist as
 (a) diplanar ions **(b) zwitter ions** (c) anions (d) cations
40. All of the followings are true of protein denaturation except that it
 (a) is a shape change **(b) is always irreversible**
 (c) may be caused by a pH change (d) could result from a temperature change
41. There are several levels of protein structure, the most complex of which is
 (a) primary (b) secondary (c) tertiary **(d) quaternary**
42. The functional group $-\text{NH}_2$ is a
 (a) carboxyl group **(b) amino group** (c) hydroxyl group(d) phosphate group
43. In the formation of a macromolecule, what type of bond would join two amino acid subunits?
 (a) ionic bond (b) phosphor-di-ester bond (c) hydrogen bond **(d) peptide bond**
44. The sequence of amino acids in a polypeptide is called the
(a) primary structure (b) secondary structure (c) tertiary structure (d) quaternary structure
45. The globular configuration of a protein is called the
 (a) primary structure (b) secondary structure **(c) tertiary structure** (d) quaternary structure
46. At what level(s) of protein structure would you expect to find disulfide bridges?
 (a) secondary (b) tertiary (c) quaternary **(d) all of these**

47. Which of the following is a characteristic of proteins?
- Some may enhance the rate of specific chemical reactions
 - They may form either long, thin fibrous molecules or compact, rounded globular molecules
 - They store genetic information for cellular metabolism.
 - Both (a) and (b)**
48. Following one represents dicarboxylic amino acids
- arginine and histidine
 - aspartic and glutamic acid**
 - histidine and cysteine
 - serine and threonine
49. Which of the following gives yellow coloured complex with ninhydrin reagent?
- asparagine
 - leucine
 - proline**
 - glycine
50. Proteins react with biuret reagent and give a violet coloured complex. It is because of the presence of
- tyrosine
 - phenylalanine
 - tryptophan
 - peptide bonds**

Unit II

- Name the type of the pathway which is involved in the synthesis of compounds?
 - Anabolic pathways**
 - Catabolic pathways
 - Amphibolic pathway
 - Anapleurotic pathway
- Which of the following cycle shows amphibolic pathway?
 - Glyoxylate
 - Citric acid cycle**
 - Glycolysis
 - Lipid metabolism
- Which of the following enzymes are not involved in galactose metabolism?
 - Galactokinase
 - Glucokinase**
 - Galactose-1-Phosphate Uridyltransferase
 - UDP-Galactose 4- epimerase
- Which of the following enzymes leads to a glycogen storage disease known as Tarui's disease?
 - Glucokinase
 - Pyruvate Kinase
 - Phosphofructokinase**
 - Phosphoglucomutase
- Which of the following enzymes is defective in galactosemia- a fatal genetic disorder in infants?
 - Glucokinase
 - Galactokinase
 - UDP-Galactose 4- epimerase
 - Galactose-1-Phosphate Uridyltransferase**
- Which of the following enzyme deficiency leads to hemolytic anaemia?
 - Glucokinase
 - Pyruvate Kinase**
 - Phosphoglucomutase
 - Phosphofructokinase

7. Which of the following is a tricarboxylic acid?
 (a) Acetic acid (b) Succinic acid (c) Oxaloacetic acid (d) **Citric acid**
8. Which of the following metabolites negatively regulates pyruvate kinase?
 (a) Citrate (b) **Alanine** (c) Acetyl CoA (d) Fructose-1,6-Bisphosphate
9. The glycerol phosphate shuttle functions in_____.
 (a) Lipid catabolism (b) Triglyceride synthesis (c) Anaerobic glycolysis for the regeneration of NAD (d) **Aerobic glycolysis to transport NADH equivalents resulting from glycolysis into mitochondria.**
10. In muscles, the pyruvate is converted into lactate. Find the correct statement
 (a) **During lactate formation, NADH is reconverted into NAD**
 (b) During the product of lactate two ATP are produced
 (c) Lactate is the substrate from the downstream pathway
 (d) Lactate acts as the substrate for the formation of amino acid
11. Which of the following glycolytic enzyme is inhibited by an accumulation of long-chain fatty acid in the liver?
 (a) **Glucokinase** (b) Hexokinase (c) Pyruvate kinase (d) Phosphofructokinase
12. Which of the following statements is known as the rate-limiting step in glycolysis?
 (a) Enolase (b) **Phosphofructokinase** (c) Phosphohexose isomerase (d) Glyceraldehyde-3-phosphate dehydrogenase
13. Which of the following hormones decreases blood glucose and increases the uptake of glucose in various tissues like skeletal muscle, adipose tissues?
 (a) **Insulin** (b) Cortisol (c) Glucagon (d) Epinephrine
14. What is the net gain of ATP during the conversion of glucose to pyruvate?
 (a) **2 ATP** (b) 4 ATP (c) 6 ATP (d) 1 ATP +1 GTP
15. Which of the following hormones is responsible for increasing gluconeogenesis in the liver during prolonged starvation?
 (a) TSH (b) Insulin (c) Thyroxine (d) **Glucagon**
16. Abnormal catabolic pathway of phenylalanine in human beings resulted in a disease called
 (a) **phenylketonuria** (b) alkaptonuria (c) both (a) and (b) (d) albinism
17. ----- is a key intermediate in the synthesis of aromatic amino acids
 (a) pyruvate (b) **chorismate** (c) shikimate (d) erythrose

Unit III

1. Saturated alcohols found in lipid molecules are
(a) glycerol (b) cholesterol (c) acetyl alcohol (d) **all of these**
2. Which of the following is found abundantly in animal fats?
(a) **palmitic acid and stearic acid** (b) palmitic acid and stearic acid
(c) stearic acid and linolenic acid (d) linoleic acid and linoleic acid
3. Following is an example for simple lipids
(a) lecithin (b) wax (c) cephalins (d) **none of the above**
4. Neutral lipids
(a) glycerides and cholesterol esters (b) **glycerides and fatty acids**
(c) triglycerides and fatty acids (d) triglycerides and glucose
5. Most of the triglycerides of nature are mixed triglycerides i.e., they contain 2 or more fatty acid units in the molecule. Such triglycerides are said to be
(a) symmetrical (b) **asymmetrical** (c) geometrical (d) isomers
6. Which one of the following is an example for plant fat?
(a) **Corn oil** (b) butterfat (c) both (a) and (b) (d) corn flour
7. In carnauba wax the fatty acids are esterified with following alcohols
(a) **tetracosanol** (b) palmitic acid (c) glycerol (d) glycol
8. In the absence of lecithin, accumulation of lipids occurs in the liver upto 30%, and the condition is referred as
(a) **fatty liver** (b) fat deposits (c) cirrhosis (d) fibroid liver
9. Snake bite causes hemolysis because
(a) **snake venom contain lecithinase** (b) snake venom contain lysolecithins
(c) Snake venom is poisonous (d) snake venom induce blood clotting
10. Cephalins resembles lecithin except
(a) choline replaced by amine (b) **choline is replaced by serine or ethanolamine**
(c) choline is replaced by cysteine (d) none of these
11. Niemann-Pick disease is associated with
(a) cephalin (b) lecithin (c) **spingomyelin** (d) ethanolamine
12. Point out glycolipid from the following

- (a) cerebrosides (b) **sphingomyelins** (c) phenanthrene(d) lecithin
13. The carbohydrate mostly found in glycolipids is
(a) **Galactose** (b) fructose (c) lactose (d) mannose
14. Which of the following is nonsaponifiable fat?
(a) sulfolipids (b) **cholesterol** (c) phospholipids (d) glycolipids
15. All the steroids are considered as derivatives of a fused and fully saturated ring system called
(a) **sterane** (b) sertine (c) phenanthrene(d) pentane
16. The molecular formula of cholesterol is
(a) **C₂₇H₄₅OH** (b) C₁₄H₂₇OH (c) C₂₇H₄₆OH (d) C₁₄H₂₆OH
17. The first step in cholesterol synthesis is conversion of acetyl CoA into
(a) **mevalonate** (b) oxaloacetate (c) isoprene units (d) farnesyl pyro phosphate
18. Generally saturated fatty acids are oxidized by
(a) α-oxidation (b) **β-oxidation** (c) oxidative decarboxylation(d) none of these.
19. Which of the following is not a lipid?
(a) **chitin** (b) terpenes (c) steroids (d) prostaglandins
20. Triglyceride contains fatty acids and
(a) glucose(b) glycogen (c) **glycerol**(d) guanine
21. The symptoms of retinol excess are
(a) bone fragility (b) nausea (c) weakness (d) **all of these**
22. Ascorbic acid acts as an
(a) **reducing agent** (b) oxidizing (c) oxidizing and reducing (d) dehydrating
23. Absence of ascorbic acid in the human diet leads to
(a) rickets (b) pernicious anemia (c) cataract (d) **scurvy**
24. An early sign of retinol deficiency in human is
(a) keratinization (b) **night blindness** (c) xerophthalmia (d) none of these
25. Which of these is a symptom of vitamin A deficiency?
(a) Osteoporosis (b) **blindness**(c) impaired taste perception (d) impaired blood clotting
26. Vitamin D deficiency can cause
(a) **rickets** (b) cataract (c) beri-beri(d) anemia
27. Vitamin C is required for the production and maintenance of

(a) **collagen** (b) hormone (c) ascorbic acid (d) RBC

Unit IV

1. A competitive inhibitor of an enzyme is usually
 - (a) a highly reactive compound
 - (b) a metal ion such as Hg^{2+}
 - (c) **structurally similar to the substrate**
 - (d) water insoluble
2. The rate determining steps of Michaelis Menten kinetics is
 - (a) ES complex formation step
 - (b) **ES complex dissociation step to P**
 - (c) the P formation step
 - (d) both (a) and (b)
3. A conformational change in an enzyme after the substrate is bound that allows the chemical reaction to proceed can be explained by
 - (a) **induced fit**
 - (b) transition
 - (c) active site
 - (d) complementation
4. The active site of an enzyme occupies
 - (a) a relatively large portion of the enzyme molecule
 - (b) **relatively small portion of the enzyme molecule**
 - (c) non enzyme part of the enzyme molecule
 - (d) substrate part of the enzyme substrate complex
5. Which category of enzymes belongs to class two in the international classification
 - (a) hydrolases
 - (b) ligases
 - (c) **transferases**
 - (d) isomerases
6. Which of the following statements is true for enzymatically catalyzed reaction?
 - (a) **the activation energy of the reaction is lowered so that reaction rate is increased**
 - (b) the activation energy of the reaction is lowered so that constant equilibrium is altered
 - (c) both (a) and (b)
 - (d) the activation energy of the reaction is increased so that reaction rate is increased
7. The enzyme inhibition can occur by
 - (a) reversible inhibitors
 - (b) irreversible inhibitors
 - (c) **both (a) and (b)**
 - (d) none of these
8. Which of the following statement is not true?
 - (a) enzymes are proteins that bind to specific substrates
 - (b) enzymes changes the velocity of the reaction
 - (c) **enzyme changes the equilibrium constant**
 - (d) enzymes function by overcoming the activation energy barrier of a reaction
9. All allosteric inhibitor of an enzyme usually

- (a) **participates in feedback regulation** (b) denatures the enzyme
 (c) increase the enzyme activity (d) is a hydrophobic compound
10. Enzyme substrate union results in the release of free energy. This energy raises the energy level of the
 (a) **substrate molecule** (b) enzyme molecule
 (c) enzyme substrate molecule (d) product molecule
11. Which of the following statements is not universally applicable to enzymes:
 (a) They can catalyze a reaction in both direction
 (b) They are not used up during a reaction
 (c) They will bind with more than one substrate in a given time
 (d) They are proteins
12. ----- metal ions are required in oxido-reduction reactions
 (a) **Fe, Cu, Mo** (b) Fe, Cu, Ca (c) Fe, Ca, Hg (d) Ag, Al, Fe
13. Which one of the following is an example for isoenzyme
 (a) succinate dehydrogenase (b) **lactate dehydrogenase**
 (c) α - ketoglutarate dehydrogenase (d) fumerase
14. Enzymes catalyze the removal of groups from substrates by mechanisms other than hydrolysis, leaving double bonds
 (a) isomerases (b) ligases (c) **lyases** (d) hydrolases
15. Father of modern enzymology
 (a) **James Batcheller Sumner** (b) Eduard Buchner (c) Kuhne (d) Pasteur
16. Interaction of substrate and enzyme was visualized in terms of a lock and key model and was proposed by
 (a) Harris (b) **Emil Fisher** (c) Koshland (d) Michaelis-Menten
17. The activity of the enzymes is controlled by
 (a) covalent modification (b) feedback inhibition
 (c) zymogen activation (d) **all of these**
18. The number of substrate molecules converted into product per unit time, when the enzyme is fully saturated with substrate
 (a) **turnover number/molecular activity** (b) molecular activity/ molecular fit
 (c) turnover time/molecular activity (d) none of these

19. Point out the appropriate one related to enzyme activity

- (a) **holoenzyme** \rightleftharpoons **apoenzyme** + **coenzyme** (b) holoenzyme \rightleftharpoons apoenzyme + inhibitor
(c) apoenzyme \rightleftharpoons holoenzyme + inhibitor (d) holoenzyme \rightleftharpoons protein part + apoenzyme

20. A simple enzymatic reaction can be represented as

- (a) **E+S** \rightleftharpoons **ES** \rightleftharpoons **EP** \rightleftharpoons **E+P** (b) ~~E+S~~ ~~ES~~ ~~EP~~ E+P
(c) E+S \rightleftharpoons ES \rightleftharpoons E+P (d) E+S \rightleftharpoons EP \rightleftharpoons E+P

Unit V

1. The second law of thermodynamics essentially says

- (a) heat is energy (b) motion energy converts to heat energy
(c) at the atomic level, motion is continuous (d) **entropy increases**

2. The energy required to destabilize existing chemical bonds is called -----energy.

- (a) **activation** (b) destabilization (c) kinetic (d) free

3. If ΔG is said to be positive, it means

- (a) H is lower
(b) reactants contain more energy than the product does
(c) S in the system is higher
(d) **products of the reaction contain more energy than the reactants**

4. Which of the following is uncharacteristic of ATP?

- (a) It is formed by attaching a phosphate group to ADP with a high-energy bond.
(b) In most reactions involving ATP, only the outer, high-energy bond is hydrolyzed.
(c) **It is a good long-term energy storage molecule.**
(d) When dephosphorylated, ATP becomes ADP.

5. The first law of Thermodynamics states that energy can be

- (a) created (b) destroyed (c) **converted** (d) all the above

6. The universal energy currency for(all cells is

- (a) **ATP** (b) NAD^+ (c) ADP (d) enzymes

7. To what category of macromolecules do most enzymes belong?

- (a) carbohydrates (b) lipids (c) steroids (d) **proteins**

8. Which of the following is a reduced compound?

- (a) CO₂(b) O₂(c) NAD⁺(**d) NADH**)
9. In an endergonic reaction,
 (a) **the reactants contain less free energy than the products**
 (b) the reactants contain more free energy than the products
 (c) no activation energy is required
 (d) catalysis cannot occur
10. The energy of random molecular motion is called
 (a) **heat**(b) free energy (c) enthalpy (d) potential energy
11. The energy available to do work in a system is called
 (a) entropy(b) activation energy (c) thermodynamics (**d) free energy**)
12. A catalyst will make a reaction
 (a) stop(b) slow down (**c) speed up**(d) go in a different direction
13. When molecules are reduced they gain
 (a) energy(b) electrons (c) hydrogen protons (**d) all the above**)
14. Cofactors
 (a) break hydrogen bonds in proteins (**b) help facilitate enzyme activity**)
 (c) increase activation energy (d) are very rare in living organisms
15. How much energy is released when one of the high-energy bonds in ATP is broken?
 (a) 730 cal/mole (b) 7.3 cal/mole (**c) 7.3 kcal/mole**(d) 73 kcal/mole
16. The loss of an electron by a molecule is called
 (a) **oxidation**(b) reduction (c) reduced fit (d) enthalpy
17. In the chemical equation $G = H - TS$, the term G stands for
 a) entropy b) the reactants c) enthalpy (**d) free energy**)
18. Enzymes B requires Zn²⁺ in order to catalyze the conversion of substrate X. The zinc is best identified as a:
 (a) coenzyme (**b) cofactor** (c) substrate (d) product.
 d) involve the gaining of energy by an oxidized substance
19. The actions of an enzyme can be affected by all of the following except
 (a) temperature (b) allosteric inhibitors (**c) availability ATP** (d) cofactors
20. Which of the following are mismatched
 (a) anabolic reactions-expense energy (b) reduction-gain of an electron

- (c) exergonic reaction-catabolism **(d) activation energy-entropy**
21. Whenever energy is transformed, there is always an increase in the
(a) A free energy of the system (b) enthalpy of the universe
(c) entropy of the system **(d) entropy of the universe**
22. According to the second law of thermodynamics
(a) the entropy of the universe is constantly increasing
(b) energy can be transferred or transformed, but it can be neither created nor destroyed
(c) for every action there is an equal and opposite reaction
(d) the total amount of the energy in the universe is conserved or constant
23. All of the following statements are representative of the second law of thermodynamics except
(a) heat energy represents lost energy to most systems
(b) every time energy changes form, there is a decrease in entropy
(c) highly organized systems require energy for their maintenance
(d) energy transfers are always accompanied by some loss.
24. Which of the following would decrease the entropy within a system?
(a) catabolism (b) hydrolysis **(c) dehydration reactions** (d) respiration
25. According to the second law of thermodynamics, all of the following statements are true except that
(a) the synthesis of large molecules from small molecules is exergonic
(b) life exists at the expense of greater energy that it contains
(c) entropy increases in a closed system
(d) every chemical transformation represents a loss of free energy
26. A chemical reaction that has a positive ΔG , is correctly described as
(a) exothermic (b) exergonic (c) enthalpic **(d) endergonic**
27. Why is ATP an important molecule in metabolism?
(a) ATP is not hydrolysed
(b) Hydrolysis of its phosphate groups releases energy
(c) Its phosphate bonds are easily formed and broken
(d) Both (b) and (C)

Section B

Unit I

1. What are isomers? Give examples.
2. What is isomerism?
3. What are optical isomers?
4. What you mean by Kilian cyanohydrin synthesis?
5. Give the Haworth formula of glucose.
6. Give an example for cis-trans isomes.
7. Define mutarotation.
8. What is racemization?
9. Suggest a reaction to distinguish aldoses from ketoses.
10. Give two examples for reducing sugars.
11. What is enolization?
12. Why is glucose not well suited for preserving fruits?
13. Name the predominant form of sugar transported in higher plants.
14. Draw the structure of lactose.
15. Differentiate maltose from isomaltose.
16. What are the two isomeric form of trehalose?
17. Define gluconeogenesis.
18. Name any two structural polysaccharides.
19. Give any two structural polysaccharides.
20. In what forms carbohydrates are stored in plants and animals?
21. Why is it not possible to write on an oily paper?
22. What is gun cotton?
23. Write the general formula of an amino acid.
24. Define isoionic point.
25. Write down the ionization of alanine when titrated with alkali and acid.
26. Find out the isoelectric point of an amino acid, having pK_{a1} 2.34 and $pK_{a2} = 9.69$
27. Write the structural formula of tyrosine.
28. Give the structural formula of any one sulphur containing amino acid.

29. Show the molecular structure of monocarboxylic amino acid.
30. How does proline and hydroxyproline differ from all other 19 protein amino acids?
31. What is a dipeptide?
32. Write a note on disulphide bond.
33. Comment on Ramachandran Plot.
34. What do you understand by α - helix?
35. Write any two characteristic features of α – keratin.
36. Give any two important characteristics of collagen.
37. What are globulins?
38. Give any two examples for globular protein.
39. Why does our skin become wrinkled in old age?
40. Why do some wounds leave scars while some do not?
41. The shape of hair is determined in part by the pattern of disulfide bonds in keratin, its major protein. How can curls be induced?
42. When wool sweater or socks are washed in hot water or dried in an electric dryer, they shrink but silk does not shrink under the same conditions – give reason.
43. What is called conjugated protein?
44. What is chaperone?
45. What is meant by deamination?

Unit II

1. Define metabolism
2. What is anabolism?
3. What is amphibolic reaction?
4. Explain the entry of glycogen into glycolysis.
5. What are the reasons of phosphorylation of intermediates of glycolysis?
6. What is TCA cycle? Why TCA cycle is also known as Krebs's cycle or citric acid cycle?
7. Write a substrate level phosphorylation reaction in TCA cycle.
8. Why TCA cycle is said to be amphibolic in nature? 6. State the energetics of TCA cycle.
9. State the metabolic role of HMP pathway.
10. Why is gluconeogenesis necessary for the body?

11. Name the rate limiting enzymes of gluconeogenesis.
12. Gluconeogenesis is not reversal of glycolysis. Justify the statement.
13. What is glycogenesis? explain the reactions.
14. How is glycogen metabolism regulated?
15. How does substrate level phosphorylation differ from oxidative phosphorylation?
16. Explain Tryptophan metabolism.
17. Write notes on phenylketonuria.
18. Structure of phenylalanine
19. Outline the pathway of tyrosine synthesis.

Unit III

1. What are simple lipids? Give an example.
2. Define phospholipids.
3. What are glycolipids?
4. Write the generic formula of triglycerides.
5. Give the structure of α - lecithin.
6. What is the importance of HDL-C level?
7. Draw the molecular structure of cholesterol.
8. What do you mean by LDL-C and HDL-C.?
9. Differentiate between fat and oil.
10. Comment on fatty acids.
11. What are lipids?
12. How many acetate units are needed to form mevalonate?
13. Point out the major step of regulation in cholesterol synthesis.
14. Complete combustion of fatty acids to CO_2 and H_2O occur in two stages. What are they?
15. How many acetyl CoA are produced after complete oxidation of one molecule of palmitic acid.
16. What are vitamins?
17. What is rickets?
18. What are fat soluble vitamins?

Unit IV

1. What are called transferases?
2. Mention the role of oxido-reductases.
3. What are isoenzymes?
4. Define active site.
5. Define activation energy.
6. What is K_m ?
7. What is V_{max} ?
8. Comment on cofactors.
9. What is an apoenzyme?
10. Write the role of catalysts?
11. What is holoenzyme?
12. Comment on prosthetic group?
13. Write about co-enzyme?
14. How to temperature affect the enzyme activity?
15. What is the role of competitive inhibitors?
16. What is meant by feedback inhibition?

Unit V

1. What is bioenergetics?
2. Define redox reaction.
3. What is an oxidizing agent? Give an example.
4. Comment on redox pair.
5. Define redox potential.
6. Define standard free energy.
7. Define entropy.
8. When water freezes, its entropy decreases. Give the reason.
9. Name any four high energy compounds met within biological systems.
10. What is the relationship between the system and the surroundings?
11. Give an example for a redox couple.
12. What is phosphorylation?
13. Enumerate the different types of phosphorylation.

14. Draw the molecular structure of ATP.
15. Write the role played by ATP in biochemical reactions.
16. Where does ATP synthesis occur?
17. Distinguish between anabolic and catabolic reactions.
18. How is the energy generated during metabolic processes usually stored for later use?
19. Define phosphorescence.
20. How many ATP molecules are produced when one molecule of glucose is oxidized completely?
21. When will you say that the reaction is exergonic?
22. Define energy.
23. State any two properties of light.

Section C

Unit I

1. Represent the different form of molecular structure of glucose.
2. Write any three chemical properties of monosaccharides.
3. Differentiate between reducing and non-reducing sugars. Give examples.
4. Draw the molecular structure of maltose, lactose and sucrose.
5. Outline the biosynthesis of sucrose.
6. Define gluconeogenesis. Write the advantages of gluconeogenesis.
7. How is sucrose hydrolysed? Explain.
8. Write on any one heteropolysaccharide.
9. Comment on amylopectin.
10. Give a brief account on cellobiose.
11. Write the molecular structure of any four aromatic amino acids.
12. What are essential amino acids? Include their names.
13. List of physical properties of amino acids.
14. Discuss the classification of amino acids based on their group.
15. Write notes on lipoprotein.
16. Write the characteristics, occurrence and types of fibrillar proteins.
17. Discuss the primary structure of protein.
18. Give a brief account of amino acid sequencing.
19. Write the defects associated with the metabolism of phenyl alanine.

20. What are protamines and histones? Give their significance.

Unit II

1. What is glycolysis? Mention the role of oxygen in glycolysis.
2. Name the steps of glycolysis where ATP is consumed.
3. Write the glycolytic reactions where ATP is produced.
4. What is substrate level phosphorylation? Write two reactions of substrate level phosphorylation in glycolytic pathway.
5. Explain the fate of pyruvate formed in glycolysis.
6. How many ATPs are formed in glycolysis in the presence of oxygen? Write the reactions.
7. What are rate limiting and key enzymes of glycolysis?
8. What is anaplerosis? Write anaplerotic reactions.
9. What is HMP pathway? How does HMP pathway differ from EMP pathway?
10. Write the reactions involved in oxidative phase of pentose phosphate pathway.
11. What is gluconeogenesis? Name the substrates of gluconeogenesis.
12. Write a note on CORI CYCLE.
13. What is glycogenolysis? Explain the activity of glycogen phosphorylase and debranching enzyme.
14. What are glycogen storage diseases?

Unit III

1. Briefly outline the classification of lipids.
2. Explain the molecular structure of triglycerides.
3. Give an account of wax.
4. Write the differences between animal and plant fats.
5. Write down the physical properties of fats.
6. What are derived lipids? Explain with an example.
7. Explain saponification by giving an appropriate reaction.
8. Explain the Wald's visual cycle.
9. Write the biochemical functions of vitamin D
10. Write down the biochemical functions of vitamin C

Unit IV

1. Enumerate the importance of enzymes.
2. Give the classification of enzymes.
3. List out the characteristic features of active site.
4. Explain activation energy.
5. Differentiate between cofactors and inhibitors by giving suitable examples.
6. Explain competitive inhibition.
7. Explain the concept of intermolecular fit.
8. What are Coenzymes? Explain the mechanism of coenzyme action.
9. Discuss the different factors affecting the enzyme activity.
10. Explain the mechanism of enzyme action.

Unit V

1. What are coupled reactions? Explain with an example.
2. Standard free energy value of chemical reaction are additive. Support this statement with an example.
3. Write the difference between ΔG and ΔG°
4. Explain the concept of enthalpy in relation to living system.
5. State the first law of thermodynamics and write its mathematical expression.
6. Distinguish between entropy and free energy.
7. Explain redox couple.
8. Write the wave properties of light.
9. State the second law of thermodynamics and the concept of entropy
10. ATP is the energy currency of cell – Justify.

Section D

Unit I

1. Explain structure and properties of disaccharides.
2. Discuss the properties of monosaccharides.
3. Explain the biosynthesis and hydrolysis of starch.

4. Write an account on gluconeogenesis.
5. Explain the structure of homopolysaccharides that you have studied.
6. What are heteropolysaccharides? Explain in detail with suitable examples.
7. Write an essay on isomerism, giving appropriate examples each.
8. Write the chemical properties of amino acids.
9. What are the bonds that stabilize the structure of a functional protein? Explain.
10. Describe the tertiary structure of protein.

Unit II

1. Outline the metabolism of gluconeogenesis.
2. Describe the pathway of glycogen metabolism.
3. Explain the metabolism of galactose.
4. Elucidate the pathway of glycolysis.
5. Explain the process of kreb cycle.
6. Explain pentose phosphate pathway.
7. Outline the metabolism of tyrosine.
8. How is tryptophan synthesized and degraded in living organisms.
9. Discuss the metabolic pathways of phenylalanine.
10. Explain Commercial polypeptides – ACTH, Thymosin.

Unit III

1. Describe the structure and properties of derived lipids.
2. What are compound lipids. Write the molecular structure and properties of phospholipids.
3. Explain glycolipids and differentiate compound lipids from simple lipids.
4. Write the chemical properties of lipids.
5. Write down the various steps involved in palmitic acid synthesis.
6. How is palmitic acid oxidized? Elaborate.
7. Outline the steps involved in biosynthesis of cholesterol.
8. Write the biochemical functions of vitamin B.
9. Write biochemical functions of vitamin A.
10. Write biochemical functions of vitamin C.

11. Write biochemical functions of vitamin D.

Unit IV

1. Explain the mechanism of enzyme action.
2. Discuss enzyme kinetics.
3. How the enzyme activity is regulated? Explain.
4. Outline the various factors affecting the enzyme activity.
5. Write essay on classification of enzyme according to IUPAC.
6. Explain the mechanism of coenzyme action
7. What is enzyme inhibition? Explain the three types of enzyme inhibition.
8. Discuss the characteristic features of active site of enzyme.
9. Write notes on a) isozyme b) Allozyme c) Cofactors d) Coenzyme
10. Explain the derivation of Michelis Menton equation.

Unit V

1. What is oxidative phosphorylation? How does it occur in living cells?
2. What is photophosphorylation? Explain it in detail.
3. ATP is said to be “high energy compound” - support this statement.
4. Explain the laws of thermodynamics by giving possible examples.
5. Explain the properties of light.
6. Write an essay on bioluminescence.
7. Differentiate Phosphorescence and fluorescence.
8. Explain the concept of enthalpy and entropy.
9. Explain the concept of electromagnetic spectrum.
10. Explain the dual nature of light.

ST.MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001
II M.Sc. Botany – Semester III
Core X - Taxonomy of Angiosperms - Course Code: 21PBOC32

Section - A

Unit - I

1. Select the principle of naming which is not on the basis of ICBN
 - (a) **Botanical Nomenclature depends on Zoological nomenclature**
 - (b) Nomenclature of a taxonomic group is based upon priority of publication
 - (c) Scientific names of taxonomic groups are treated as latin
 - (d) Each taxonomic group at particular ranks bear only one correct name.
2. Select the family names from the list of families below, whose traditional names were accepted by ICBN rules
 - (a) Brassicaceae & Malvaceae (b) **Asteraceae & Lamiaceae**
 - (c) Poaceae & Cyperaceae (d) Apiaceae & Sterculiaceae
3. Based on the typification methodology of nomenclature of a family _____ is the type of a family
 - (a) **genus** (b) species (c) variety (d) species & variety
4. The name *Cerasus cornuta* was first proposed by Sir Wall but validly published by Royle. Pick up the correct citation for the above mentioned taxon
 - (a) *C. cornuta* (Sir Wall) Royle
 - (b) ***C. cornuta* Sir Wall. ex Royle**
 - (c) *C. cornuta* Roy.emend Sir Wall
 - (d) *C. cornuta* (Royle) Wall.
5. Based on priority criterion in selecting the legitimate name, write the correct name of the *Nymphaea*
 - (a) *N. pubescence* Willd; 1799
 - (b) ***N. nouchali* Burm.f., 1768**
 - (c) *N. torus* Hook. f. et T., 1872
 - (d) *N. stellata* Willd. 1799
6. Based on the rules of ICBN the nomenclature *Malus malus* is rejected, because it is
 - (a) a later homonym (b) a nomen nudum (c) **a tautonym** (d) a nomen superfluum
7. _____ is the botanical code agreed to conserve the names that do not satisfy the principle of priority
 - (a) **Nomina conservanda** (b) Nomina rejicienda
 - (c) Nomina familiarum conservanda (d) Opera utique oppressa
8. Binominal system of nomenclature was effectively proposed by
 - (a) Charles Darwin
 - (b) Wallace
 - (c) **Carolus Linnaeus**

- (d) Caspher Bahuin
9. The term taxonomy was first introduced by
(a) Johan Ray (b) Darwin (c) **A.P. de Candolle** (d) Linnaeus
10. Names of varieties are commonly
(a) binomial (b) **trinomial** (c) monomial (d) polynomial
11. First step in taxonomy is
(a) **description** (b) naming (c) identification (d) classification
12. When the generic name is repeated in the specific epithet the name is termed as
(a) synonym (b) homonym (c) **tautonym** (d) basonym
13. Scientific names are advantageous over common names because
(a) They vary from region to region (b) They are not consistent
(b) Many organisms do not have a common name (d) **All the above**
14. Specimen on which the original description of the species is made is known as
(a) **Holotype** (b) Neotype (c) Paratype (d) None of the above
15. A name may be rejected
(a) Because they are illegitimate (b) Because of taxonomic judgment
(c) **Both (a) and (b)** (d) None of the above
16. The correct sequence of a taxa is
(a) Class-order-tribe-family-genus (b) Order-class-tribe-family-genus
(c) Tribe-class-order-genus-species (d) **Class-order-family-genus-species**
17. A binomial in which the genus name and specific epithet are identical in spelling is
(a) Homonym (b) Synonym (c) **tautonym** (d) basonym
18. Two or more names belonging to the same taxa are called
(a) Homonym (b) **Synonym** (c) Both homonym and synonym (d) None of the above
19. In the early 1700's, the classification system used was
(a) **Polynomial** (b) Tetranomial (c) Trinomial (d) Binomial
20. A major problem with polynomial names was that they were
(a) Inaccurate (b) **Cumbersome** (c) Not descriptive (d) In Latin
21. A specimen or any other element selected from the original material cited by the author when no holotype was designated at the time of publication is called:
(a) Holotype (b) Isotypes (c) **Lectotype** (d) Topotype
22. When the generic name is repeated in the specific epithet the name is termed as
(a) synonym (b) homonym (c) **tautonym** (d) basonym
23. The term taxonomy was first introduced by
(a) Johan Ray (b) Darwin (c) **A.P. de Candolle** (d) Linnaeus
24. Names of varieties are commonly
(a) binomial (b) **trinomial** (c) monomial (d) polynomial
25. A genus having many species is known as
(a) **polytypic** (c) monotypic (c) polygamic (d) both (a) and (b)
26. A taxonomic group belonging to any rank is conveniently known as

- (a) category (b) species (c) **taxon** (d) community
- (b) The species inhabiting different geographical areas are
 (a) **allopatric** (b) sympatric (c) sibling species (d) morphological species
27. Genus *Leitneria* has a single species thus it is
 (a) monotypic family (b) vicarious species (c) cryptic species (d) **monotypic genus**
28. Who proposed typhological species concept
 (a) Mayre (1942) (b) Meglitsch (1954) (c) **John Ray (1686)** (d) Wiley (1978)
29. Which of the following characters is not related to an ideal species
 (a) **It must be an asexually reproducing plant**
 (b) It should be isolated genetically from other species
 (c) It must not have sub species such as varieties
 (d) It must be a sexually reproducing plant
30. In the hierarchial classification, the number of obligate categories is
 (a) **7** (b) 8 (c) 6 (d) 12
31. The correct sequence of taxonomic categories is
 (a) division-class-family-order- species-genus
 (b) **division-class-order-family-genus-species**
 (c) order-class-division- family-genus-species
 (d) class-division- order-family-genus-species
32. The concept of species was first proposed by
 (a) Linnaeus (b) **Bauhlin** (c) Bentham (d) Julian Huxley

Unit II

1. Who were the author of Principles of Numerical Taxonomy
 (a)Theophrastus (b) De candole (c) **Sokal & Sneath** (d) Hutchinson
2. Choose the correct website revealing the refinement of APG of classification of plant kingdom.
 (a) www.rsady.org/publication/angio.in
 (b) www.inform.umd.edu/PBLO/fam/aahtml
 (c) **www.mobot.org/MOBOT/Research/APweb**
 (d) www.raebg.org/taxa/angio/in
3. Pick up the correct set of series from the list below belong to Subclass Monochlamydeae according to Bentham & Hooker
 (a) Coronariceae, Calycinae, Microspermae
 (b) **Curvembryae, Micrembryae, Unisexuales**
 (c) Apocarpae, Curvembryae, Micrembryae
 (d) Unisexuales, Coronarieae, Microspermae
4. Expand the abrevation APG
 (a) **Angiosperm phylogeny group** (b) Amentiferae paraphylitic group
 (c) Angiosperms pinatae group (d) Amentiferae phylogenetic group

5. Which one of the following taxonomic categories tops the hierarchy of given categories?
(a) genus (b) order (c) species (d) **class**
6. The Linnaeus system of classification contains
(a) 4 classes of plants (b) 8 classes of plants
(c) 16 classes of plants (d) **24 classes of plants**
7. In taxonomic hierarchy, the various categories are arranged in
(a) **descending series** (b) horizontal series (c) ascending series (d) none of these
8. The Bentham and Hooker's classification is
(a) **classification of taxa on actual examination** (b) artificial system of classification
(c) based on evolution (d) phylogenetic classification
9. The book *Genera Plantarum* (1737) was written by
(a) Rendle (b) De candolle (c) **Linnaeus** (d) Bentham and Hooker
10. The branch of taxonomy utilizing statistical methods is known as
(a) numerical taxonomy (b) taximetrics (c) mathematic taxonomy (d) **all the three above**
11. A relationship involving overall similarity of all available characters from different disciplines is called
(a) phylogenetic relationship (b) cladistic relationship
(c) **phenetic relationship** (d) patristic relationship
12. Graphic representations indicating evolutionary relationships of groups is
(a) dendrogram (b) **cladogram** (c) α -taxonomy (d) hierarchy
13. Which of the following classification is commonly followed in Indian herbaria?
(a) **Bentham and Hooker** (b) Engler and Prantl (c) Hutchinson (d) Takhtajan

Unit III

1. A flora is an inventory of plants useful to identify plants of restricted geographical region.
_____ is the flora compiled by Dr.K.M.Mathew
(a) Regional flora of British India (b) **Flora of Tamil Nadu Carnatic**
(c) Flora Europaea (d) Flora of Delhi
2. Genus *Illicium* from winteraceae was separated due to variation in its nodal anatomy. Find out the specific node of *Illicium* from the variants below
(a) **Unilocular node** (b) Bilocular node (c) trilocular node (d) multilocular node
3. Which of the plants below which is placed along the tribe chlorideae based on its chromosome similarities?
(a) *Paeonia* (b) ***Spartina*** (c) *Tragopogon* (d) *Crepis*
4. Which of the following families are authentically included under group Centrospermae due to presence of a secondary metabolite, betalains
(a) Caryophyllaceae & Molluginaceae (b) Caryophyllaceae & Cactaceae
(c) **Didiereaceae & Cactaceae** (d) Cactaceae & Molluginaceae
5. List the embryological features of *Trapa* helped to isolate *Trapa* from Onagraceae

- (a) ***Polygonum* type of embryo sac** (b) Well developed superior haustorium
 (c) Absence of endosperm (d) Inferior ovary, trilobular with many ovules per chamber
6. Central National Herbarium is situated at
 (a) Chennai (b) **Kolkatta** (b) Dehradun (d) Mumbai
7. The science of chemotaxonomy is based on
 (a) cell organelles (b) shape and size of the cell (c) monograph (d) **none of these**
8. What is the primary function of herbarium?
 (a) accurate identification (b) alpha taxonomic research
 (c) beta taxonomic research (d) **Both (a) and (b)**
9. The science of chemotaxonomy is based on
 (a) starch grains (b) flavonoids (c) electrophoresis of proteins (d) **all the above**
10. Which of the following is not included in the minor herbaria?
 (a) regional herbaria (b) college herbaria
 (c) **national herbaria** (d) local herbaria
11. Herbarium of Forest Research Institute is situated at
 (a) Lucknow (b) Kolkata (c) **Dehradun** (d) Allahabad
12. Which of the following chemicals is used for poisoning the specimens in herbarium techniques?
 (a) **mercuric chloride** (b) silver nitrate (c) hydrochloric acid (d) silver chloride
13. What is the international size of the herbarium sheet?
 (a) 42 x 30 cm (b) **42 x 29 cm** (c) 40 x 29 cm (d) 45 x 32 cm
14. The herbarium specimens are easily attacked by
 (a) silver fish (b) dermestid beetle (c) **both (a) and (b)** (c) none of the above
15. Which of the following classification is commonly followed in Indian herbaria?
 (a) **Bentham and Hooker** (b) Engler and Prantl (c) Hutchinson (d) Takhtajan
16. Botanical survey of India was established by
 (a) **George king** (b) Takhtajan (c) George Bentham (d) Hooker
17. A label for herbarium sheet is pasted on the _____
 (a) lower left hand corner (b) **lower right hand corner**
 (c) upper left hand corner (d) upper right hand corner
18. The presence of alkaloid _____ is showing the close relationship of Fumariaceae with Papaveraceae
 (a) lupin (b) tropane (c) **protopine** (d) morphine
19. The characters used for rapid identification of organisms using dichotomous couplets are known as
 (a) Identifying characters (b) Lock characters
 (c) Classifying characters (d) **Key characters**
20. Which statement is not true about taxonomic keys?
 (a) A key consists of a number of couplets (b) Each couplet has a pair of leads
 (c) The two leads of a couplet are arranged in yokes

(d) Polyclave keys are single-access keys

Unit IV

1. Which of the following characters are most agree with regard to *Pisum sativum*?
 - (a) **Papilionaceas corolla with monocarpellary ovary**
 - (b) Papilionaceous corolla with monodelphous stamens
 - (c) Coronary corona with unilocular ovary
 - (d) Papilionaceous corolla with bilocular ovary
2. Select the correct list of plants belong to family Capparidaceae
 - (a) *Gynandropsis, Cleome, Trianthema* (b) ***Cleome, Gynandropsis, Crataeva***
 - (c) *Cleome, Gynandropsis, Zizyphus* (d) *Cractaeva, Gynandropsis, Mollugo*
3. *Zizyphus jujuba* belongs to the family
 - (a) Tiliaceae (b) **Rhamnaceae** (c) Fabaceae (d) Sapotaceae
4. _____ is the largest family of flowering plants
 - (a) Fabaceae (b) **Asteraceae** (c) Poaceae (d) Orchidaceae
5. _____ is the fruit formed from monocarpellary unilocular ovary with marginal placentation
 - (a) drupe (b) berry (c) **legume** (d) multiple fruit
6. Butter cup belongs to the family
 - (a) Malvaceae (b) Lamiaceae (c) Papavaraceae (d) **Ranunculaceae**
7. Asteraceae is a more appropriate name for
 - (a) **Compositae** (b) Graminae (c) Labiatae (d) Palmae
8. Which angiospermous family is considered to be the most advanced among dicots?
 - (a) Ranunculaceae (b) **Asteraceae** (c) Leguminosae (d) Solanaceae
9. The condition in which stamens united by their filaments is
 - (a) gynandrous (b) synandrous (c) **adelphous** (d) polyandrous
10. The receptacle is flattened at the top and bear numerous sessile flowers in centripetal order is
 - (a) cyathium (b) verticillasater (c) **capitulum** (d) catkin
11. Syngenesious anthers are present in family
 - (a) Liliaceae (b) Labiatae (c) Cruciferae (d) **Asteraceae**
12. Homogamous rayed head is found in one of the following plants
 - (a) *Solanum* (b) *Vernonia* (c) ***Chrysanthemum*** (d) all of these
13. When the stamens fuse along their anthers the condition is known as
 - (a) **syngenesious** (b) synandrous (c) monoadelphous (d) tetradynamous
14. Which of the following is not correct about the family compositae?
 - (a) syngenesious anthers (b) cypsela fruit
 - (c) capitulum inflorescence (d) **hypogynous flower**
15. In which of the following families the calyx is modified into pappus?
 - (a) **Asteraceae** (b) Leguminosae (c) Verbenaceae (d) Solanaceae
16. Legume fruit develops from

- (a) bicarpellary pistil (b) syncarpous pistil
(c) **monocarpellary pistil** (d) apocarpous pistil
17. Odd sepal is anterior in the family
(a) Ranunculaceae (b) **Fabaceae** (c) Capparidaceae (d) Sapindaceae
18. Placentation in capparidaceae
(a) **Parietal** (b) Axile (c) Basal (d) Free central
19. Fruit in family Fabaceae is:
(a) Siliqua (b) Nut (c) etaerio (d) **Legume**
20. Inflorescence of family Asteraceae is:
(a) Verticillaster (b) Cyathium (c) Catkin (d) **Capitulum**
21. If a flower has an inferior ovary, then the insertion of the other floral organs is termed:
(a) **Epigynous** (b) Hypogynous (c) Perigynous (d) Superior
22. The floral formula showing bisexual, zygomorphic, $K_{(5)}$, C_5 , A_{9+1} , $G_{(1)}$ arrangement represents which of the following?
(a) Illupai (b) **Pea** (c) Sunflower (d) Sapota
23. The florets in capitulum of sunflower are arranged in a manner:
(a) Centrifugal (b) **Centripetal** (c) Acropetal (d) Basipetal
24. Plants with laticiferous ducts are common in
(a) Fabaceae (b) **Sapotaceae** (c) Tiliaceae (d) Aizoaceae
25. Sapotaceae belongs to which series ?
(a) Inferae (b) **Heteromerae** (c) Bicarpellatae (d) Calyciflorae
26. Cypsella fruit is characteristic to which family?
(a) Sapotaceae (b) **Asteraceae** (c) Tiliaceae (d) Aizoaceae
27. _____ are the families here under belong to thalamiflorae
(a) Asteraceae, Sapotaceae, Aizoaceae (b) **Capparidaceae, Polygalineae, Tiliaceae**
(c) Asteraceae, Sapotaceae, Tiliaceae (d) Capparidaceae, Polygalineae, Fabaceae
28. A member of Ranunculaceae with dimorphic leaves
(a) **Ranunculus aquatilis** (b) *Delphinium ajacis*
(c) *Ranunculus scleratus* (d) *Aquilegia vulgaris*
29. In Fabaceae stamens are
(a) monadelphous (b) diadelphous
(c) **monadelphous or diadelphous** (d) diadelphous or free
30. In Fabaceae, monadelphous stamens are met with in
(a) **Crotalaria retusa** (b) *Clitoria ternatea* (c) *Arachis hypogea* (d) *Pisum sativum*
31. Corolla with descendingly imbricate aestivation is found in
(a) Asteraceae (b) Rhamnaceae (c) **Fabaceae** (d) Sapotaceae
32. In Fabaceae dimorphic stamens are seen in
(a) *Aeschynomene* sp (b) **Crotalaria** sp (c) *Clitoria* sp (d) *Arachis* sp
33. Vexillum is the other name for
(a) wing petal (b) keel petal (c) **standard petal** (d) ligulate

34. An example for fabacean hydrophyte is
 (a) *Cajanus cajan* (b) *Clitoria ternatea* (c) ***Aeschynomene aspera*** (d) *Crotalaria burhia*
35. Type of fruit in groundnut is
 (a) nut (b) berry (c) caryopsis (d) **legume**
36. Spirocyclic, numerous free stamens and apocarpous carpels are found in the family
 (a) Capparidaceae (b) **Ranunculaceae** (c) Polygalaceae (d) Rhamnaceae
37. Cypsela fruit and capitulum inflorescence are found in which family?
 (a) **Asteraceae** (b) Rhamnaceae (c) Capparidaceae (d) Ranunculaceae
38. In hypogynous flower all floral parts arise
 (a) **below the gynoecium** (b) below the bracts
 (c) above the gynoecium (d) around the gynoecium

Unit V

1. *Verbena*, *Lippia*, *Datura*, *Physalis* are the members of series bicarpellatae. Find the families which the above genera belong
 (a) **Verbenaceae & Solanaceae** (b) Solanaceae & Boraginaceae
 (c) Verbenaceae & Gentianaceae (d) Boraginaceae & Scrophulariaceae
2. The flower which has androecium but lacks gynoecium is called
 (a) complete (b) pistillate (c) **staminate** (d) actinomorphic
3. Which of the following characters are best suited to family Nyctaginaceae
 (a) Plants of aquatic habit having apetalous flowers
 (b) Plants of annual herbs having hooded anther
 (c) **Plants of woody climber having petaloid bract**
 (d) Plants have perennial herb having syngenesious anthers
4. Eliminate the odd one from the variants given here under
 (a) *Cestrum diurnum* – Solanaceae
 (b) *Cordia rothii* – Boraginaceae
 (c) *Linaria vulgaris* – Scrophulariaceae
 (d) ***Tradiscantia albiflora* – Orchidaceae**
5. _____ are the families hereunder belonging to bicarpellatae
 (a) Asteraceae, Sapotaceae, Polygalae (b) **Verbenaceae, Boraginaceae, Solanaceae**
 (c) Solanaceae, Verbenaceae, Casuarinaceae
 (d) Scrophulariaceae, Verbinaceae, Asteraceae
6. Which of the following monocot families has the unique feature called pollinium
 (a) Musaceae (b) Poaceae (c) Cyperaceae (d) **Orchidaceae**
7. Eliminate the wrong information with regard to family Commelinaceae
 (a) members show cleistogamous flowers (b) tricarpellary syncarpous ovary
 (c) trimerous flowers (d) **epigynous flower**
8. Odd one out
 (a) woody climber – Nyctanginaceae (b) Epiphytic – Orchidaceae

- (c) Sedges – Cyperaceae (d) **Aquatic – Casuarinaceae**
9. Find the most suitable pair
 (a) **Cyperus – Spike** (b) *Casuarina* – Verticillaster
 (c) *Tradescantia* – Capitulum (d) *Calanthe*– helicoid cyme
10. *Cyperus* is the anemophilous plant in respect to pollination. It is effected by
 (a) Animals (b) Insect (c) **Wind** (d) Water
11. Systematically *Cyperus* is placed under the class monocots what would be the series to which it belongs
 (a) Thalamiflorae (b) Unisexuales (c) Microembryae (d) **Glumaceae**
12. Find out the incorrect list of plant given below related to Verbenaceae
 (a) *Vitex, Duranta, Lantana* (b) *Tectona, Vitex, Verbena*
 (c) ***Vitex, Solanum, Bignonia*** (d) *Lippia, Lantana, Duranta*
13. Stem in Cyperaceae is
 (a) 4-sided (b) cylindrical (c) **3-sided** (d) none of the above
14. In the members of which of the following families joined stem with swollen nodes are present
 (a) **Commelinaceae** (b) Cyperaceae (c) Orchidaceae (d) Verbenaceae
15. Stamens in Solanaceae are
 (a) epiphyllous (b) syngenesius (c) **epipetalous** (d) synandrous
16. Oblique septum and swollen axile placenta are characteristics of
 (a) **Solanaceae** (b) Verbenaceae (c) Bignoniaceae (d) Boraginaceae
17. Twigs of which one of the following look like *Equisetum*?
 (a) *Verbena* (b) *Bignonia* (c) ***Casuarina*** (d) *Millingtonia*
18. The fruit of tomato is
 (a) drupe (b) **berry** (c) hesperidium (d) pepo
19. In the members of which of the following families the calyx is persistent?
 (a) **Solanaceae** (b) Scrophulariaceae (c) Bignoniaceae (d) Boraginaceae
20. Resupination of ovary is characteristic to which family?
 (a) Cyperaceae (b) Commelinaceae (c) **Orchidaceae** (d) Nyctaginaceae
21. Tricarpellary, syncarpous gynoecium, inferior ovary with parietal placenta are found in which of the following families
 (a) Solanaceae (b) **Orchidaceae** (c) Commelinaceae (d) Cyperaceae
22. An example of tree species in Boraginaceae is
 (a) ***Cardia sebestina*** (b) *Heliotropium indicum*
 (c) *Heliotropium subulatum* (d) *Trichodesma indicum*
23. Bignoniaceae is characterized by
 (a) gamopetalous corolla (b) zygomorphic flowers (c) compound leaves (d) **all the above**

Section - B

Unit – I

Comment /Write notes on/ Define/ List out

1. Tautonym
2. Punched card
3. ICBN
4. Nomina conservanda
5. Lectotype
6. Citation
7. Polynomials
8. Generic epithet
9. Specific epithet
10. Effective publication
11. Valid publication
12. Difference between category & rank
13. Taxonomic hierarchy
14. Ideal species
15. Genus
16. List of infraspecific ranks based on ICBN.

Unit – II

1. Carolus Linnaeus
2. Phylogentic system of classification
3. APG
4. Cladistics
5. Numerical taxonomy
6. Phylogenetic diagram
7. Taximetrics
8. Applications of numerical taxonomy
9. Phenetics
10. Clades

Unit – III

1. Floras
2. Monographs
3. Manuals
4. Vasculum
5. Leaf anatomy in plant systematics
6. Epidermal features in plant systematics

7. Chromosomal numbers in plant systematics
8. DNA bar coding
9. BSI
10. Chemosystematics
11. Importance of chloroplast DNA in plant systematics
12. Any two national herbaria
13. e-Herbaria

Unit – IV

1. Pollination in Fabaceae
2. Four primitive features of Ranunculaceae
3. Butter cup family
4. Gynandrophore
5. Vegetative features of *Zizyphus jujuba*
6. Legume
7. Essential part of flower of Ranunculus
8. Capitulum
9. Fruit of Sapindaceae
10. Androphore
11. Gynophore
12. Tendril in sapindaceae

Unit – V

1. Adnation
2. Scorpioid cyme
3. Pollinia in Orchidaceae
4. Vegetative characters of *Vanda*
5. Gynoecium in scrophulariaceae
6. Flower of *Bougainvillaea*
7. Spike
8. Inflorescence of Commelineaceae
9. Perianth of Orchidaceae
10. Inflorescence of *Casuarina*
11. Habit of Commelinaceae
12. Systematic position of Verbenaceae

SECTION – C

Unit- I

1. Why is scientific name necessary?
2. List out the principles of ICBN
3. Give some generic name indicating their source of origin
4. Exemplify some specific epithet based on their source of origin
5. Define typification. What is holotype?
6. Distinguish lectotype, neotype and epitype
7. Why Latin diagnosis preferred for validly naming a plant
8. List any four situations leading to rejection of name.
9. What is legitimate and illegitimate names?
10. Illustrate the principle of priority
11. Mention the most essential features of the International code of Botanical Nomenclature and their significance.
12. What is Phylocode? Write down the principle and rules of Phylocode.
13. Substantiate the view that species constitute the basic unit of classification
14. What you understand on hierarchical classification? Comment on species concept
15. What are infraspecific ranks? Explain.

Unit – II

1. Enumerate the merits and demerits of Bentham and Hooker's system of classification
2. Explain the contribution done by Carolus Linnaeus to taxonomy
3. Outline the phylogenetic classification you have studied.
4. Write a critical commentary on merits and drawbacks of taximetric system of classification.
5. What are the salient features of the system of APG IV classification
6. Enumerate the merits and demerits of Linnaeous classification
7. Write notes on major taxonomic categories of hierarchical classification.
8. Name minor taxonomic categories of hierarchical classification. Explain.
9. Bring out the importance of palynology in the phylogentic system of classification.

Unit – III

1. How do wood anatomy and trichomes help plant systematists?
2. How embryological characters are useful in taxonomy?
3. Write notes on the importance of DNA bar coding in plant taxonomy
4. What is herbarium? Explain the role of herbaria in learning and research
5. How are herbarium specimens protected from insects and pests?
6. Who initiated the art of herbarium? Suggest methods of mounting herbarium specimens
7. Write about two major herbaria of the world and enumerate the number of specimens there in
8. Write notes on objectives and contribution done by BSI to plant taxonomy

9. Quote the families of angiosperm with unique embryological features contributed for their systematic.
10. Discuss the role of phytochemistry in the classification and determination of interrelationships.

Unit- IV

1. Write the systematic position of Asteraceae according to Bentham and Hooker and give the salient features of the family
2. Write notes on salient features of family Ranunculaceae with reference to its type genus.
3. Highlight the characters of Capparidaceae
4. Diagrammatically explain the variation in essential parts of Capparidaceae
5. Give an account on pollination mechanism of Fabaceae.
6. Differentiate monoadelphous and diadelphous stamens with examples.
7. Describe the diagnostic features of the family Tiliaceae
8. With illustrations describe the vegetative characters of any two families you have studied under disciflorae
9. Differentiate homogamous head from heterogamous head with examples.
10. The family Sapotaceae belongs to heteromerae-justify
11. Enumerate the salient features of the family Rhamnaceae and discuss its systematic position
12. Enumerate the salient features of the family Sapindaceae and discuss its systematic position
13. Exclusively on the basis of the gynoecium and androecium how would you distinguish Capparidaceae from Tiliaceae

Unit- V

1. Describe any one taxon of Commelinaceae with illustrations.
2. Write notes on vegetative and floral characters of Casuarinaceae
3. How will you differentiate flowers of Boraginaceae and Bignoniaceae
4. Draw the diagram of L.S of an orchid flower and label its parts.
5. Describe Cyperaceae with reference to type genus.
6. Compare the floral characters of Scrophulariaceae and Solanaceae
7. Write notes on the diagnostic features of a monochlamydean family you have studied
8. Write what is unique in the flower of *Orchid*
9. Give a brief account on pollination mechanism in Orchidaceae
10. Make floral diagram and write floral formula of one representative species of Verbenaceae and Nyctaginaceae
11. Describe the uniqueness of corolla in Scrophulariaceae and gynoecium in Cyperaceae

SECTION – D

Unit- I

1. What is multi-access key? Explain the process of identification of plants using multi access keys.
2. Explain the different types of taxonomic literature you have studied and add a note on their applications in plant identification
3. Explain the rules for naming genus, species and infraspecific ranks.
4. Give an account of principles of priority and its limitation.
5. Narrate the guidelines for constructing dichotomous keys and add a note on the importance of taxonomic keys.
6. Write short notes on (a) author citation (b) valid publication
7. What are the principles of ICBN and add a note on conservation of names
8. Define species, genus, family, order, and illustrate them with suitable examples.
9. Distinguish polynomial from binomial nomenclature and a note on the advantages of binomials
10. Write notes on (a) typification (b) retention and rejection of names
11. What is an ideal species? explain the various theories of species concept/

Unit II

1. Outline the Bentham & Hooker's system of plant classification and substantiate it is a very sound system of classification
2. Write an essay on numerical taxonomy
3. What is phylogenetic system of classification? Describe a phylogenetic system of classification you have studied
4. Give an elaborate account on revival of the cladistic concept of systematic by taxonomist of APG
5. What is character weightage? What are the steps followed in taximetrics
6. Describe a system of classification of angiosperms used in practical classes. Give reasons for its use.

Unit- III

1. What is chemosystematics? Write an essay on the role of phytochemical, in plant classifications.
2. Describe the process involved in the preparation of Herbarium. Add a note on its role in teaching & research
3. Give an elaborate note on embryology in relation to taxonomy
4. Write an essay on cytological & anatomical features that are useful in plant identification.
5. Elaborately discuss plant anatomy have merits in plant systematics.
6. Highlight the importance of chemotaxonomy in the aid of systematics of angiosperms.
7. Write the importance of morphological evidences in taxonomy.
8. Discuss the value of cytological characters in improving the existing systems of classification
9. Discuss modern trends in taxonomy with suitable examples.

Unit IV

1. With suitable sketches describe the range of variation in androecium of polypetalous families you have studied
2. With illustrious explanation of family Ranunculaceae, give substantial support that members are highly primitive among Angiosperms.
3. Asteraceae is the most evolved and members are highly successful land dwellers among angiosperms. Justify it.
4. Compare the floristic features of Tiliaceae and Rhamnaceae
5. Write the systematic position and describe vegetative and reproductive characters of Sapindaceae
6. Describe in technical terms the family Polygalaceae.
7. Compare the families Capparidaceae and Ranunculaceae
8. Write an essay on the families under disciflorae you have studied
9. With illustrations describe the family Fabaceae in detail.
10. Write an essay on the diagnostic features of Sapotaceae.

Unit V

1. Compare the families Boraginaceae and Verbenaceae with illustrations.
2. Explain the range of floral variations in Orchidaceae with sketches.
3. Compare the floristic characters of the family Solanaceae and Scrophulariaceae
4. Describe the floristic features of the families belonging to monoclamydeae that you have studied.
5. Give a detailed account on the floral variations in Scorophulariaceae and compare its diagnostic features with Verbenaceae
6. With sketches explain the range of floral variations in the families of Bicarpellatae you have studied.
7. Give a comparative account of any two monocot families studied by you.
8. With illustrations describe the features of a monotypic family you have studied.
9. With illustrations describe the family Nyctaginaceae
10. Compare the families Commelinaceae and Cyperaceae

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II M. Sc Botany - SEMESTER III

Core XI - Molecular Biology and Genetic Engineering - Course Code: 21PBOC33

SECTION A

Unit I

1. Which enzyme is responsible for unwinding the DNA helix during replication?
(a) DNA polymerase (b) Helicase (c) Ligase (d) Topoisomerase
2. In prokaryotes, DNA replication begins at a specific site called the:
(a) Promoter region (b) OriC (c) Telomere (d) Exon
3. Which of the following proteins prevent the reannealing of single-stranded DNA during replication?
(a) Helicase (b) Single-Strand Binding Proteins (c) Topoisomerase (d) Primase
4. The synthesis of Okazaki fragments occurs on the:
(a) Leading strand (b) Lagging strand (c) Both strands (d) None of the above
5. What is the function of DNA gyrase in prokaryotic replication?
(a) Adds nucleotides to the growing chain (b) Relieves supercoiling (c) Joins Okazaki fragments (d) Initiates the replication process
6. Which enzyme synthesizes the RNA primer in DNA replication?
(a) DNA polymerase (b) Primase (c) Ligase (d) Helicase
7. In eukaryotic replication, the enzyme responsible for extending the ends of chromosomes is:
(a) Telomerase (b) DNA polymerase α (c) DNA ligase (d) RNA polymerase
8. Telomerase contains a:
(a) DNA-dependent RNA polymerase (b) RNA-dependent DNA polymerase (c) DNA ligase (d) Helicase
9. Which DNA polymerase is responsible for proofreading in prokaryotes?
(a) DNA polymerase I (b) DNA polymerase II (c) DNA polymerase III (d) DNA ligase
10. In eukaryotes, which DNA polymerase synthesizes the leading strand?
(a) DNA polymerase α (b) DNA polymerase δ (c) DNA polymerase ϵ (d) DNA polymerase γ

11. What is the role of DNA ligase in replication?
(a) Adds new nucleotides (b) Seals nicks in the DNA backbone (c) Unwinds the DNA helix (d) Synthesizes RNA primers
12. DNA polymerase III in prokaryotes exhibits which type of activity?
(a) 5' → 3' polymerase (b) 3' → 5' exonuclease (c) Both (a) and (b) (d) Neither (a) nor (b)
13. Which eukaryotic DNA polymerase is involved in mitochondrial DNA replication?
(a) DNA polymerase α (b) DNA polymerase δ (c) DNA polymerase ϵ (d) DNA polymerase γ
14. Which model explains replication of circular DNA in prokaryotes?
(a) Theta model (b) Rolling circle model (c) D-loop model (d) Semiconservative model
15. Which of the following describes the rolling circle model of replication?
(a) Both strands are replicated simultaneously (b) One strand is displaced and synthesized (c) Occurs at multiple origins (d) Specific to eukaryotes
16. D-loop replication is specific to:
(a) Prokaryotic plasmids (b) Eukaryotic organelles like mitochondria (c) Bacterial chromosomes (d) Linear viral genomes
17. What is the main necessity for DNA repair mechanisms?
(a) To allow recombination (b) To fix mutations and maintain genome integrity (c) To initiate DNA replication (d) To remove primers
18. Which type of repair mechanism corrects mismatched base pairs during replication?
(a) Base excision repair (b) Mismatch repair (c) Nucleotide excision repair (d) Non-homologous end joining
19. Which enzyme is involved in repairing thymidine dimers caused by UV damage?
(a) Photolyase (b) Telomerase (c) DNA ligase (d) Topoisomerase
20. In mismatch repair, which enzyme removes the incorrect nucleotide?
(a) Exonuclease (b) Helicase (c) Ligase (d) Topoisomerase

Unit II

1. What is the functional unit of heredity in living organisms?
(a) Chromosome (b) Gene (c) DNA (d) Protein
2. Which type of gene is constantly expressed to maintain basic cellular functions?
(a) Structural gene (b) Regulator gene (c) Housekeeping gene (d) Inducible gene

3. In prokaryotic transcription, the enzyme responsible for RNA synthesis is:
(a) RNA polymerase (b) DNA polymerase (c) Helicase (d) Ligase
4. Which of the following is true about eukaryotic transcription?
(a) Occurs in the cytoplasm (b) Requires RNA polymerase II for mRNA synthesis (c) Involves sigma factors (d) Produces RNA without processing
5. What is the start codon in the genetic code?
(a) UGA (b) AUG (c) UAA (d) UAG
6. The genetic code is described as being:
(a) Ambiguous (b) Universal (c) Single-stranded (d) Non-overlapping
7. In prokaryotic translation, the first amino acid is:
(a) Methionine (b) Formylmethionine (c) Alanine (d) Glycine
8. The Shine-Dalgarno sequence is important for:
(a) DNA replication (b) Transcription initiation (c) Translation initiation in prokaryotes (d) RNA splicing
9. In eukaryotes, translation initiation requires:
(a) Shine-Dalgarno sequence (b) Kozak sequence (c) Promoter sequence (d) Enhancer sequence
10. During elongation in translation, which site in the ribosome holds the tRNA carrying the growing polypeptide chain?
(a) A site (b) P site (c) E site (d) S site
11. What triggers termination of translation in prokaryotes?
(a) A stop codon (b) Helicase binding (c) RNA polymerase stalling (d) Sigma factor release
12. In eukaryotic translation, the ribosome binds to:
(a) Shine-Dalgarno sequence (b) 5' cap of mRNA (c) Poly-A tail (d) Intron region
13. Post-translational modifications of proteins include:
(a) RNA splicing (b) Glycosylation (c) DNA replication (d) Transcription initiation
14. Protein folding occurs with the assistance of:
(a) Topoisomerase (b) Chaperone proteins (c) RNA polymerase (d) Helicase
15. Splicing of RNA in eukaryotes involves the removal of:
(a) Exons (b) Introns (c) Codons (d) Anticodons
16. Which of the following is not a stop codon?
(a) UAA (b) UGA (c) AUG (d) UAG

17. Which RNA carries amino acids to the ribosome during translation?
(a) mRNA (b) tRNA (c) rRNA (d) snRNA
18. RNA processing in eukaryotes includes all except:
(a) 5' capping (b) Poly-A tail addition (c) RNA splicing (d) RNA polymerization
19. In prokaryotes, transcription and translation are:
(a) Separated by the nuclear membrane (b) Coupled in the cytoplasm (c) Independent processes (d) Regulated by ribosomal binding
20. Polypeptide folding is critical for:
(a) Replication accuracy (b) Protein functionality (c) DNA repair (d) RNA transcription

Unit III

1. Which type of gene regulation involves turning genes on or off in response to environmental changes?
(a) Constitutive regulation (b) Coordinated gene regulation (c) Post-translational control (d) Transcriptional regulation
2. The lac operon in *E. coli* is an example of gene regulation by:
(a) Repression (b) Induction (c) Feedback inhibition (d) Alternative splicing
3. In the lac operon, the repressor binds to:
(a) Promoter (b) Operator (c) Structural genes (d) Enhancer
4. Which molecule acts as the inducer in the lac operon system?
(a) Lactose (b) Glucose (c) cAMP (d) Allolactose
5. When tryptophan levels are high, the trp operon is:
(a) Activated (b) Repressed (c) Induced (d) Unregulated
6. In the trp operon, tryptophan acts as a:
(a) Repressor (b) Co-repressor (c) Inducer (d) Activator
7. Which type of chromatin is transcriptionally active?
(a) Heterochromatin (b) Euchromatin (c) Centromeric chromatin (d) Telomeric chromatin
8. Acetylation of histones typically results in:
(a) Chromatin condensation (b) Chromatin relaxation (c) Gene silencing (d) DNA methylation
9. Which enzyme is responsible for adding acetyl groups to histones?
(a) Histone acetyltransferase (b) Histone deacetylase (c) DNA polymerase (d) RNA polymerase

10. Methylation of nucleotides in eukaryotic DNA is often associated with:
(a) Gene activation (b) Gene silencing (c) Translation initiation (d) Splicing regulation
11. Control elements in eukaryotic transcription are:
(a) RNA-binding proteins (b) DNA sequences regulating transcription (c) Chaperone proteins (d) Ribosomal units
12. Which of the following is an example of a transcription factor?
(a) Histone (b) TATA-binding protein (c) RNA polymerase (d) DNA ligase
13. Hormones regulate gene expression by:
(a) Directly binding to DNA (b) Activating transcription factors (c) Inhibiting RNA polymerase (d) Degrading mRNA
14. Alternative splicing is a form of gene regulation that occurs at the:
(a) Transcription level (b) Post-transcriptional level (c) Translational level (d) Post-translational level
15. What determines the lifespan of mRNA in eukaryotes?
(a) 5' cap structure (b) Poly-A tail length (c) Ribosome binding site (d) Presence of exons
16. RNA interference (RNAi) regulates gene expression by:
(a) Enhancing transcription (b) Degrading mRNA (c) Modifying chromatin structure (d) Increasing translation rates
17. Polyproteins are regulated by:
(a) RNA splicing (b) Post-translational cleavage (c) Protein folding (d) Histone modification
18. Protein folding is assisted by:
(a) DNA polymerase (b) Chaperone proteins (c) Transcription factors (d) Ribosomes
19. Which of the following is a mechanism for protein degradation?
(a) Polyadenylation (b) Ubiquitination (c) RNA interference (d) Histone acetylation
20. Transport of RNA from the nucleus to the cytoplasm is regulated by:
(a) RNA helicase (b) Nuclear pore complexes (c) Poly-A polymerase (d) Telomerase

Unit IV

1. What is the process of denaturation of DNA?
(a) formation of hydrogen bonds between complementary strands
(b) **separation of double-stranded DNA into single strands due to heat or chemical treatment**
(c) synthesis of new DNA strands

- (d) re-association of single-stranded DNA into double-stranded DNA
- Which of the following enzymes is primarily used to cleave DNA at specific sequences?
 - DNA polymerase
 - RNA polymerase
 - Restriction enzymes**
 - Ligases
 - What type of restriction enzyme produces "sticky ends" after DNA cleavage?
 - Endonucleases that cut in the middle of the recognition site
 - Exonucleases that remove nucleotides from the ends
 - Restriction enzymes that cut DNA at specific palindromic sequences, leaving overhangs**
 - Ligases that join DNA fragments
 - Which of the following is NOT a characteristic of plasmid vectors?
 - They can replicate independently of the host cell's chromosomal DNA
 - They typically carry genes for antibiotic resistance
 - They are always large in size**
 - They can be used to clone foreign DNA
 - What is the primary function of cloning vectors?
 - To express proteins in the host organism
 - To transport foreign DNA into a host cell for replication**
 - To introduce mutations into a DNA sequence
 - To degrade foreign DNA
 - Which of the following plasmid vectors is commonly used for cloning and has a high copy number?
 - pBR322
 - pUC8**
 - pBluescript
 - Lambda phage
 - What type of vector is a cosmid?
 - A type of plasmid vector
 - A hybrid vector containing both plasmid and bacteriophage characteristics**
 - An artificial chromosome vector
 - A viral vector used for gene therapy
 - Which of the following vectors is known for its use in expressing large DNA fragments?
 - BAC (Bacterial Artificial Chromosome)**
 - pUC plasmids
 - M13 phage vectors
 - pBR322
 - What are shuttle vectors designed for?
 - To degrade unwanted DNA

- (b) **To be used in multiple host species for gene cloning**
 - (c) To solely express proteins in eukaryotic cells
 - (d) To maintain the stability of the inserted foreign DNA
10. What is a characteristic feature of M13 phage vectors?
- (a) They can carry very large DNA fragments
 - (b) **They can be used to produce single-stranded DNA**
 - (c) They are only suitable for cloning small DNA fragments
 - (d) They require a bacterial host for propagation

Unit V

1. What technique is used for the generation of DNA fragments by cutting DNA at specific sequences?
- (a) Polymerase chain reaction
 - (b) Southern blotting
 - (c) **Restriction enzyme digestion**
 - (d) Gel electrophoresis
2. Which of the following techniques is primarily used for detecting specific DNA sequences in a sample?
- (a) Northern blotting
 - (b) Western blotting
 - (c) **Southern blotting**
 - (d) PCR
3. What is the purpose of Northern blotting in molecular biology?
- (a) To analyze protein expression
 - (b) **To detect specific RNA sequences**
 - (c) To visualize DNA fragments
 - (d) To clone DNA
4. Which method is used to synthesize genes artificially using chemical methods?
- (a) PCR
 - (b) Enzymatic assembly
 - (c) **Oligonucleotide synthesis**
 - (d) Homopolymer tailing
5. In the context of joining DNA fragments, what is the main difference between sticky end and blunt end ligation?
- (a) Sticky ends can only be joined by specific enzymes, whereas blunt ends can be joined by any enzyme.
 - (b) **Sticky ends have overhangs that facilitate pairing, while blunt ends do not.**
 - (c) Sticky end ligation requires heat, while blunt end ligation does not.
 - (d) There is no difference; they are interchangeable terms.
6. Which of the following methods involves the use of electric fields to introduce recombinant DNA into host cells?
- (a) Transformation
 - (b) Microinjection
 - (c) **Electroporation**

- (d) Transduction
7. What technique uses viral vectors to introduce recombinant DNA into host cells?
(a) Transformation
(b) Transduction
(c) Microinjection
(d) Electroporation
8. Which of the following is NOT a method for selecting and screening transformed cells?
(a) Use of antibiotic resistance genes
(b) Southern blotting
(c) Reporter genes
(d) Elimination of non-transformed cells
9. What is the role of reporter genes in the selection of transformed cells?
(a) To amplify the foreign DNA
(b) To provide a visible marker for successful transformation
(c) To cleave DNA at specific sites
(d) To enhance protein expression
10. How has genetic engineering contributed to human welfare?
(a) By eliminating the need for agriculture
(b) By enhancing food security and developing gene therapies
(c) By increasing the price of medicines
(d) By creating organisms that are harmful to the environment

SECTION B

Unit I

1. Define DNA replication.
2. What is the role of helicase in DNA replication?
3. Name the enzyme responsible for adding nucleotides during DNA replication.
4. Differentiate between leading and lagging strands.
5. What is the significance of Okazaki fragments in DNA replication?
6. Explain the role of single-strand binding proteins (SSBs) in replication.
7. What is the function of DNA ligase in the replication process?
8. Describe the role of telomerase in eukaryotic DNA replication.
9. What is theta replication? Name an organism where it occurs.
10. What is rolling circle replication? Provide an example of where it is observed.
11. Define the D-loop model of DNA replication.
12. Why is DNA repair important for cells?
13. What are thymidine dimers, and how are they formed?
14. Differentiate between mismatch repair and base excision repair.

15. List the types of DNA polymerases involved in prokaryotic replication and their functions.

Unit II

1. Define a gene.
2. What are housekeeping genes? Give an example.
3. List two functions of genes in an organism.
4. What is the difference between structural genes and regulatory genes?
5. Define transcription.
6. What is the role of RNA polymerase in transcription?
7. What is a promoter, and why is it important in transcription?
8. Differentiate between introns and exons.
9. What is the function of the 5' cap in eukaryotic mRNA?
10. What is a poly-A tail, and why is it added to eukaryotic mRNA?
11. What is the significance of the genetic code being degenerate?
12. Name the start codon and its corresponding amino acid.
13. What is the role of tRNA in translation?
14. What is the Shine-Dalgarno sequence, and where is it found?
15. What are the three phases of translation?
16. What is the role of ribosomes in protein synthesis?
17. What happens during the elongation phase of translation?
18. Define protein folding.
19. What are chaperone proteins, and what is their role in protein folding?
20. What is the difference between primary and secondary structure in proteins?

Unit III

1. What is coordinated gene regulation in prokaryotes?
2. Explain the concept of gene induction in the lac operon.
3. What is the role of the trp operon in gene regulation in prokaryotes?
4. Define multigene families and give an example.
5. What is the role of acetylation of histones in gene expression?
6. How do euchromatin remodeling complexes influence transcription?
7. What is DNA methylation, and how does it affect gene expression?
8. Define transcription factors and their role in gene regulation.
9. What are control elements, and how do they regulate gene expression?
10. What is the role of insulators in gene expression regulation?

11. How do hormones regulate gene expression in eukaryotes?
12. Explain the concept of post-transcriptional control in eukaryotes.
13. What is alternative splicing, and how does it affect gene expression?
14. How does RNA influence gene expression post-transcriptionally?
15. What are polyproteins, and how do they function in gene regulation?
16. Explain the regulation of gene expression by controlling RNA transport.
17. How is gene expression regulated at the translation level?
18. What factors contribute to mRNA degradation and its regulation?
19. Describe the role of chaperone proteins in protein folding.
20. How does protein degradation contribute to the regulation of gene expression?

Unit IV

1. Define the process of DNA denaturation.
2. Explain what are restriction enzymes? Provide an example.
3. Differentiate between sticky ends and blunt ends in the context of DNA cleavage.
4. Indicate the components required for recombinant DNA technology.
5. Explain the purpose of cloning vectors in genetic engineering.
6. Summarize the main characteristics of plasmid vectors.
7. Explain the unique features of bacteriophage vectors compared to plasmid vectors.
8. Discuss what is a cosmid vector, and how does it differ from a traditional plasmid vector?
9. Explain the function of artificial chromosome vectors in genetic engineering.
10. Discuss on shuttle vectors.

Unit V

1. Explain the purpose of Southern blotting in genetic engineering.
2. Indicate what are restriction enzymes?
3. Explain the difference between sticky end ligation and blunt end ligation.
4. Discuss the application of Northern Blotting in molecular biology.
5. Summarize the significance of using reporter genes in the selection of transformed cells
6. Express what is homopolymer tailing.
7. Restate on transformation.
8. Explain the role of oligonucleotide synthesis in the artificial synthesis of genes.

9. Explain what is the purpose of screening transformed cells.

SECTION C

Unit I

1. Describe the molecular mechanism of DNA replication in prokaryotes, including activation, initiation, elongation, and termination.
2. Explain the process of DNA replication at the ends of eukaryotic chromosomes and the role of telomerase.
3. Compare and contrast the roles of DNA polymerase enzymes in prokaryotic and eukaryotic replication.
4. Illustrate the theta model of DNA replication and explain its significance in prokaryotes.
5. Explain the rolling circle model of replication, mentioning its mechanism and biological importance.
6. What are Okazaki fragments? Describe their formation and joining during lagging strand synthesis.
7. Discuss the necessity of DNA repair and the types of DNA mistakes that require repair mechanisms.
8. Explain the biochemical mechanism of mismatch repair in DNA replication.
9. Describe the process by which thymidine dimers are repaired, including the enzymes involved.
10. Write a detailed note on the D-loop model of DNA replication, including its occurrence and significance.

Unit II

1. Explain the different types of genes and their functions with suitable examples.
2. Describe the process of transcription in prokaryotes, highlighting the role of RNA polymerase and promoter sequences.
3. Discuss the steps involved in RNA processing in eukaryotes, including splicing, 5' capping, and polyadenylation.
4. Explain the genetic code and its properties, such as universality, degeneracy, and non-overlapping nature.
5. Describe the mechanism of translation in prokaryotes, focusing on initiation, elongation, and termination.
6. Compare and contrast translation in prokaryotes and eukaryotes.

7. What is protein folding? Explain its significance and the role of chaperone proteins in this process.
8. Describe the post-translational modifications of proteins and their importance in cellular function.
9. Illustrate and explain the role of tRNA and ribosomes in the translation process.
10. Write a note on the significance of the start codon and stop codons in the process of translation.

Unit III

1. Explain the mechanisms of gene regulation in prokaryotes, focusing on the lac operon (induction) and the trp operon (repression). Include their structure and functioning.
2. Describe how acetylation of histones and methylation of nucleotides influence gene expression in eukaryotes. Discuss the role of these modifications in transcriptional regulation.
3. Elaborate on the role of transcription factors, control elements, and mediators in the regulation of gene expression in eukaryotes.
4. Discuss the significance of euchromatin remodeling complexes in the regulation of gene expression. How do these complexes affect the accessibility of DNA for transcription?
5. Explain the process and importance of post-transcriptional regulation of gene expression in eukaryotes, including alternative splicing and the choice of splice sites.
6. Discuss the role of regulatory proteins and hormones in controlling gene expression at the transcriptional and post-transcriptional levels in eukaryotes.
7. Describe how RNA can regulate gene expression post-transcriptionally, including through RNA interference (RNAi) and regulation of RNA transport.
8. Elaborate on the regulation of gene expression at the translation level, focusing on the control of translation initiation, elongation, and termination.
9. Explain how mRNA degradation is controlled and how it contributes to the regulation of gene expression in eukaryotic cells.

Unit IV

1. Compile the processes of denaturation and renaturation of DNA.
2. Relate the role of restriction enzymes in genetic engineering.
3. Show the differences between cloning vectors and expression vectors.
4. Produce the various types of plasmid vectors, including their characteristics and applications.

5. Present the concept of cosmid vectors and their advantages in cloning large DNA fragments.
6. Compile the characteristics and applications of artificial chromosome vectors.
7. Construct the structure of phagemid vectors and their dual functionality.
8. Compile the uses of shuttle vectors in recombinant DNA technology.
9. Show the significance of linkers in recombinant DNA technology.

Unit V

1. Compile how restriction enzymes recognize specific DNA sequences and the types of cuts they produce.
2. Present the techniques of Northern blotting, highlighting their applications.
3. Show the steps involved in their execution of Southern blotting.
4. Produce the various methods used to introduce recombinant DNA into host cells, such as transformation, transduction, and electroporation.
5. Predict the concept of using reporter genes for the selection and screening of transformed cells.
6. Compile the role of Western blotting in the analysis of proteins and its significance in genetic engineering.
7. Produce on the homopolymer tailing method in DNA cloning.
8. Show the importance of DNA cleavage techniques, such as restriction enzyme digestion, in molecular cloning.

SECTION D

Unit I

1. Describe the complete process of DNA replication in prokaryotes, covering initiation, elongation, termination, and the role of various enzymes.
2. Explain the molecular mechanism of DNA replication in eukaryotes, focusing on the replication of linear chromosomes and the function of telomerase.
3. Compare and contrast DNA replication in prokaryotes and eukaryotes with respect to the enzymes, origin of replication, and mechanisms involved.
4. Illustrate and explain the different models of DNA replication: theta replication, rolling circle model, and D-loop model.
5. Discuss the enzymology of DNA replication in detail, emphasizing the roles of DNA polymerases, DNA ligase, helicase, and topoisomerase.

6. Write an essay on the necessity of DNA repair, describing the different types of DNA damage and the specific mechanisms involved in mismatch repair and repair of thymidine dimers.
7. Explain the structural and functional aspects of the lac operon and trp operon as models of gene regulation in prokaryotes.
8. Describe the various DNA repair mechanisms, highlighting their importance in maintaining genomic stability.
9. Discuss the role of Okazaki fragments in lagging strand synthesis, including the steps of their formation and joining.
10. Explain the challenges and mechanisms involved in replicating the ends of eukaryotic chromosomes, with a focus on the function and regulation of telomerase.

Unit II

1. Describe in detail the process of gene expression, RNA processing, and translation in both prokaryotes and eukaryotes.
2. Explain the central dogma of molecular biology. Discuss the key steps involved in transcription and translation in prokaryotic and eukaryotic cells, highlighting the differences between them.
3. Discuss the structure of codons, the concept of degeneracy, and how the genetic code is universal, with examples from prokaryotes and eukaryotes.
4. Discuss the entire process of transcription and RNA processing in eukaryotes explaining the roles of transcription factors, RNA polymerase, and modifications like splicing, 5' capping, and polyadenylation.
5. Compare and contrast translation in prokaryotes and eukaryotes, focusing on the initiation, elongation, and termination stages. Include the roles of ribosomes, tRNA, and initiation factors in both types of organisms.
6. Explain the structure and function of tRNA in translation. Discuss its role in decoding the mRNA sequence and how it contributes to protein synthesis.
7. Describe the process of protein folding and the importance of chaperone proteins. Explain how improper folding can lead to diseases such as prion diseases or Alzheimer's.
8. Discuss the post-translational modifications. Explain how these modifications influence protein activity and cellular function.

9. Elaborate on the significance of the start codon (AUG) and stop codons in translation. Explain how they initiate and terminate the protein synthesis process, and discuss their role in reading frames and translation regulation.
10. Explain the role of regulatory proteins and transcription factors in gene expression regulation. Discuss how these factors influence gene activation or repression in both prokaryotic and eukaryotic cells.

Unit III

1. Explain the mechanism of gene regulation in prokaryotes using the lac operon as an example.
2. Describe how histone acetylation and DNA methylation affect gene expression in eukaryotes.
3. Discuss the role of transcription factors and enhancers in the regulation of gene expression.
4. What is alternative splicing, and how does it contribute to gene regulation in eukaryotes?
5. Explain the process of RNA interference (RNAi) and its role in gene silencing.
6. Describe the regulation of gene expression at the translational level in eukaryotes.
7. Discuss the role of hormones in regulating gene expression in eukaryotic cells.
8. Explain the significance of protein folding in post-translational regulation.
9. Discuss the control of mRNA stability and degradation in gene expression regulation.
10. Explain how post-transcriptional control mechanisms regulate gene expression in eukaryotes.

Unit IV

1. Examine the processes of DNA denaturation and renaturation, highlighting their significance in genetic engineering.
2. Compare cloning vectors and expression vectors, detailing their roles in genetic engineering.
3. Analyze the different types of plasmid vectors used in genetic engineering.
4. Evaluate the role of artificial chromosome vectors such as BAC and YAC in genomic research.
5. Support the importance of cosmid vectors in genetic engineering.
6. Evaluate the various biological tools required for recombinant DNA technology.

Unit V

1. Analyze the artificial synthesis of genes through chemical and enzymatic assembly of oligonucleotides.
2. Examine the various methods used to introduce recombinant DNA into host cells.
3. Explain the significance of selection and screening techniques for transformed cells in genetic engineering.
4. Analyze the role of DNA cleavage techniques in recombinant DNA technology, focusing on their significance in cloning and gene manipulation.
5. Evaluate the impact of genetic engineering techniques on human welfare with reference to agriculture and medicine.
6. Evaluate the future prospects and challenges of genetic engineering techniques in addressing global issues, such as food security and disease prevention.

Section A

Answer all questions

Unit I

- Find the ecosystem which has upright pyramid of number
(a) **pond ecosystem** (b) forest ecosystem
(c) ocean ecosystem (d) parasitic ecosystem
- Identify the food chain which starts from dead organic matter.
(a) grazing food chain (b) herbivore food chain
(c) **detritus food chain** (d) both (a) and (b)
- Name the process in which soil particles are carried in the form of small leaps.
(a) slip erosion (b) suspension
(c) surface creep (d) **saltation**
- Identify the process in which soil is conserved using basal parts of herbaceous plants.
(a) Crop rotation (b) **mulching** (c) strip cropping (d) lay forming
- Identify the horizon which has the maximum amount of organic matter
(a) Horizon A2 and B (b) Horizon B only
(c) **Horizon A** (d) Horizon B and C
- Competition occurring between members of the same population is known as
(a) interspecific (b) **intraspecific** (c) antibiosis (d) co-operation
- Lianas are the example of
(a) mutualism (b) **commensalism** (c) protocoperation (d) exploitation
- Find the inhibitory activity of one plant on another plant.
(a) parasite (b) symbiosis (c) competition (d) **allelopathy**
- Which one of the following factors is biotic?
(a) photoperiod
(b) **CO₂ content of the soil**
(c) texture and porosity of soil
(d) rainfall
- Solubility and availability of plant nutrients related to
(a) **soil pH**
(b) soil porosity

- (c) soil temperature
- (d) soil colour

Unit II

1. Find the mortality rate of organisms following a type III survivorship curve
 - (a) fairly constant throughout life
 - (b) higher in post-reproductive years
 - (c) lower after the organisms become established**
 - (d) unrelated to age
2. Find the shape of a population growth curve of a living being in a new habitat
 - (a) a sigmoid shaped form**
 - (b) a 8-shaped form
 - (c) a U-shaped form
 - (d) a bell shaped form
3. Name the process when members of a population move out of a given area
 - (a) immigration
 - (b) mortality
 - (c) emigration**
 - (d) demography
4. Name the final stage of community
 - (a) ecads
 - (b) ecotype
 - (c) ecosystem
 - (d) climax**
5. Identify the correct statement regarding population density
 - (a) number of species per community
 - (b) number of communities per ecosystem
 - (c) number of individuals per species
 - (d) number of individuals per species per unit area or volume.**
6. The last community in a succession is called
 - (a) Ecosystem
 - (b) **Climax community**
 - (c) Ecotone
 - (d) Serial community
7. If the rate of growth becomes slow and stable, the shape of the age pyramid is
 - (a) round
 - (b) triangle
 - (c) bell**
 - (d) urn
8. Name the community which has life forms lower than those in the expected climatic climax
 - (a) post climax
 - (b) **preclimax**
 - (c) super climax
 - (d) coclimax
9. Identify the term for the development of a bare area without any form of life
 - (a) invasion
 - (b) ecesis
 - (c) nudation**
 - (d) aggression
10. Identify the first stage of xerosere.
 - (a) moss stage
 - b) crustose lichen stage**
 - c) foliose lichen stage
 - d) herbs stage.
11. Name the succession taking place due to the influence of existing plant community.
 - (a) autotrophic succession
 - (b) heterotrophic succession
 - c) autogenic succession**
 - (d) allogenic succession

Unit III

1. What is the primary purpose of an Environmental Management Plan (EMP)?
 - (a) To increase profits
 - (b) To manage environmental impacts and promote sustainability**
 - (c) To provide a legal framework for construction projects
 - (d) To lobby against environmental regulations
2. Which of the following components is typically included in an EMP?
 - (a) Financial projections

- (b) **Environmental impact assessment**
 (c) Marketing strategy
 (d) Employee recruitment plan
3. What is bioremediation?
 (a) The use of chemical agents to clean pollutants
 (b) **The process of using living organisms to remove or neutralize contaminants from the environment**
 (c) The application of physical methods to treat waste
 (d) The restoration of natural habitats
4. Which of the following organisms are commonly used in bioremediation?
 (a) Bacteria (b) Fungi (c) Plants (d) **All of the above**
5. What is the primary goal of bioremediation?
 (a) To maximize industrial production
 (b) To reduce the cost of waste disposal
 (c) **To restore contaminated environments to a safe condition**
 (d) To enhance plant growth
6. Which of the following metals is commonly extracted through bioleaching?
 (a) Gold (b) Iron (c) **Copper** (d) Aluminum
7. What is bioleaching?
 (a) The process of using heat to extract metals from ores
 (b) **The extraction of metals from ores using microorganisms**
 (c) The physical separation of metals from ores
 (d) The use of chemical solvents to extract metals
8. Name the microorganism which is most commonly associated with bioleaching.
 (a) *Escherichia coli*
 (b) ***Acidithiobacillus ferrooxidans***
 (c) *Saccharomyces cerevisiae*
 (d) *Clostridium botulinum*
9. Identify which method is NOT used in carbon sequestration
 (a) Ocean fertilization (b) Direct air capture (c) **Fossil fuel combustion**
 (d) Afforestation
10. Find the primary function of biofilters
 (a) Metal extraction (b) **Gas purification and odor removal** (c) Enhancing crop growth (d) Energy production
11. Identify the artificial carbon sequestration
 (a) Wetland restoration (b) **Enhanced rock weathering** (c) Planting mangroves
 (d) Ocean thermal energy conversion

Unit IV

1. Sacred groves are essential because they are repositories of flora and fauna diversity that have been conserved by _____ in a sustainable manner.
 (a) **local communities** (b) organization (c) institution (d) all the above
2. _____ are communally protected forests that usually have a significant religious association for the protecting community.

- (a) forest (b) sthalaviriksha (c) botanical garden (d) **sacred groves**
3. Find which of the following is a direct benefit of conserving biodiversity
(a) Cultural diversity (b) **Ecosystem stability**
(c) Increased fossil fuel extraction (d) Industrial development
4. Identify the primary goal of *ex-situ* conservation.
(a) Protect species in their natural habitats
(b) **Protect species outside their natural habitats**
(c) Conserve landscapes and ecosystems
(d) Increase human population
5. The Chipko Movement in India was aimed at:
(a) **Protecting forests from deforestation**
(b) Increasing agricultural productivity
(c) Conserving water resources
(d) Reducing carbon emissions
6. Find which of the following methods is not considered ex-situ conservation
(a) Botanical gardens (b) Zoos (c) Seed banks (d) **Biosphere reserves**
7. Find which of the following is an example of a biosphere reserve in India
(a) Kaziranga National Park (b) **Sundarbans**
(c) Ranthambore (d) Gir Forest
8. Identify the primary purpose of a DNA bank.
(a) To preserve extinct species
(b) **To store genetic information for future research and conservation**
(c) To increase biodiversity artificially
(d) To archive ecosystem data
9. Find which of the following is an example of in-situ conservation.
(a) Zoos (b) Seed banks (c) **National parks** (d) Botanical gardens
10. Find which factor is essential for storing seeds in seed banks.
(a) High temperatures and low humidity
(b) **Low temperatures and low humidity**
(c) High temperatures and high humidity

(d) Low temperatures and high humidity

Unit V

1. Recall how the term 'biodiversity' is described?

- (a) **The range of different species in an environment**
- (b) The seasonal and daily changes in an environment
- (c) The way species differ from one another
- (d) The influence of physical factors on an environment

2. Identify the correct abbreviation of IUCN

- (a) Indian Union for Conservation of Nature and Natural Resources
- (b) **International Union for Conservation of Nature and Natural Resources**
- (c) International United state Conservation of Nature and Natural Resources
- (d) Italian Union for Conservation of Nature and Natural Resources

3. Find out the location of the IUCN headquarters.

- (a) Spain
- (b) **Switzerland**
- (c) Italy
- (d) USA

4. The National Bureau of Plant Genetic Resources (NBPGR) in India is primarily responsible for:

- (a) Conservation of wildlife habitats
- (b) **Preservation and documentation of plant genetic resources**
- (c) Protection of endangered animal species
- (d) Maintenance of water resources

5. Identify when was the Wildlife Protection Act passed in India.

- (a) 1965
- (b) **1972**
- (c) 1985
- (d) 1991

6. Find which principle is key to sustainable development

- (a) Maximizing resource exploitation
- (b) Maintaining economic growth without considering environmental factors
- (c) **Balancing environmental, economic, and social needs**
- (d) Prioritizing industrial development

7. Recall under TRIPS, which aspect of biodiversity is primarily protected.

- (a) Ecosystem services
- (b) **Genetic resources and associated traditional knowledge**

- (c) Wildlife corridors
- (d) Migratory species conservation

8. Identify how are species categorized under CITES.

- (a) **Appendix I, II, and III based on trade restrictions**
- (b) Threatened, Endangered, and Vulnerable species
- (c) Terrestrial, Aquatic, and Arboreal species
- (d) Domesticated, Wild, and Hybrid species

9. Name the sector which is primarily supported by the Indian Council of Agricultural Research (ICAR)?

- (a) Industrial development
- (b) Forest conservation
- (c) **Agricultural and livestock development**
- (d) Urban planning

10. Identify the primary function of the International Union for Conservation of Nature (IUCN)?

- (a) Classifying organisms based on taxonomy
- (b) **Publishing the Red List of Threatened Species**
- (c) Promoting agricultural development
- (d) Conducting genetic engineering research

Section B (2 Marks)

Unit I

1. Differentiate producer and consumers.
2. Discuss edaphic factors
3. Compare forest and desert ecosystem.
4. Explain biotic agencies causing soil erosion
5. Differentiate A horizon from B horizon.
6. Compare negative and positive interaction.
7. Define commensalism.
8. Discuss the methods of conservation of soil.

9. List out the different structures of soil.
10. Write the importance of climatic factors.

Unit II

1. Discuss the age groups in population
2. Differentiate natality from mortality
3. Explain the use of life table.
4. Discuss the age groups in population.
5. Explain succession.
6. List out the causes of succession.
7. Compare the roots of hydrophytes and halophytes.
8. Discuss the physiological adaptations of xerophytes.
9. Compare xerosere and hydrosere.
10. Differentiate monoclimax and poly climax theory.

Unit III

1. Write notes on ecological indicators
2. Define Bioleaching
3. Define an Environmental Management Plan and mention its importance.
4. Summarise how does bioaugmentation is benefit in wastewater treatment.
5. Explain two natural methods of carbon sequestration.
6. List out the limitations of bioaugmentation.
7. Explain ocean-based carbon sequestration.
8. Summarize the common applications of biofiltration.
9. Compare biological and geological methods of carbon sequestration.
10. Define blue carbon .

Unit IV

1. Explain biodiversity conservation.
2. Explain biodiversity.
3. Write notes on sacred groves.
4. Explain the significance of the Green Movement.
5. Write the role of DNA banks in conservation biology.
6. Define and mention biodiversity conservation objectives.
7. Compare *in-situ* and *ex-situ* conservation methods.
8. Explain the challenges of maintaining DNA banks in biodiversity conservation.

9. Define cryopreservation.
10. Discuss the importance of social forestry.

Unit V

1. Interpret the advantages of Wild life preservation act.
2. Discuss Rio summit.
3. Summarize the notes on WHF.
4. Write the objective of CITES.
5. Discuss the three main objectives of the Convention on Biological Diversity.
6. Explain the two provisions of the Wildlife Protection Act, 1972.
7. Write role of local communities in sustainable biodiversity management.
8. Compare UNEP and ICAR.
9. List out the organisations associated with biodiversity.
10. Write the importance of biodiversity legislations.

Section C (5 Marks)

Unit I

1. Show the food chain in the pond ecosystem.
2. Predict the factors causing soil erosion.
3. Compile the process of soil reclamation.
4. Present the different horizons of soil profile.
5. Present any two negative interactions among the population.

Unit II

1. Predict the factors influencing population density.
2. Classify the age group in a population.
3. Relate the laws of thermodynamics with energy flow.
4. Compare primary and secondary succession.
5. Discuss mono climax theory.
6. Explain the types of population dispersion.
7. Classify the types of hydrophytes.

Unit III

1. Discuss about EMP.
2. Explain the bioremediating methods of xenobiotics .

3. Discuss the components of an Environmental Management Plan (EMP) and its role in sustainable development.
4. Elaborate on the process of bioleaching, its advantages, limitations, and applications in the mining industry.
5. Compare and contrast bioaugmentation and biofiltration in terms of their mechanisms, applications, and limitation.
6. Evaluate the significance of bioaugmentation in remediating oil spills and contaminated groundwater.

Unit IV

1. Compile the values of biodiversity.
2. Discuss about Sthalaviriksha.
3. Explain the Chipko movement.
4. Discuss the challenges associated with DNA Bank maintenance.
5. Evaluate the significance of biosphere reserves in conservation of biodiversity.

Unit V

1. Predict the advantages and disadvantages of UNEP.
2. Relate TRIPS and CITES.
3. Discuss the roles of IUCN, and ICAR in biodiversity management and their contributions to conservation.
4. Discuss how sustainable development principles can be integrated into biodiversity conservation strategies.
5. Discuss the key features and impact of the Wildlife Protection Act, 1972, in India.

Section D (10 Marks)

Unit I

1. Analyse the fundamental aspects of pond ecosystem.
2. Outline the types of soil erosion.
3. Recommend some methods to conserve soil.
4. Categorize the trophic level in grassland ecosystem
5. Analyse the importance of microorganisms in soil.
6. Analyse the effect of light intensity on plants.
7. Prove that temperature is the important climatic factor in influencing plants

Unit II

1. Analyse the qualitative characters of community.

2. Prove that primary autotrophic succession is completed through a number of sequential steps.
3. Compile the morphological adaptation of leaves of xerophytes.
4. Classify the types of hydrophytes.
5. Analyse the anatomical adaptations of hydrophytes
6. Evaluate how the anatomical adaptations of xerophytes help them to survive in dry Environment.

Unit III

1. Examine the Bio-augmentation and write the uses of enzymes
2. Analyse the bioremediating method of heavy metal
3. Distinguish the methods of *insitu* and *exsitu* bioremediation.
4. Critically analyze the importance of carbon sequestration techniques in combating climate change. Discuss challenges and future prospects.
5. Discuss the environmental benefits and economic challenges of bioleaching

Unit IV

1. Investigate the importance of wild life sanctuaries.
2. Categorize the methods of exsitu conservation.
3. Evaluate the role of afforestation in plant conservation.
4. Discuss the importance of biodiversity conservation
5. Evaluate the silent valley movement.

Unit V

1. Evaluate the significance of TRIPS, CITES, and the Wildlife Protection Act in conserving Biodiversity.
2. Discuss the contribution NBPGR, and WHF to biodiversity conservation.
3. Critically evaluate the objectives, successes, and challenges of the Convention on Biological Diversity.
4. Explain the role of ICAR and NBPGR in preserving agrobiodiversity.
5. Analyze the impact of TRIPS on biodiversity conservation.

Section - A

UNIT-I

1. During day, decreasing water potential and osmotic potential of guard cells leading to stomatal opening are facilitated
 - (a) Hydrolysis of starch into sugars in guard cells.
 - (b) Synthesis of sugars and malate in guard cells
 - (c) ATP-driven H^+/K^+ exchange pump mechanism leading to accumulation of K^+ ion in guard cells
 - (d) **All of above**
2. Which one of the following colours of light is effective in stomatal opening?
 - (a) Red
 - (b) Far-red
 - (c) **Blue**
 - (d) Green
3. Which of the following forms of CO_2 has controlling influence on stomatal movements?
 - (a) **Intercellular**
 - (b) Intracellular
 - (c) Atmospheric
 - (d) None of the above.
4. The stomata close in water-stressed plants due to accumulation of ABA in,
 - (a) mesophyll cells
 - (b) subsidiary cells
 - (c) **guard cells**
 - (d) none of the above
5. Which of the following substances are not anti-transpirants?
 - (a) Colour plastics and silicone oils
 - (b) Low viscosity waxes and ABA
 - (c) phenylmercuric acetate and very high conc. of CO_2
 - (d) **None of the above**
6. In some angiosperms, watery drops ooze out from uninjured margins of leaves. This phenomenon is called as,
 - (a) transpiration
 - (b) root pressure
 - (c) **guttation**
 - (d) none of the above
7. Protein-lecithin theory of absorption of mineral salts was first proposed by
 - (a) Lundegardh and Burstrom
 - (b) **Bennet-Clark**
 - (c) Donnan
 - (d) none of the above
8. The mineral salts after being absorbed by epidermal cells of root are transported to xylem by
 - (a) apoplastic pathway
 - (b) symplastic pathway
 - (c) transmembrane pathway
 - (d) **all of these**
10. Which part of the root is involved in absorption of mineral salts in higher plants?
 - (a) **meristematic zone**
 - (b) root cap
 - (c) zone of elongation
 - (d) root hair zone
11. Cohesive force of water is due to the presence of
 - (a) **hydrogen bonds between water molecules**
 - (b) Covalent bonds between water molecules
 - (c) hydrogen bonds between water and components of xylem walls
 - (d) some other force
12. Which of the following is most important in transport of ionisable solutes across the membrane?
 - (a) concentration of solutes
 - (b) **electrochemical potential gradient**

- (c) chemical potential gradient (d) electrical potential gradient
13. Which one of the following is not the main component that determine the H₂O potential of plant under normal condition?
 (a) solute potential (b) pressure potential (c) **gravity** (d) temperature
14. Light is the dominant environmental signal that control stomatal movement in leaves of well watered plant in normal environment. Which one of the following wavelengths of light is responsible for such regulation?
 (a) red light (b) **blue light** (c) green light (d) far red light
15. Minor elements with respect to plants are referred as
 (a) elements which are present in the soil very low amount
 (b) These are trace elements used to detect the molecules
 (c) These are micromolecules with low molecular weight
 (d) **These are elements required for plants a least amount**
16. The ascent of water through the xylem to the leaf surface is effected due to
 (a) negative hydrostatic pressure at the top of the leaf
 (b) positive hydrostatic pressure at the top of the leaf
 (c) positive hydrostatic pressure at the root (d) **both (a) and (c)**
17. The rate of diffusion increases if,
 (a) temperature is increased (b) density of diffusing particles is lesser
 (c) the medium through diffusion occurs is less concentrated (d) **all of these**
18. Cohesion of water and transpiration pull are the basis of ascent of sap. This theory was proposed by
 (a) **Dixon and Jolly** (b) Hatch and Slack (c) Melvin Calvin (d) Sachs
19. In water stressed plant, the cells have,
 (a) **relatively more negative water potential** (b) less negative water potential
 (c) no water potential (d) more turgor pressure
20. If a cell contain certain fixed cation in it and is placed in a salt solution containing cation and anions, then Donnan's equilibrium will result in,
 (a) **accumulation of anion inside the cell**
 (b) accumulation of cations inside the cell
 (c) equal number of anions and cations inside the cell
 (d) none of the above
21. Osmotic pressure is higher in
 (a) isotonic solution (b) **hypertonic solution**
 (c) hypotonic solution (d) coloured solution
22. Blocking of xylem tracheid or vessel by an air bubble is called as
 (a) cavitation (b) embolism (c) hydraulic discontinuity (d) **both (a) and (b)**
23. Which of the following are not called as major or macronutrients?
 (a) **Cu, Zn, and Mo** (b) N, P and K (c) C, H and O (d) Ca, S and Mg
24. phloem loading and unloading occur in higher plants through
 (a) apoplastic pathway (b) symplastic pathway (c) **both (a) and (b)** (d) none of the above
25. An important constituent of protein, nucleic acids, porphyrins and alkaloids is
 (a) Mg @N @S @Ca

UNIT-II

- The DCMU inhibits electron transport in chloroplast by preventing the reduction of
(a) PC (b) P₆₈₀ (c) **PQ** (d) FRS
- Where is ATPase enzyme located in the chloroplast?
(a) stroma (b) **thylakoid membrane**
(c) Chloroplast DNA (d) lumen of thylakoid
- Under saturating light condition the conc. of atm. CO₂ at which rate of photosynthesis equals to the rate of respiration is called as
(a) light compensation point (b) **carbon di-oxide compensation point**
(c) extinction point (d) none of above
- step (i) $4\text{H}_2\text{O} \rightarrow 4\text{H}^+ + 4\text{e}^- + 4(\text{OH})$**
step (ii) $4(\text{OH}) \rightarrow 2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^-$
Above equations represent photolysis of H₂O
Which one of the following statements about these equations is **not true**?
(a) **Step (i) is carried out in the reaction centre**
(b) Step (i) and (ii) Occur in the pigment system
(c) It is the strongest oxidation reaction ever known
(d) Each step requires one extremely short flash of light
- Photosynthetic pigments are found in chloroplasts in the form of pigments –protein complexes chiefly in,
(a) Stroma lamellae (b) **thylakoids** (c) stroma (d) all the above
- In chloroplasts, photodynamic damage is prevented by
(a) Chlorophyll-b (b) **carotenoids** (c) phycobillins (d) None of the above
- Which of the following has more energy per photon of light?
(a) Red light (b) blue light (c) **UV light** (d) Infra-red light
- Which of the following is not a component of electron transport chain in chloroplasts?
(a) Plastoquinone (b) **Plastocyanin**
(c) Ubiquinone (d) cytochrome b6-f complex
- Which of the following does not form one electron redox system?
(a) P-680 (b) plastocyanin (c) **Plastoquinone** (d) Cytochromes
- Which of the following phosphorylated sugar is not involved in Calvin cycle?
(a) Ribulose-5-phosphate (b) xylulose-5-phosphate (c) **Erythulose-4-phosphate** (d) Erythrose-4-phosphate
- Which of the following does not occur in cyclic electron transport & photophosphorylation?
(a) photolysis of water (b) O₂ evolution
(c) Formation of reduced NADPH (d) **All the above**
- Non –cyclic electron transport and O₂ evolution are inhibited by,
(a) 2,4-dinitrophenol (b) atractylic acid
(c) bongkreikic acid (d) **CMC and DCMU**
- Which of the following plants do not show Kranz anatomy in their leaves?

- (a) **wheat and Barley** (b) Sugarcane
 (c) Maize and sorghum (d) *Atriplex* and *Amaranthus*
14. Red drop of and Emerson's enhancement effect have been instrumental in the discovery of,
 (a) **two pigment systems (photosystems)**
 (b) cyclic electron transport and photophosphorylation
 (c) non-cyclic electron transport and photophosphorylation
 (d) none of the above
15. Light harvesting complexes (LHCI and LHCII) in the two photosystems consists of,
 (a) Reaction centre I and II
 (b) **antenna pigments associated with proteins**
 (c) cytochrome b6 -f complex
 (d) none of above
16. During photorespiration, one mol. CO₂ and one mol of NH₃ are released in,
 (a) peroxisome (b) **mitochondrion**
 (c) chloroplast (d) none of the above
17. C₄ -plants differ from C₃-plants in having
 (a) little or no photorespiration (b) low CO₂ compensation point
 (c) Kranz anatomy in their leaves (d) **all the above**
18. Main credit for investigating the sequences of dark reaction of photosynthesis goes to Nobel Laureate,
 (a) Ruben and Kamen (b) **Melvin calvin**
 (c) A.A. Benson (d) J. Bassham
19. who among the following scientists has contributed a lot in our understanding of electron transport system and photophosphorylation occurs at,
 (a) Hill (b) Bessel Kok et al
 (c) **Arnon** (d) Van Niel
20. Calvin cycle is also known as ,
 (a) C₃ pathway (b) reductive pentose pathway (RPP) cycle
 (c) PCR pathway (d) **all the above**
21. Accessory or antenna pigments absorb and transfer light energy to,
 (a) chlorophyll - b (b) chlorophyll - c
 (c) **chlorophyll - a** (d) pheophytin
22. Photolysis of water in photosynthesis requires the presence of,
 (a) Mn⁺⁺ ions (b) Mg⁺⁺ ions (c) **Mn⁺⁺ and Cl⁻ ions** (d) K⁺Cl⁻ ions
23. Which of the following is incorrect about photorespiration
 (a) **It occurs in C₄ plants** (b) It causes the loss of CO₂ fixed by calvin cycle (c) It is due to oxygenase activity of rubisco (d) phosphoglycolic acid is the immediate product of photorespiration
24. The plot showing relative effectiveness of different wavelength of light in photosynthesis is
 (a) absorption spectrum (b) **action spectrum** (c) emission spectrum (d) excitation energy
25. The C₄ plants are photosynthetically more efficient than C₃ plants because
 (a) They have more chloroplast (b) The CO₂ compensation point is high (c) **There is**

no photorespiration(d) CO₂ efflux is not prevented

26. Rubisco fix CO₂ in the bundle sheath cells of C₄ plants – Assertion

Because it is highly sensitive to O₂ to be protected from the external atmosphere –

Reason

27. Which of the following is correct with respect to above assertion and reason?

(a) **both assertion and reason are correct**

(b) the assertion is correct and reason is incorrect

(c) both assertion and reason are incorrect

(d) assertion is incorrect and reason is correct

28. CAM plants accounts for their efficiency of water use mechanism. Which of the following events are true in these plants?

(a) CAM plants can grow only in desert place

(b) **Their stomata close during day to minimize water loss**

(c) They fix CO₂ only by Rubisco

(d) Their CO₂ fixation mechanisms are spatially separated

29. Which of the following is incorrectly matched

a) PS I --- Reaction center

b) Chl. b -- antenna pigments

c) primary O₂ donor -- water

d) plastoquinone - mobile carriers

30. Electron carriers in thylakoid membranes are

a) Cofactors

b) Coenzymes

c) Carbohydrates

d) Vitamin c

31. Which of the following doesn't play any role in photosynthesis

a) Xanthophylls

b) Plastocyanin

c) Stroma

d) FADH

UNIT-III

1. The RQ of the organic compound are greater than 1 because

(a) **Organic acids are rich in O₂** (b) Organic acids are rich in CO₂

(c) Organic acids are rich in SO₄ (d) Organic acids are poor in O₂

2. Proton motive force during oxidative phosphorylation is generated in mitochondria by

(a) Exchanging proton for Na ions

(b) **Pumping protons out into the inter membrane space**

(c) Pumping hydroxyl ion into the mitochondria

- (d) hydrolysis of ATP
3. In anaerobic respiration there is net gain of only 2 ATP molecules/ glucose oxidized. These ATP are synthesized during
- (a) **Glycolytic metabolism** (b) Oxidative phosphorylation
(c) Alcoholic fermentation (d) Krebs cycle
4. Which of the following statement concerning symbiotic N₂ fixation is incorrect?
- (a) Various rhizobia species can associate to legumes roots to fix N₂
(b) Nitrogenase enzyme is highly sensitive to excessive oxygen
(c) Rhizobium provides fixed NH₃ to host to the cost of carbohydrate from the host
(d) **The nitrogenase enzyme of the legume plant fix atmospheric nitrogen and supply to rhizobium**
5. Which of the following is common in both aerobic and anaerobic respiration?
- (a) **Glycolysis** (b) Kerb's cycle
(c) Alcoholic fermentation (d) none of the above
6. The process of glycolysis occurs in,
- (a) Mitochondria (b) **cytosol**
(c) peroxisome (d) all of above
7. How many reduced NADH molecules one produced in aerobic oxidation of one glucose molecule?
- (a) 8 (b) **10** (c) 12 (d) 24
8. Mitochondrial electron transport system (ETS) consists of,
- (a) two complexes (b) three complexes
(c) **four complexes** (d) none of the above
9. How many sites of phosphorylation (ATP synthesis) are there in mitochondrial electron transport system?
- (a) **Three** (b) Two (c) One (d) none of the above
10. Cyanide resistant respiration is found in,
- (a) **plants** (b) animals
(c) plants and animals (d) none of above
11. The enzyme nitrate reductase is inducible type of enzyme which is found in cells in,
- (a) **cytosol** (b) chloroplasts
(c) leucoplasts (d) All the above
12. Which of the following nitrogen fixing bacteria are anaerobic?
- (a) *Anabaena, Aulosira, calothrix*
(b) *Azotobacter, Azospirillum, Beijerinckia*
(c) ***Chromatium, Rhodospirillum, Clostridium***
(d) None of the above
13. Oxidative phosphorylation takes place,
- (a) in mitochondrial matrix (b) In thylakoids of grana in chloroplasts
(c) **on cristae in mitochondria** (d) all of above
14. In pentose pathway,
- (a) reduced coenzymes are not generated
(b) reduced coenzymes are produced which on oxidation from ATP molecules

- (c) **reduced coenzymes are produced but not linked to generation of ATP molecules**
 (d) none of the above
15. The enzyme pyruvate dehydrogenase involved in TCA cycle is
 (a) simple enzyme (b) an isozyme
 (c) **multienzyme complex** (d) none of the above
16. The rhizobia enter into roots of leguminous host plant through,
 (a) epidermal cells (b) **root hairs**
 (c) meristematic region (d) zone of elongation
17. Phosphorylating complexes in mitochondria consists of,
 (a) F_0 (b) F_1 -ATP synthase
 (c) **both (a) and (b)** (d) cristae
18. The base piece (F_0) of phosphorylating complex is an integral protein complex which forms,
 (a) **membrane channel for protons** (b) membrane channel for electrons
 (c) membrane channel for electron carriers (d) none of the above
19. How much energy is released during complete aerobic oxidation of one molecule of glucose?
 (a) **686 k cal.(2868 KJ)** (b) 586 K cal.(2450 KJ)
 (c) 786 k cal (3286 KJ) (d) None of the above
20. Most common respiratory substrates in plants are,
 (a) Fats (b) Protein (c) **Carbohydrates** (d) Organic acids
21. Which of the following is the main source of energy for a plant root that is flooded?
 (a) **Glycolysis** (b) Krebs's cycle (c) Oxidative decarboxylation (d) terminal oxidation
22. Who proposed the chemi-osmotic mechanism of ATP synthesis in the cells
 (a) Calvin cycle 1950 (b) **Mitchell 1961** (c) Benson 1950 (d) Kortschack 1950
23. Which of the following is **incorrect** about nitrogen fixation?
 (a) It is catalysed by nitrogenase enzyme
 (b) **It requires aerobic condition**
 (c) Only symbiotic bacteria can do this process
 (d) Ferredoxin serves as an e⁻ donor to this
24. Glutamate + oxaloacetate → aspartate + 2-oxoglutarate.
 Choose the correct enzyme from below that can catalyse the above reaction
 (a) **Aspartate amino transferase**
 (b) Glutamine synthetase
 (c) Glutamate synthetase
 (d) Nitrogenase
25. Consider the following statement
 Assertion A : Heterocyst are the site of N_2 fixation in the blue green algae
 Reason B: Nitrogenase is available in the heterocyst
 (a) **Both A and B are true and B is the reason for A**
 (b) Both A and B are true. B is not the correct reason for A
 (c) A is true but B is false
 (d) Both A and B are false

26. NO_3^- assimilation in plants takes place through the following chemical intermediates. Find out the correct sequence.

1. NO_2^- 2. Amino acid 3. NH_3 4. Protein
(a) 4,2,1,3 (b) **1,3,2,4** (c) 1,4,2,3 (d) 3,1,2,4

27. How does the glycolytic pathway continue in the direction of glucose catabolism

- a) Glycolysis occur in either direction
- b) The enzymes of glycolysis functions only in one direction
- c) High ATP keep the pathway going forward direction
- d) There are 3 irreversible reactions that act as the driving force in the pathway

28. Regulations of glycolytic pathway includes-----

- a) Feed back inhibition by ATP
- b) Allosteric stimulation by ADP
- c) Allosteric inhibition by ATP
- d) All the above

29. A product of glycolysis that is consumed in alcoholic fermentation

- a) Pyruvate
- b) Fructose 6-phosphate
- c) Phenol pyruvate
- d) Malate

30. In glycolysis which of the following substrates is catalysed by a kinase enzyme

- a) Glucose 6-phosphate
- b) Fructose 6-phosphate
- c) 2-P glycerate
- d) Phenol pyruvic acid

UNIT-IV

1. The plant hormone IAA is present in most plants. The structure of this hormone is related to which one of the following amino acids?

- (a) glutamic acid (b) Aspartic acid (c) Lysine (d) **Tryptophan**

2. Response of plant to cold temperature treatment expressed in the form of flowering is called as

- (a) photoperiodism (b) stratification (c) scarification (d) **vernalization**

3. Which of the following is an example of programmed cell death?

- (a) formation of necrotic lesions following pathogen infection
(b) formation of aerenchyma in aquatic plants
(c) disappearance of protoplast in mature xylem vessels and tracheids
(d) **all of these**

4. The inhibitory effect of red light on flowering during critical dark period in short day plants can be overcome by

- (a) **far- red light** (b) blue light (c) infra- red rays (d) ultra violet rays
5. Which of the following physiological effect is exhibited by brassinosteroids and not by auxins?
- (a) cell elongation in stem (b) xylem differentiation
(c) delay of senescence
(d) **involvement in expression of many light regulated genes**
6. Respiration climacteric exhibited by some fruits refers to
- (a) **remarkable increase in rate of respiration just before ripening**
(b) remarkable decrease in rate of respiration just before ripening
(c) complete inhibition of respiration just before ripening for certain period
(d) none of the above
7. Which of the following are non -climacteric fruits?
- (a) apple, avocado and banana (b) fig, mango and melon
(c) pear, plum and tomato (d) **orange, grapes and pineapple**
8. Ethylene receptors are located on
- (a) plasma membrane (b) tonoplast (c) **endoplasmic reticulum** (d) cell wall
9. ABA occurs in plants predominantly in
- (a) roots (b) stems (c) **mature green leaves** (d) flowers
10. Fruit ripening processes are known to be
- (a) low levels of atmospheric O₂ and high levels of atmospheric CO₂
(b) low atmospheric pressure (c) absence of sufficient light (d) **all of above**
11. Which of the following is now considered as natural auxin?
- (a) Indole-3-butyric acid (b) 4-Chloro-indole-3-acetic acid
(c) **Both (a) and (b)** (d) none of these
12. Abscission of leaves is controlled by
- (a) presence of auxin in the proximal side of abscission zone
(b) presence of auxin in the distal side of abscission zone
(c) **relative concentration of auxin in the two sides of abscission zone**
(d) none of the above
13. In plants, photoperiodic stimulus is perceived by
- (a) roots (b) stems (c) **leaves** (d) flowers
14. Which type of cytochrome predominates in etiolated seedlings?
- (a) **type I** (b) type II (c) both type I and II (d) none of the above
15. Overall senescence is typical of
- (a) **annual plants** (b) perennial plants (c) deciduous plants (d) tropical trees
16. Morphactins are synthetic derivatives of,
- (a) **Fluorene-9-carboxylic acid** (b) kinetin
(c) ABA (d) none of the above
17. Ethylene can easily diffuse through plasma membrane in plant cells because this hormone has
- (a) hydrophilic structure (b) **hydrophobicity**
(c) amphoteric nature (d) none of these
18. Which of the following is not a physiological effect of auxin in higher plants?
- (a) apical dominance (b) cell elongation

- (c) root initiation (d) **programmed cell death**
19. Production of large sized seedless grapes and malting of barely can be enhanced by
 (a) auxins (b) **gibberellins** (c) ethylene (d) morphactins
20. The colour of skin in ripening apple, tomato and grape fruits is due to accumulation of
 (a) lycopene (b) bêta carotene (c) **anthocyanin** (d) chlorophyll
21. All of the following are growth inhibitors **except**
 (a) ABA (b) dormin (c) ethylene (d) **IAA**
22. Out of the numerous gibberellins, which one the following is called as gibberellic acid?
 (a) GA₇ (b) GA₅ (c) GA₄ (d) **GA₃**

UNIT-V

1. During acclimation, tolerance of a plant against a particular stress is,
 (a) decreased (b) **increased** (c) not affected (d) all the above
2. Which of the followings are reversible?
 (a) Plastic biological strains (b) **Elastic biological strains**
 (c) Both Plastic and Elastic biological strains (d) None of the above
3. Drought resistance in plants is related to,
 (a) **negative water potential** (b) positive water potential
 (c) surplus water (d) Matric potential
4. Which of the following is commonly known as resurrection plant?
 (a) Creosote bush (b) Sagebrush
 (c) *Selaginella selaginoides* (d) club moss
5. Which of the following is concerned in desiccation avoidance or postponement in xerophytes ?
 (a) Drought escapers & water spenders (b) Water collectors & water savers
 (c) Osmotic adjustments (d) **all the above**
6. Which of the following organic compounds contributes to osmotic adjustments of the cells in increasing resistance of plants to water stress?
 (a) Glycine betaine (b) proline (c) Sorbitol (d) **all of above**
7. Which of the following amino acids chiefly accumulate in the cells of water stressed plants and also halophytes to maintains osmotic relations of the cells?
 (a) Glycine (b) **Proline** (c) Leucine (d) None of the above
8. The halophytes which can resist a wide range of salt concentrations are called as,
 (a) glycophytes (b) stenohaline (c) **euryhaline** (d) halophytes
9. Which of the following methods are adopted by plants to cope with salt stress?
 (a) Avoiding salinity (b) Evading salinity
 (c) Tolerating salinity (d) **All the above**
10. Which of the following are more susceptible to chilling injury?
 (a) Tropical plants (b) Subtropical plants
 (c) **Both tropical and subtropical plants** (d) Temperate zone plants
11. Chilling injury in plants results due to,
 (a) **low temperature well above their freezing point**
 (b) low temperature ay freezing point

UNIT-I

1. Osmotic pressure.
2. Plasmolysis.
3. Turgor pressure.
4. Diffusion pressure deficit.
5. Root pressure.
6. Carrier concept.
7. Trace elements.
8. Antitranspirants.
9. Transpiration.
10. Phloem loading.

UNIT-II

1. Photosynthetic unit.
2. Phosphorescence.
3. Phaeophytin.
4. Photophosphorylation.
5. Rubisco.
6. Photorespiration.
7. Plastocyanin.
8. Reaction centre
9. Grana.
10. Calvin cycle.

UNIT-III

1. α - Ketoglutarate.
2. Embden – Meyerhof – Paranas pathway.
3. Enolase.
4. NAD / NADH.
5. nod - factors.
6. nif - genes.
7. Nitrogenase.
8. Lectins.
9. Leghemoglobin.
10. Nitrate reductase.

UNIT-IV

1. Growth hormones
2. ABA.
3. Richmond – Lang effect.
4. Zeatin.
5. Apical dominance.
6. Phytochrome.

7. Photoperiod.
8. Florigen.
9. Senescence.
10. Circadian rhythm.

UNIT-V

1. Elastic stress.
2. Tolerance.
3. Compatible solutes.
4. Euryhaline.
5. Salt evasion.
6. Cryoprotectants.
7. Secondary messengers.
8. Signal transduction.
9. Phytochelatins.
10. cAMP.

Section - C

UNIT-I

1. Differentiate between wall pressure and turgor pressure.
2. Distinguish between diffusion pressure deficit and water potential.
3. Explain plant cells as osmotic systems.
4. How is water transported to top of the trees like Australian Eucalyptus?
5. Explain source - sink relationship.
6. Comment on apoplastic and symplastic loading.
7. What are the demerits of Munch's hypothesis.
8. Bring out the role of Mg in the growth and development of plants.
9. Discuss the different types of transpiration.
10. Explain cytochrome pump theory.

UNIT-II

1. Describe the structure of thylakoid membrane.
2. Explain redox couple with suitable examples.
3. Write notes on OEC (Oxygen Evolving Complex).
4. Schematically represent C₃ cycle.
5. List out the significance of photorespiration.
6. Discuss the possible role of Rubisco in photosynthesis.
7. Briefly outline the types of C₄ cycle.
8. Distinguish between the cyclic and non-cyclic electron transport.
9. How do succulent plants assimilate carbon dioxide.
10. Define accessory pigments, reaction centre and light harvesting chlorophyll protein.
11. How thylakoid membrane is organized to do light reactions of photosynthesis?
12. Schematically represent the journey of electron and production of ATP and NADPH during photosynthesis?
13. Discuss CAM is the versatile mechanism of conservation of water in plants

14. Trace out C₄ cycle and evaluate the adaptive advantages of organic matter production

UNIT-III

1. Outline briefly how a molecule of glucose is converted into pyruvic acid.
2. What do you understand by oxidative phosphorylation?
3. Outline glyoxylate cycle.
4. List out the significance of pentose phosphate pathway.
5. Write notes on nitrogenase.
6. Comment on the role of root nodules in agriculture.
7. Elucidate the role of nitrogenase in nitrogen fixation.
8. Discuss GS-GOGAT pathway.
9. What do you know about symbiotic nitrogen fixation?

UNIT-IV

1. Write any five commercial applications of auxin.
2. Enumerate the uses of ethylene.
3. Classify plants in relation to their response to photoperiod. Give an example for each.
4. What are the changes that occur during fruit ripening?
5. Write down the physiological changes that occur during senescence.
6. Briefly write about biological clock in plants.
7. Explain the role of gibberellin in cell elongation.
8. Write the importance of photoperiodism.
9. Write any five phytochrome mediated photoresponses in plants.
10. Explain the two main categories of plant responses to light signals.

UNIT-V

1. Bring out the different morpho-physiological adaptation of plants to combat drought.
2. What is stress? Give an account of plants defense mechanism against biotic stress.
3. What are stress induced proteins? Explain with example.
4. Differentiate between salinity stress and water stress.
5. How do plants respond to radiation stress?
6. What is meant by secondary messengers? What are their importances?
7. cAMP is a secondary messenger. Justify.
8. Explain the importance of Ca – calmodulin.
9. How do plants adapt to freezing temperature.
10. Differentiate between stress and strain.

Section - D

UNIT-I

1. Describe the mechanism of stomatal movement.
2. Explain the different theories related to transport of ions in plants.
3. Give an account on hydroponics.
4. The rate of transpiration varies with respect to climate change. Explain

5. Discuss source-sink relationship.
6. Explain the relationship between osmotic pressure, turgor pressure and suction pressure.
7. Justify Dixon and Jolly's theory to explain ascent of sap in tall trees is more appropriate.
8. Discuss the mechanism of absorption of mineral ions by plants. How does it differ from absorption of water?
9. Explain the role of light and CO₂ in closing and opening of stomata.
10. Transpiration is less during rainy season. Justify.
11. Write down the deficiency symptoms of any five essential macroelements.

UNIT-II

1. Explain the recent concepts of thylakoid membrane.
2. Illustrate electron transport mediated by light.
3. C₃ plants are more suitable to reduce global warming. Discuss.
4. Explain C₄ cycle.
5. Schematically represent CAM pathway? How does it differ from other mode of carbon fixation?
6. What is photorespiration? Is it essential to plants? Discuss.
7. Explain the different types of phytophosphorylation.
8. Write notes on (a) OEC (b) Rubisco
9. Explain redox system of chloroplast.
10. Explain dark reaction.
11. Elucidate photosynthetic CO₂ assimilation through calvin cycle.
12. With reference to photorespiration and calvin cycle discuss oxygenation and carboxylation of ribulose 1,5- biphosphate are competing reactions.

UNIT-III

1. Describe the mechanism of aerobic oxidation of pyruvic acid in plants. How many ATP molecules are produced by each glucose molecule in this process?
2. Give an account of TCA cycle.
3. Describe schematically the pentose phosphate pathway.
4. Describe the respiratory process which is common in aerobic and anaerobic respiration.
5. Explain glyoxylate cycle and add a note on its significance.
6. Describe the mechanism of symbiotic nitrogen fixation.
7. Explain the mechanism of asymbiotic nitrogen fixation.
8. Write an essay on assimilation of nitrate and ammonia in plants.
9. Nitrogen fixation is genetically controlled. Discuss.
10. Explain mitochondrial electron transport.
11. Describe the mitochondrial electron transport system and analyse the chemiosmotic synthesis of ATP.
12. Outline the process of oxidation of food stuffs in cytosol and derive the energy transformation in it.

UNIT-IV

1. Explain the mechanism of action of auxin in plants.
2. Give an account on the physiological role of gibberellin. Explain its role in seed germination.
3. How does cytokinins act as secondary messenger? Explain.
4. Relate the role of abscissic acid in stomatal movement and water absorption.
5. What are the changes that occur in the vegetative buds before flowering.
6. Enumerate the physiological role of morphactins and brassinosteroids.
7. Ethylene is a plant growth regulator. Justify.
8. What is senescence? Describe the physiological changes occur during senescence.
9. Define abscission. Bring out the role of plant growth regulators in abscission.
10. Write an essay on biological clock.

UNIT-V

1. How do plants defend themselves against biotic stress? Explain.
2. What are secondary messengers? Explain the role of cAMP and Ca-calmodulin.
3. Classify different types of stress and discuss salinity stress.
4. Explain in detail the impact of drought on plants.
5. Write an essay on radiation stress.
6. Discuss freezing stress and stress proteins.
7. Describe the adaptive mechanism of plants to heavy metals
8. Distinguish between drought tolerance and drought avoidance. Describe various morpho-physiological adaptations of plants to combat drought.
9. Give an account of salt stress and salt resistance in higher land plants.

ST.MARY'S COLLEGE (Autonomous) – Thoothukudi – 628 001
II M.Sc. Botany – Semester IV
Core XIV - Horticulture and Seed Technology - Course Code: 21PBOC42

Section A

Unit I

1. An ideal Greenhouse must have a good system for control of
 - (a) **Temperature, humidity, nutritional requirement and pathogen**
 - (b) Temperature, Misting, Cooling, heating and balancing the air
 - (c) Temperature, lighting, humidity and pathogen
 - (d) Temperature, heating, lighting, humidity and mist
2. Major types of greenhouse are
 - (a) Even span (b) **Lean to** (c) Odd span (d) both a and b
3. Growing medium for green house plant production is
 - (a) **A nutritive substance in which seeds germinate and plants grow** (b) Unsterilized soil
 - (c) Soil which hasn't been graded for size (d) the cellular structure that make up wood
4. Horticulture is the study that includes
 - (a) **Fruits, vegetables and flowers** (b) All food crops (c) Vegetables, gardens and lawn near hotels (d) Some bush crops and apples
5. In cold places frost damage can be reduced in horticultural crops using these methods except
 - (a) Overhead sprinklers at night (b) **Green houses and shade nets** (c) Wind breaks placement (d) Appropriate fungicide application
6. Which of the following greenhouse styles is recommended for hilly areas?
 - (a) Even span (b) Uneven span (c) Lean to (d) **Ridge and furrow**
7. Arboriculture deals with
 - (a) fruit cultivation (b) vegetable cultivation
 - (c) flower cultivation (d) **tree cultivation**
8. The lean-to green house has.
 - (a) No roof slope (b) 3 roof slopes (c) **Only one roof slopes** (d) Many roof slopes
9. Which is not a component of protected cultivation?
 - (a) **Drip irrigation** (b) Shade net (c) Low tunnel (d) None of the above.
10. What is the night time temperature of cool green house?
 - (a) 5 – 7°C (b) 10 – 12°C (c) 12 – 18°C (d) **7 – 10°C**
11. Suitable plants under cool green house is..
 - (a) **Carnations** (b) Geraniums (c) Sweet peas (d) All of the above
12. What is the night time temperature of warm green house?

- (a) 8 – 12°C (b) **10 – 13°C** (c) 15 – 20°C (d) None of the above
13. Suitable plants under warm greenhouse is..
 (a) **Daffodils** (b) Tulip (c) African violets (d). Narcissi.
14. Who is the father of Horticulture?
 a. Charles Dowing b. E.J.Butler c. K. Philips d. **L.H. Bailey**
15. Father of Horticulture in India is
 a. **M. H. Marigowda** b. Chadda c. Charles Dowing b. E.J.Butler
16. Olericulture is related to
 a. **Production of Vegetables** b.Fruit Production c. Cultivation of Flowers d.
 Ornamental Gardening
17. The term pomology is related to
 a. Production of Vegetables b.**Fruit Production** c. Cultivation of Flowers d.
 Ornamental Gardening
18. Which irrigation method is most suitable for lawns/turfs?
 a. furrow b. Drip c. basin d. **sprinkler.**

Unit-II

1. Branch of Horticulture which deals with cultivation of fruit crops
 (a)floriculture (b)olericulture (c)arboriculture (d) **pomology**
2. The land in which fruit trees are grown on commercial scale is called
 a. rockery (b) **orchard** (c) lawn (d) topiary
3. Fruit trees are raised in orchards by planting
 a.seedlings (b) grafts (c) suckers (d) **all the above**
4. Who is known as the father of pomology.
 a. M.S. Swaminathan b. M.S Randhawa c. **Charles Dowing** d. K.L Chadda
5. An orchard is one where different----- crops have been planted in an orderly manner.
 (a)phosphorus (b) **orchard** (c) lawn (d) topiary
6. Floor management practices should increase or at least maintain ----- matter in the orchard soil
 (a)phosphorus (b) **organic mater** (c)sulphur (d) water
7. **Orchard management** aims at to provide -----moisture conditions in soil during the critical growth stages.
 (a)**optimum** (b) maximum (c)minimum (d) none of the above
8. Good **orchard management** always ----- soil erosion.
 (a)**prevent/control** (b) not prevented (c) not control (d) none of theabove
9. **Orchard management** increase or at least maintain ----- matter in soil.
 (a)**organic** (b)water management (c) nutrient management (d)soilmanagement
10. Clean cultivation, sod culture, use of herbicides, mulching, inter-cropping, covercrops are some of the important-----practices.
 (a)organic (b)water management (c) nutrient management (d)**soil management**
- good **orchard management** program always ensures ----- to the grower.
 (a)income(b) higher return / income (c) experimental(d) **higher return /income**
- good **orchard management** practice always improve structure and aeration of the_____
 (a) water (b) **soil** (c) spagnum (d) perlite

13. Orchards maintained in research institutions with the main aim of conducting several experiments are referred as ----- orchards.

- (a) physical (b) chemical (c) biological (d) **experimental**

Unit III

1. The word olericulture is derived from

- a) **Greek** b) latin c) spanish d) french

2. Types of vegetable gardens based on the purpose for which they have been developed are

- (a) 2 (b) 4 (c) **6** (d) 5

3. The term olericulture is related to

- (a) **vegetable** (b) flower (c) crop (d) flower

4. For checking sprouting of onion during storage, which growth regulator is used?

- (a) IBA (b) Malic hydrazide (c) IAA (d) Gibberrellic acid

5. Which of the following is true about fruits and vegetable processing?

- a) They get spoil very fast and hence need to be consumed soon
b) They have high moisture content and should be kept in a cold, dark place
c) They're tender and hence get spoiled easily

- d) All of the mentioned**

6. Which of the following is not related to Post Harvest losses?

- a) Post harvest losses can be reduced by adding value to products
b) Packaging, storage, transportation areas are where losses take place
c) **Farmers don't earn much after adding value to products**
d) Value can be added to products by converting raw form into a more processed/refined form

Unit-IV

1. Reduction or elimination of dormancy in crop plant is due to :

- a. Domestication b. Hybridization c. Mutation d. **Acclimatization**

2. Dormancy due to factors within the embryo is:

- a. **Endogenous** b. Exogenous c. Combination d. None of above

3. Secondary dormancy in non dormant seeds is due to:

- a. Temperature** b Moisture c. Aeration c. d. Light

4. Germination of undeveloped seeds is favored by:

- a. Warm temperature (20°C) b. Gibberallic acid c. Low temperature (20°C) **d. a & b**

5. During stratification, the most important factor is:

- a. Temperature b. Duration c. Media **d. All of above**

6. Stage at which seed achieves its maximum dry weight and has maximum Germination potential and vigor is:

- a. Physiological maturity** b. Edible maturity c. Harvest maturity d. None of the above

7. Certified seed is the progeny of

- a. nucleus seed **b. foundation seed** c. registered seed d. breeder seed

8. The process of separating quality from chaff is called

- a. **winning** b. threshing c. harvesting d. irrigation

9. Golden yellow colour tag is given to

- a. nucleus seed b. foundation seed c. registered seed **d. breeder seed**

10. The colour of "Tag" stitched on bag of certified seed is

- a. **blue** b. white c. red d. yellow

11. Tag that denotes breeder seed is?
a. **Golden yellow** b. white c. Azure blue d. purple .

UNIT V

1. Seed vigor is affected by
a. Time of storage b. Type of seed stored c. Storage environment **d. All of above**
2. Tetrazolium test to check seed viability is
a. Chemical test b. Enzyme test c. Germination test **d. a&c**
3. Researchers describe seed moisture contents in terms of :
a. Dry weight b. Wet weight c. Percent weight **d. a&b**
4. During Stratification, the most important factor is
(a) Temperature (b) Duration (c) Media **(d) All of above**
5. Which of the following is a major acid used in acid seed scarification?
(a) Phosphoric acid (b) acetic acid (c) Oxalic acid (d) **sulphuric acid**
6. The process of Seed drying is very important to maintain its?
(a) Viability and vigour (b) Protein content (c) Oil content (d) Chemical composition
7. The vigour test method that estimates decarboxylation activities?
(a) ATPase (b) GADA test (c) Leachate test (d) All of the above
8. International Seed Testing Association (ISTA) was founded in the year?
(a) 1824 (b) 1876 (c) 1914 **(d) 1924**
9. Certification is not required for?
(a) Breeder seed (b) Foundation seed (c) Registered seed (d) All of these
10. The seed viability test is also known as?
(a). T test (b). Z test (c). Germination test **(d). TZ test (Tetrazolium test)**

Section B

Unit I

1. Define horticulture.
2. Write the special features of horticulture.
3. Write notes on hot beds and cold frames
4. Differentiate glass house from greenhouse
5. List out the different divisions of horticulture with suitable examples.
6. Write the importance of horticulture.
7. What kind of site works best for an Orchard?
8. Write notes on special features of horticulture.
9. List out the types of outdoor garden.
10. Write notes on greenhouse.
11. Name the heating systems in hot bed.

Unit II

1. Define pomology.
2. Write note on planting method of an orchard and describe the transplantation methods.
3. Define pruning.
4. Write note on harvesting methods of fruits.
5. Write note on storage and preservation of fruits.
6. Write note on laying out of an orchard.

Unit III

1. Define olericulture.
2. Write the climate and soil requirement for cultivating tomato.

3. Write note on preservation of vegetables.
4. Write the climate and soil requirement for cultivating cucumber .
5. Write note on water and weed management for the cultivation of Bhendi.
6. Write note on water and weed management for the cultivation of cluster beans.
7. Write note on water and weed management for the cultivation of chilly.
8. Write the climate and soil requirement for cultivating onion.
9. Write the climate and soil requirement for cultivating bitter guard.

Unit IV

1. Define seed technology.
2. Write the importance of seed production.
3. Write factors affecting seed longevity during storage.
4. Describe different methods of seed drying.
5. Write note on seed storage principles.
6. Write the importance of seed fortification.
7. Define seed priming.
8. Write note on seed coating.
9. Define seed pelleting.
10. Write note on specific gravity separator

Unit V

1. Define seed viability.
2. Write note on seed certification.
3. Define seed vigour.
4. Write note on seed ageing.
5. Write note on seed longevity.
6. Define seed testing.
7. Write any two factors affecting seed vigour.
8. Write any two factors affecting seed viability.

Section C

Unit I

1. Discuss the various division of horticulture in brief.
2. Describe the different types of greenhouses based on Covering materials used and Shape.
3. Discuss about the plant growing structure.
4. Describe different methods of irrigation of horticulture plants.
5. Nutrition of horticulture plants are important. Explain.
6. Discuss the importance of horticulture.

Unit II

1. Proper selection of site is important to establish an orchard. Discuss.
2. Describe the various patterns of laying out of an orchard.
3. Examine the planting method of an orchard.
4. Recommend the storage methods of fruits.
5. Outline the preliminary operation of an orchard.
6. Assess the pruning techniques in an orchard.

Unit III

1. Describe the preservative methods of vegetables.
2. Discuss the cultivation of brinjal.
3. Examine the different methods of storage and preservation of vegetables.
4. Describe the cultivation of tomato. bitter guard.

5. Discuss the cultivation of chilly.
6. Discuss the cultivation of Bhendi.
7. Describe the cultivation of cluster beans.
8. Describe the cultivation of dolichous beans.
9. Discuss the cultivation of onion.
10. Describe the cultivation of cucumber.
11. Describe the cultivation of bitter guard.

Unit IV

1. Appraise the principles of GM crop production.
2. Appraise the principles of organic seed production.
3. Describe the seed enhancement quality testing.
4. Outline factors affecting seed longevity during storage.
5. Discuss about seed processing
6. Assess the importance of seed quality enhancement techniques.
7. Analyse the working principles of any to upgrading equipment you have studied.

Unit V

1. Outline the factors affecting seed viability.
2. Describe the procedure for seed certification.
3. Recommend the procedure for seed certification,
4. Seed standard is essential for seed germination. Justify the given statement.
5. Examine the Pre and post-harvest factors affecting seed viability.
6. Discuss the physiology of seed deterioration liquid peroxidation seed viability.
7. Analyse the factors affecting seed vigour.

Section D

Unit I

1. With suitable illustrations, explain the construction of green house.
2. Describe the types of plant growing structures.
3. Discuss the various division of horticulture in brief.
4. Describe the different types of greenhouses based on Covering materials used and Shape.
5. Discuss different methods of irrigation techniques.

Unit II

1. List out the points to be remembered while preparing a plan for an orchard.
2. Proper selection of site is important to establish an orchard. Discuss.
3. Describe the various patterns of laying out of an orchard.
4. Recommend the planting methods to establish an orchard.
5. Describe the preservative methods of fruits.
6. List out the points to be remembered while preparing a plan for an orchard.

Unit III

1. Describe the preservative methods of vegetables.

2. Discuss the cultivation of brinjal.
3. Describe the cultivation, storage and preservation of tomato.
4. Describe the cultivation, storage and preservation of Bhendi,
5. Describe the cultivation, storage and preservation of chilly.
6. Describe the cultivation, storage and preservation of cluster beans.
7. Discuss the cultivation of dolichous bean.
8. Discuss the cultivation, storage and preservation of onion.
9. Discuss the cultivation of cucumber.
10. Describe the cultivation, storage and preservation of bitter guard.

Unit IV

1. Appraise the principles of GM crop and organic seed production.
2. Outline the factors affecting seed longevity during storage.
3. Describe the seed enhancement quality testing.
4. Examine the seed storage principles and factors affecting seed longevity during storage.
5. Outline the seed quality enhancement techniques and its importance.
6. Analyse the principles of seed production.
7. Outline the principles of seed technology

Unit V

1. Analyse the different phases of seed certification.
2. Discuss about seed quality.
3. Outline the factors affecting seed viability.
4. Describe the procedure for seed certification.
5. Analyse the pre- and post-harvest factors affecting seed viability.
6. Analyse the physiological and basis of seed vigour in relation to crop performance and yield.
7. Analyse the factors affecting seed vigour.

Section A

Unit I

- The pair of hormones required for a callus to differentiate are_____.
(a) Ethylene and Auxin **(b) Auxin and cytokinin**
(c) Auxin and Abscisic acid (d) Cytokinin and gibberellin
- The growth of plant tissues in artificial media is called_____
(a) Gene expression (b) Transgenesis
(c) **Plant tissue culture** (d) Cell hybridization
- In plant tissue culture, the callus tissues can be regenerated into complete plantlets primarily by altering the concentration of _____
(a) Sugars (b) Amino Acids **(c) Hormones** (d) Vitamins and minerals
- The phenomenon of mature cells into meristematic state is referred as
(a) redifferentiation (b) **dedifferentiation** (c) totipotentiality (d) plueripoentiality
- During tissue culture some plants produce phenols which inhibit the cell growth. To avoid this problem which of the following organic supplement is added in nutrient media?
(a) vitamins (b) antibiotics (c) **activated charcoal** (d) organic acid
- Find out the suitable hormone pair required for a callus to differentiate
(a) **auxin and cytokinin** (b) auxin and ethylene
(c) auxin and abscisic acid (d) cytokinin and gibberllin
- What is organogenesis?
(a) formation of callus tissue (b) **Formation of root and shoot on callus tissue**
(c) both a and b (d) redifferentiation of explant
- The phenomenon of the reversion of mature cells to meristematic state leading to the formation of callus is known as
(a) **dedifferentiation** (b) redifferentiation
(c) either a or b (d) none of the above
- The most common solidifying agent in micropropagation is _____
(a) agar (b) dextran (c) mannan (d) all of these
- Which of the following option is the best source for haploid production
(a) **anther, pollen grain** (b) anther, meristem
(c) pollengrain, zygote (d) meristem, node
- Choose the suitable medium given under preferred for anther culture
(a) MS medium (b) B5 medium (c) **Nitsch's medium** (d) White's medium
- The phenomenon of apomixis is responsible for the spontaneous production of haploids. What is apomixis?

- (a) **development of embryo from an unfertilized egg**
- (b) development of haploid embryos from microspores
- (c) development of pollen cell into gamete
- (d) development of haploid embryos from fertilized egg

Unit II

1. Single cell culture is used for _____
 - (a) Production of enzymes
 - (b) **Production of Secondary metabolites**
 - (c) Production of vaccines
 - (d) Production of monoclonal antibodies
2. Which of the following plant cell will show totipotency?
 - (a) xylem vessel
 - (b) sieve tube
 - (c) **meristem**
 - (d) phloem cells
3. In protoplast culture it is essential to ensure that the isolated protoplasts are healthy and viable. Which of the following method is not used to assess the protoplast viability?
 - (a) fluorescein diacetate staining
 - (b) phenosafranine staining
 - (c) **Gram's staining**
 - (d) exclusion of Evans blue dye
4. Select the ionic osmoticum which is used to maintain the osmotic pressure during protoplast culture.
 - (a) **potassium chloride**
 - (b) sorbitol
 - (c) mannitol
 - (d) sucrose
5. Find out the suitable technique to select the specific mutant or hybrid cells from protoplast culture
 - (a) co-culture of protoplast
 - (b) microdrop culture
 - (c) liquid culture
 - (d) **Feeder layer technique**
6. Somatic hybridization involves *in vitro* fusion of isolated protoplast. Which of the following treatments show high success rate for the fusion of protoplast?
 - (a) treatment with sodium nitrate
 - (b) high pH and high Ca^{2+} ion treatment
 - (c) **polyethylene glycol treatment**
 - (d) electrofusion
7. Pomato is achieved through _____
 - (a) protoplast culture
 - (b) **somatic hybridization**
 - (c) androgenesis
 - (d) embryo culture
8. Select the suitable chemical from the following list to induce chromosomal elimination in somatic cells that results in production of haploids
 - (a) polyethylene glycol
 - (b) potassium chloride
 - (c) **chloramphenicol**
 - (d) all the above
9. Somatic hybridization is achieved through
 - (a) grafting
 - (b) **protoplast fusion**
 - (c) conjugation
 - (d) DNA technology
10. Which of the following enzymes required to obtain naked protoplast
 - (a) **cellulase and pectinase**
 - (b) cellulase and proteinase
 - (c) cellulase and amylase
 - (d) amylase and pectinase
11. Select the best explants for culturing disease free plants.

- (a) **apical meristem** (b) nodes (c) mature leaf (d) flower buds
12. Which of the following is the cause of somaclonal variation?
 (a) transposable elements (b) mitotic crossing over
 (c) mutation in cytoplasmic genome (d) **all the above**

Unit III

1. The enzyme which are produced within the cell or at the cytoplasmic membrane are called as _____
- (a) **endocellular enzymes** (b) exocellular enzyme
 (c) pancreatic enzyme (d) none of these
2. Of the following which organism is used for alcohol production
 a) *Bacillus thuringiensis*
 b) *Penicillium notatum*
 c) *Saccharomyces cerevisiae*
 d) all the above
3. _____ bacterium used as microbial pesticide
 a) *Bacillus thuringiensis*
 b) *Pseudomonas syringae*
 c) *Rhizoctonia solani*
 d) *Agrobacterium tumefaciens*
4. The enzyme papain is the rich source of
 a) Sugarcane b) pumpkin c) pineapple d) **papaya**
5. The main advantage of Biopesticide is
 a) Environment friendly b) Improve food quality c) Cost effective d) **All the above**
6. Airlift bioreactor are commonly employed for _____
 (a) **Aerobic bioprocessing technology**
 (b) Anaerobic bioprocessing technology
 (c) Both (a) and (b)
 (d) None of these
7. Photobioreactor specially made for fermentation that can be carried out either by exposing _____ or _____
 (a) **Sunlight / artificial illumination**
 (b) Blue light / UV light
 (c) Infra red light / X – ray
 (d) UV light / Infra red
8. A fertilizer that has been derived from natural seaweed sources.
 (a) Chemical fertilizer b) element fertilizer c) **seaweed liquid fertilizer** d) all the above
9. A continuous stirred tank bioreactor consists of a cylindrical vessel with motor driven central shaft that support one or more _____
 (a) Motor (b) gas outlet (c) **agitator** (d) pump

- (c) **World Intellectual Property Organization**
 (c) World Innovation Programme and Organization
 (d) Wide Intellectual programme
4. What are the hazards that you may found in the lab.
 (a) Chemicals (b) physical hazard such as falling from the wet floor (c) Infectious bacteria (d) **all the above**
5. Intellectual Property Rights (IPR) is a process which protects the use of information and ideas that are of.
 (a) Ethical value (b) **Commercial value** (c) Social value (d) Moral value
6. What is the name of the procedure performed under sterile conditions to eliminate contamination in hopes to obtain a pure culture of one type of microorganism?
 (a) **sterilization technique** (b) aseptic technique (c) disinfectant technique (d) pathogen technique
7. Fume hoods protect laboratory members from which of the following hazards/biohazards?
 (a) Bacteria (b) Viruses (c) **Toxic volatiles** (d) None
8. -----are an internationally recognized form of intellectual property used to protect unique plant varieties.
 (a) **PVR** (b) PBR (c) DUS (d) none
9. Of the following, which is the best character of herbicide resistance
 a) rapidly degraded in the soil
 b) killing weeds without affecting crop
 c) nontoxic to animals and microorganisms
 d) **all the above**
10. Which of the following is supplemented with vitamin A in order to improve its nutritional quality?
 (a) Cotton (b) Potato (c) Tomato (d) **Rice**
11. When working with infectious biological material, the best place to perform the work would be:
 (a) **In a Biological Safety Cabinet** (b) On the laboratory bench
 (c) On a clean bench, wearing a dust mask (d) In a Fume Hood
12. The plant variety protected in India include
 (a) Extant variety (b) Essentially derived variety (c) Farmer's variety (d) **All the above**

Section B

Unit I

1. Dedifferentiation and redifferentiation.
2. Totipotency
3. Direct embryogenesis
4. Explants
5. Surface sterilization
6. Callus
7. MS medium

8. Embryo culture
9. Organogenesis
10. Plant Growth regulators

Unit II

1. micropropagation
2. Secondary metabolites
3. Somatic hybrids
4. Protoplast culture
5. stages of protoplast culture
6. Protoplast fusion
7. Somoclonal variation
8. Advantages and disadvantages of micro propagation
9. Encapsulation
10. Meristem culture

Unit III

1. fermentor
2. biopesticide
3. SLF
4. Types of fermentor
5. Biodiesel
6. Microbes used in alcohol production
7. methods of cell immobilization
8. Differentiate adaptive and constitutive enzymes

Unit IV

1. VAM
2. Therapeutic properties of *Spirulina*
3. *Azospirillum*
4. BGA
5. Rhizobium
6. Nanoparticles
7. Biofertilizer
8. Blue Green Algae
9. Single cell protein
10. Morphology of *Scenedesmus*
11. Phytoremediation

12. Nanotechnology

Unit V

1. Herbicide resistance
2. Biosafety
3. PR protein
4. Golden rice
5. Edible vaccine
6. Copy right
7. Patents
8. Farmer's right
9. Plant breeder's right
10. Intellectual property rights

Section C

Unit I

1. How is surface sterilization accomplished in tissue culture works?
2. How will you prepare one litre of MS Medium?
3. Explain the different chemical constituents of any two tissue culture media.
4. Outline the design of a plant tissue culture laboratory
5. Describe callus culture from explants with diagram.
6. Show the steps involved in the initiation of *invitro* callus culture
7. Write different methods of sterilization used in tissue culture works?
8. Summaries the chemical composition of culture medium for *invitro* culture
9. Discuss the role of plant growth hormone in *invitro* plant development
10. Give briefly the factors influencing haploid production.
11. Define androgenesis. Enumerate the applications of haploids

Unit II

1. Recommend the methods used for culturing single cells
2. Organize different methods of protoplast culture
3. Explain the techniques involved in haploid production and its significance in plant breeding programme

4. Write an essay on techniques involved in micropropagation and defends it has more advantages over conventional methods of vegetative propagation.
5. Describe the process of protoplast isolation and fusion technology
6. Discuss Somatic embryogenesis
7. Write short notes on Protoplast fusion and somatic hybridization
8. Write notes on selection of hybrid cells application of protoplast hybridization
9. Compile different stages of micropropagation with neat diagrams
10. Write notes on meristem culture
11. Explain the methods of *in vitro* culture of cells for secondary metabolites and discuss the factors determining thereof.
12. What are the advantages of meristem culture?

Unit III

1. List out the types of fermentor and their uses.
2. Summaries the classes of biopesticides
3. Outline the applications of immobilized cell
4. Summarize the uses of alcohol
5. Present the advantages and disadvantages of the use of biodiesel
6. Give an account on Microbial enzyme production at commercial level.
7. List out the application of SLF
8. Discuss the application of higher plants in pharmaceutical and cosmetic industry
9. What are the microbes used in fermentation process?
10. Explain the method of biodiesel production at the commercial level.

Unit IV

1. Describe the synthesis of nanoparticle from plant sources.
2. How will you isolate VAM spores and produce VAM inoculant? List out their importance
3. Outline the production of single cell protein
4. Write notes on mass production of *Rhizobium*,
5. Give an account on mass production of *Azospirillum*
6. How Blue Green Algae (BGA) produced in large scale. Write the methods.
7. Mention the structure and use of Vesicular Arbuscular Mycorrhizal Fungi (VAM).
8. What is phytoremediation and how does it differ from other methods of bioremediation?

9. Write short notes on
 - i) phytoextraction
 - ii) rhizofiltration
 - iii) phyto – degradation
 - iv) phytostabilization
10. write short notes on
 - i) *Pseudomonas fluorescens*
 - ii) *Thlapsi caerulecsens*
11. How can transgenic plants be produced and used for phytoremediation? Discuss with examples

Unit V

1. Describe the methods of molecular farming to enhance quality of seed protein
2. What is IPR? Describe the process of patenting
3. Elucidate the biosafety issue of genetically modified organisms
4. Write short notes on Regulations in Biotechnology
5. Enumerate the biosafety in relation to transgenic research
6. Give an account on biosafety guidelines and implementation.
7. Give an account on Farmers Rights
8. Briefly discuss process of patenting of biotechnological products
9. Present the methods for the development of insect resistance transgenic plants
10. Discuss virus and bacterial resistance transgenic plants are economically more viable and mention the strategies of production of transgenic plants
11. Present the guidelines and implementation of biosafety in transgenic research
12. Stepdown the process of production transgenic plants with reference improved seed quality

Section D

Unit I

1. Discuss about various factors regulating organogenesis and embryogenesis.
2. Write a detailed account on media composition and preparation
3. How will you establish plant tissue culture laboratory? - Explain
4. Outline the embryo culture with diagram and add its significance
5. Write an essay on production of haploids using Anther

Unit II

1. What are secondary metabolites? How plant tissue culture has helped to obtain secondary metabolites?
2. Describe the method of culturing plant cells for the extraction of secondary metabolites
3. How Meristem culture is useful for virus free plant. Explain
4. Describe the micro propagation methods for the multiplication of flowering plants.
5. Describe the procedure involved in the *in vitro* fusion of isolated protoplast to form a hybrid
6. Describe the method for the protoplast culture.
7. Give an essay on protoplast culture and somatic hybridization

Unit III

1. What are biopesticide? list out their applications.
2. Propose the process of microbial enzyme production at commercial scale.
3. Explain the commercial production of SLF and write down their application.
4. Give a detailed account on alcohol production and list out its applications.
5. How does the higher plants are useful in pharmaceutical and cosmetic industry? - Explain

Unit IV

1. How will you produce biofertilizer using BGA?- Explain
2. Write a detailed account on *Scenedesmus* production
3. Explain the production of single cell protein
4. Enumerate the green synthesis of nanoparticles
5. Explain the mass production of *Rhizobium*
6. Outline the mass production of *Azospirillum*
7. Recommend the methods for mass culture of BGA.
8. What are biosensors? Discuss the use of biosensors for environment monitoring
9. Recommend the methods of phytoremediation of heavy metals using transgenic plants

Unit V

1. Give a detailed account on Biosafety.
2. Explain the farmers rights and breeder's rights
3. Write an essay on biosafety in relation to transgenic research
4. Discuss - process of patenting of biotechnological products.

5. How can transgenic plants be developed for production of edible vaccine and antibodies?
Discuss with examples.

Section A

UNIT I

1. Identify the temperature range known as the "temperature danger zone" for pathogenic bacteria:
(a) 0°F to 40°F (b) **40°F to 140°F** (c) 140°F to 212°F (d) Below 0°F
2. Find the optimal pH range preferred by most bacteria for growth:
(a) pH 2 to 4 (b) pH 4 to 6 (c) **pH 6.6 to 7.5** (d) pH 8 to 9
3. Find out which of the following extraction method is suitable for the extraction of juice in grapes.
(a) **hot extraction** (b) cold extraction (c) solvent extraction (d) none of the above
4. Tell which one of the following help in preserving the colour and freshness of the Amla candy.
(a) propyl gallate (b) sodium propionate (c) sorbic acid (d) **Lemon juice**
5. Write the suitable edible foam stabilizer added in foam mat drying
(a) **Modified soyabean protein with methyl cellulose** (b) sodium bicarbonate
(c) benzoic acid (d) sugar
6. Write the optimum relative humidity for crisp vegetables
(a) 70% (b) 50% (c) **90-95%** (d) 30%
7. Identify the enzyme responsible for causing enzymatic browning in fruits and vegetables.
(a) **polyphenol oxidase** (b) amylase (c) cellulose (d) none of the above
8. Identify the chemical involved in the preparation of a hot lye solution.
(a) Sodium bicarbonate (b) **Caustic soda** (c) Sodium chloride
(d) Sodium sulphate
9. Identify the main ingredient used to prepare tutti frutti:
(a) Mangoes (b) Amla (c) **Assorted fruits** (d) Grapes
10. Find the optional ingredient that can be added to mango pulp for preservation:
(a) Sugar (b) Water (c) **Lemon juice** (d) Honey
11. Write the method used to dry grapes into raisins in a sunny area:
(a) Oven drying (b) Freezing (c) **Sun-drying** (d) Blanching
12. Tell the purpose of blanching amla before candying:
(a) To remove the seeds (b) To enhance sweetness
(c) **To soften the fruit and reduce bitterness** (d) To improve flavor
13. Identify the type of fruit used to prepare amla candy:
(a) Papaya (b) **Indian gooseberry** (c) Pineapple (d) Cherry
14. Write the best storage method for raisins to maintain their flavor:
(a) In an open bowl (b) **In airtight containers**
(c) Wrapped in plastic wrap (d) In the refrigerator
15. Tell the potential contaminants that might affect fruits during poor hygiene practices in harvesting:
(a) Mold spores (b) Animal feces (c) **Bacteria and viruses from hands and equipment** (d) Pesticides

16. Identify the food safety system designed to address hazards at critical control points in fruit processing:
 - (a) Good Agricultural Practices (GAPs)
 - (b) Good Manufacturing Practices (GMPs)
 - (c) **Hazard Analysis Critical Control Point (HACCP)**
 - (d) Storage condition protocols
17. Find one preventive measure that can control contamination during the harvesting of fruits:
 - (a) Use of pesticides
 - (b) **Worker health and hygiene practices**
 - (c) Cross-contamination during packaging
 - (d) Improper temperature control
18. Find the spoilage type caused by the reaction of fats and oils with oxygen:
 - (a) Non-enzymatic browning
 - (b) Proteolysis
 - (c) **Oxidation**
 - (d) Fermentation
19. Write one symptom of yeast spoilage in food:
 - (a) Rancid smell
 - (b) **Gas production and fermentation**
 - (c) Dry and hardened texture
 - (d) Brown coloration due to enzymatic browning
20. Name the enzyme responsible for enzymatic browning in fruits and vegetables:
 - (a) Lipase
 - (b) **Polyphenol oxidase**
 - (c) Protease
 - (d) Amylase

UNIT II

1. The genus name *Moringa* derives from the Tamil word Murungai. Find the meaning of the word "murungai"
 - (a) short pod
 - (b) elongated pod
 - (c) spiny pod
 - (d) **twisted pod**
2. Identify the common name for the group of fungi Genus *Pleurotus*
 - (a) Enoki mushrooms
 - (b) **Oyster mushrooms**
 - (c) Button mushrooms
 - (d) Portobello mushrooms
3. Find a product that isn't made from coconuts.
 - (a) Coconut oil
 - (b) Coconut milk
 - (c) Coconut candy
 - (d) **Coconut juice**
4. Identify the alternative name for *Ganoderma* in traditional Chinese medicine
 - (a) **Lingzhi**
 - (b) Ginseng
 - (c) Echinacea
 - (d) Turmeric
5. Identify the adjustment that is frequently required for SVO fuel systems to improve combustion and minimize clogging.
 - (a) Installing a catalytic converter
 - (b) Adding water to the fuel tank
 - (c) **Using a dual-tank system**
 - (d) Increasing engine compression
6. Identify the correct method to harvest cut flowers

- (a) **with stalk**
 - (b) without stalk
 - (c) with hole plants
 - (d) with leaves
7. Find the cut flower which is known as queen of flowers
- (a) Carnation
 - (b) **Rose**
 - (c) Lotus
 - (d) Marigold
8. Find the environmental condition is crucial for the growth of Pleurotus sajor-caju?
- (a) Low humidity
 - (b) High light intensity
 - (c) **Low temperature**
 - (d) High carbon dioxide levels
9. What is the preferred substrate for cultivating Pleurotus sajor-caju?
- (a) Cow dung
 - (b) **Wheat straw**
 - (c) Pine wood
 - (d) Concrete
10. What is the main component of coconut oil?
- (a) **Saturated fat**
 - (b) Monounsaturated fat
 - (c) Polyunsaturated fat
 - (d) Trans fat

UNIT III

1. Arrange the order of the deep drawing process in packaging
 - (a) Blank preparation, Forming and Flanging, Drawing operation, Trim and Finish.
 - (b) **Blank preparation, Drawing operation, Forming and Flanging, Trim and i. Finish.**
 - (c) Drawing operation, Blank preparation, Forming and Flanging, Trim and Finish.
 - (d) Forming and Flanging, Blank preparation, Drawing operation, Trim and Finish.
2. Find out the botanical name of Banana
 - (a) *Musaparadisiaca*
 - (b) *Cocos nucifer*
 - (c) *Phyllanthus emblica*
 - (d) *Lycopersicon esculentum*
3. Find the importance of value added products
 - (a) **High market value**
 - (b) Low processing cost
 - (c) Labor requirement
 - (d) Maintains nutritional value
4. Identify the value added plants that make great fertilizers with high concentrations of potassium, phosphorus, and nitrogen.
 - (a) **Banana peels**
 - (b) Coco peat
 - (c) Amla
 - (d) tomato
5. Find out the correct definition of value addition
 - (a) **transforming a product from its original state to a more valuable state.**
 - (b) the length of time for which an item remains usable, fit for consumption
 - (c) is the stage of crop production immediately following harvest
 - (d) in the period between harvesting and consumption

6. Name the package that snacks need to be packaged in sized containers that are light and easily portable.
 - (a) Trans wrap
 - (b) Doy pack**
 - (c) Plastic packaging
 - (d) Sachet packaging
7. Write the bench mark for complex packaging material.
 - (a) 3- 7%
 - (b) less than 2%
 - (c) 8-10%**
 - (d) more than 10%
8. Find the doypack used for cold drinks
 - (a) Coffee
 - (b) Cured meats
 - (c) Wine**
 - (d) Hot chocolate
9. To which division does mushroom belong?
 - (a) Pteridophyta
 - (b) Thallophyta
 - (c) Basidiomycetes**
 - (d) Molluscus
10. Mushroom is
 - (a) Autotrophic algae
 - (b) Saprophyticfungi**
 - (c) Heterotrophic fungi
 - (d) BGA

UNIT IV

1. Find the primary factor determining the natural durability of wood?
 - (a) Density**
 - (b) Color
 - (c) Grain pattern
 - (d) Moisture content
2. Identify the wood species which is typically known for its high natural durability
 - (a) Pine
 - (b) Cedar**
 - (c) Spruce
 - (d) Poplar
3. Identify the most resistant wood to fungi and insects
 - (a) Softwood
 - (b) Hardwood**
 - (c) Engineered wood
 - (d) Composite wood
4. Which environmental factor is most detrimental to the natural durability of wood?
 - (a) High humidity**
 - (b) Low temperature
 - (c) Moderate sunlight
 - (d) Dry air
5. Find the term used to describe the resistance of wood against decay and deterioration
 - (a) Durability index
 - (b) Weathering resistance
 - (c) Corrosion resistance
 - (d) Natural durability**
6. Identify the part of a tree that typically exhibits the highest natural durability
 - (a) Heartwood**
 - (b) Sapwood
 - (c) Bark
 - (d) Cambium
7. Find the one method used to enhance the natural durability of wood

- (a) **Chemical treatment**
 - (b) Sanding
 - (c) Painting
 - (d) Exposure to sunlight
8. Identify from the following wood characteristics which one is NOT typically associated with high natural durability
- (a) High resin content
 - (b) Dense grain structure
 - (c) **Light color**
 - (d) Presence of extractives
9. Find the non-pressure wood preservation process from the following
- (a) **Heat treatment**
 - (b) Creosoting
 - (c) Pressure impregnation
 - (d) Vacuum drying
10. Identify the primary purpose of wood preservation
- (a) Enhancing wood's natural color
 - (b) Increasing wood's density
 - (c) **Protecting wood against decay and insects**
 - (d) Improving wood's flexibility
11. Find the chemical commonly used in the pressure treatment process of wood
- (a) Borax
 - (b) Linseed oil
 - (c) **Chromated copper arsenate (CCA)**
 - (d) Vinegar
12. Identify the term used for the process of soaking wood in a preservative solution without applying pressure
- (a) **Dip treatment**
 - (b) Vacuum treatment
 - (c) Brush treatment
 - (d) Spray treatment
13. Find the wood preservation method involves subjecting wood to high temperatures in the absence of oxygen
- (a) Pressure impregnation
 - (b) Chemical fumigation
 - (c) **Heat treatment**
 - (d) Ionizing radiation
14. identify the primary advantage of pressure wood preservation over non-pressure methods
- (a) Lower cost
 - (b) Faster treatment time
 - (c) Less environmental impact
 - (d) **Deeper penetration of preservatives into the wood**
15. Find the preservative chemical is often used in the dip treatment process for wood

- (a) **Pentachlorophenol (PCP)**
 - (b) Ammonium sulfate
 - (c) Sodium chloride
 - (d) Hydrogen peroxide
16. Find the purpose of chemical processing of wood
- (a) To increase its flammability
 - (b) To make it more susceptible to decay
 - (c) To enhance its natural color
 - (d) **To protect it from biological degradation**
17. Find the materials from the following used for making Synthetic woods
- (a) Natural wood fibers
 - (b) Recycled paper
 - (c) **Plastic resins**
 - (d) Aluminum alloys
18. Identify the purpose for designing marine plywood
- (a) Construction of indoor furniture
 - (b) Outdoor decking
 - (c) **Boat building**
 - (d) Garden fencing
19. Find the wood which is primarily used as fuel wood
- (a) Teak
 - (b) Ebony
 - (c) Oak
 - (d) **Eucalyptus**
20. Identify the wood species commonly used in pulp and paper making due to its long fibers
- (a) **Pine**
 - (b) Birch
 - (c) Cherry
 - (d) Bamboo
21. Find the source for matchstick
- (a) **Softwood trees**
 - (b) Hardwood trees
 - (c) Palm trees
 - (d) Shrubs
22. Identify the economic importance of pulp and paper making woods
- (a) They provide essential nutrients to the soil.
 - (b) They contribute to carbon sequestration.
 - (c) They support the construction industry.
 - (d) **They are a vital raw material for paper production and contribute to the economy through paper manufacturing.**
23. In the context of the pulp and paper industry, what does "pulp" refer to?
- (a) Highly dense wood logs
 - (b) Wood shavings and sawdust

- (c) **Fibrous material obtained from wood**
- (d) Synthetic fibers used in paper production

UNIT V

1. Identify the first step for starting a small-scale industry in most countries
 - (a) Finding a suitable location
 - (b) Conducting market research
 - (c) Drafting a business plan
 - (d) **Registering the business entity**
2. SSI registration stands for:
 - (a) Small Scale Investment
 - (b) **Small Scale Industry**
 - (c) Small Scale Innovation
 - (d) Small Scale Incorporation
3. Find the primary role of SIDBI (Small Industries Development Bank of India) is
 - (a) **Provide loans and financial assistance to small-scale industries**
 - (b) Conduct market research for small-scale industries
 - (c) Implement government policies for large-scale industries
 - (d) Facilitate international trade for small-scale industries
4. Find one of the advantages of small-scale industries (SSI)
 - (a) Access to large financial resources
 - (b) Limited government support
 - (c) **Flexibility in operations**
 - (d) High economies of scale
5. Identify the one common problem faced by small-scale industries
 - (a) Limited market opportunities
 - (b) Access to skilled labor
 - (c) **Excessive government regulations**
 - (d) Lack of technological advancements
6. Find the government scheme specifically designed to support small-scale industries
 - (a) **Make in India**
 - (b) Digital India
 - (c) Swachh Bharat Abhiyan
 - (d) Skill India
7. Under the Prime Minister's Employment Generation Programme (PMEGP), financial assistance is provided for setting up:
 - (a) Large-scale industries
 - (b) **Micro, small, and medium enterprises (MSMEs)**
 - (c) Educational institutions
 - (d) Agricultural farms
8. Identify the government body responsible for implementing policies and programs aimed at promoting small-scale industries in India
 - (a) RBI (Reserve Bank of India)
 - (b) NABARD (National Bank for Agriculture and Rural Development)

- (c) **MSME (Ministry of Micro, Small and Medium Enterprises)**
 - (d) SEBI (Securities and Exchange Board of India)
9. Find the organization primarily focuses on agricultural and rural development in India
- (a) **NABARD**
 - (b) NCDC
 - (c) MSME
 - (d) NSIC
10. FSSAI is responsible for regulating and supervising:
- (a) Financial institutions
 - (b) **Food safety and standards**
 - (c) Small-scale industries
 - (d) Export promotion
11. Find the international organization works towards achieving food security and reducing hunger worldwide?
- (a) FSSAI
 - (b) **FAO**
 - (c) ICDS
 - (d) NCDC
12. Find the full form of ICDS
- (a) Indian Consumer Development Society
 - (b) **Integrated Child Development Services**
 - (c) International Consumer Distribution System
 - (d) Intercontinental Consumer Data Services
13. Identify from the following, which is NOT a type of marketing?
- (a) Digital marketing
 - (b) Mass marketing
 - (c) Niche marketing
 - (d) **Commercial marketing**
14. Building consumer relationships involves:
- (a) Offering one-time discounts
 - (b) **Providing excellent customer service**
 - (c) Ignoring customer feedback
 - (d) Changing product features frequently
15. Identify the government agency in India provides support for small-scale industries by offering financial assistance and promotional activities?
- (a) FSSAI
 - (b) FAO
 - (c) **NSIC**
 - (d) ICDS
16. Import and export business development strategies may include:
- (a) Focusing solely on domestic markets
 - (b) Ignoring international trade regulations
 - (c) **Diversifying product offerings to cater to different markets**
 - (d) Relying solely on intermediaries for trade dealings

SECTION B

UNIT I

1. Summarize the different sources of contamination of fruits
2. Discuss the raw materials involved in pickling process.
3. Explain the medicinal uses of Amla.
4. Summarize the factors influencing the growth of microorganism
5. Discuss the raw materials involved in pickling process.
6. Explain the procedure for preparation of tutti frutti.
7. Illustrate the dry salting method.
8. Discuss the procedure for preparation of mango pulp
9. Discuss the different steps involved in canning process.
10. Explain the chemical spoilage of food.
11. Discuss the preparation methods of raisin
12. Summarize the steps involved in jam making.

UNIT II

1. Explain the economic importance of *Spirulina*(K2)
2. Discuss the structure and industrial application of *Pleurotus sajor-caju*(K2)
3. Compare the industrial use of *Ganoderma* with *Lentinus edodes*(K2)
4. Indicate the value-added products from coconut (K2)
5. Summarize the value-added products from drumstick (K2)
6. Explain the disadvantages of using Straight Vegetable Oil as fuel (K2)
7. Discuss the uses of Pure Plant Oil (K2)

UNIT III

1. Discuss the value - added product of Banana.
2. Distinguish pharma packaging and flexible packaging.
3. Express the different types of plant based packaging.
4. Interpret the role of packaging
5. Summarize the benefits of paper packaging
6. Relate foam and cushioning materials.
7. Associate the methods used for pharma packaging
8. Indicate the examples of stuffing materials.
9. List out the ingredients needed for mushroom omelette
10. Summarize the products of Banana

UNIT IV

1. Explain the natural durability of wood
2. Discuss about the wood preservation methods
3. Compare pressure processing wood with chemical processing of wood.
4. Indicate the commercial wood species
5. Summarize the economic importance of pulp and wood
6. Explain the importance of synthetic woods
7. Discuss about the fuel wood.

UNIT V

1. Compare the advantages and problems associated with small-scale industries.
2. Explain the process of registration as an SSI (Small Scale Industry).
3. Indicate the primary steps involved in starting a small-scale industry.
4. Discuss the different types of marketing strategies.
5. Summarize the roles of organizations such as NABARD and NSIC in supporting small-scale industries.
6. Explain the significance of SIDBI in providing financial assistance to small-scale industries.
7. Discuss the application process to register in SSI.

SECTION C

UNIT I

1. Present the factors influencing the growth of microorganism in food.
2. Show the different types of freezing involved in fruits and vegetable preservation.
3. Compile the different types of food spoilage.
4. Show the different methods of drying of fruits and vegetable preservation.
5. Present the steps involved in canning process of vegetable preservation.
6. Demonstrate the preparation methods of jelly.
7. Demonstrate the procedure for preparation of mango pulp.
8. Compile the different types of food spoilage.
9. Show the factors influencing the growth of microorganism.
10. Present the different sources of contamination of fruits.
11. Demonstrate the procedure for preparation of tutti frutti.
12. Demonstrate the preparation methods of amla candy.

UNIT II

1. Compile the utilization of *Spirulina* in the production of industrial products, and what steps are involved in its preparation?
2. Show the economical uses of drumstick and coconut.
3. Present the production and uses of Straight Vegetable oil.
4. Demonstrate economical uses of cut flowers with suitable example.
5. Present the mass production of *Pleurotus sajor-caju*, *Ganoderma* and *Lentinus edodes* and their uses.

UNIT III

1. Classify the packaging material used in packaging industry.
2. Present the different techniques involved in packaging.
3. Apply the most common types of doypacks.
4. Manipulate the process of deep drawing.

5. Relate foaming and flanging.
6. Show the types of plastic packaging with examples.
7. Construct the most common methods of top seal with its benefits.
8. Compile the different value added products of Palm
9. Demonstrate the coco peat manufacturing

UNIT IV

1. Compile the factors influencing the natural durability of wood
2. Show non-pressure wood preservation processes and highlight the advantages and limitations.
3. Present the chemical processing techniques used in wood preservation and their effectiveness in prolonging the lifespan of wood products.
4. Demonstrate how the commercial wood species identified, and what criteria are considered in selecting the appropriate species for specific applications?
5. Analyze the applications of marine plywood in commercial industries, exploring its unique properties and suitability for marine environments.
6. Examine the significance of pulp and paper making woods in the paper manufacturing industry, highlighting key processes and technologies involved.
7. Examine the significance of pulp and paper making woods in the paper manufacturing industry, highlighting key processes and technologies involved
8. Outline the production processes and economic significance of matchstick wood, considering its role in traditional and modern matchstick manufacturing
9. Simplify the overall economic importance of pulp and wood products, considering their contribution to various industries.

UNIT V

1. Apply the steps required for starting a small-scale industry and discuss their significance in the establishment process.
2. Show the role of SIDBI (Small Industries Development Bank of India) in supporting small-scale industries and fostering their growth
3. Compile the advantages and problems typically encountered by small-scale industries, highlighting their impact on entrepreneurial ventures
4. Present an overview of government schemes designed to support small-scale industries, including NABARD, NCDC, MSME, and NSIC, and analyze their effectiveness in promoting entrepreneurship
5. Show the importance of marketing in small-scale industries, distinguishing between different types of marketing strategies and their applicability
6. Solve challenges related to identifying various types of consumers and understanding their evolving needs in the context of small-scale industries
7. Relate the role of regulatory bodies such as FSSAI (Food Safety and Standards Authority of India), FAO (Food and Agriculture Organization), and ICDS (Integrated Child Development Services) to small-scale industry operations and compliance requirements .

8. Compile strategies for developing import and export business opportunities in the context of small-scale industries, considering market dynamics and international trade regulations

SECTION D

UNIT I

1. Conclude the different methods of drying of fruits and vegetable preservation. Write notes on drying of mango.
2. Select the suitable procedure for preparation of amla candy and raisin and add notes on its uses.
3. Conclude the steps involved in canning process of vegetable preservation. Write notes on canning of carrot.
4. Analyze the different types of freezing involved in fruits and vegetable preservation.
5. Outline the steps involved in preparation of tutti frutti and mango pulp
6. Select a suitable method for jelly and jam preparation.
7. Analyze the different factors influencing the growth of microorganism
8. Categorize the different types of food spoilage
9. Simplify the process of pickling and write the procedure for lemon pickle.
10. Analyze the different sources of contamination of fruits.

UNIT II

1. Analyse the potential of *Spirulina*, *Pleurotus sajor-caju*, *Ganoderma*, *Lentinus edodes*, drumstick, and coconut in the bioventure industry, considering their nutritional value, cultivation requirements, and market demand .
2. Examine the methods and strategies employed in marketing Pure Plant Oil (PPO) as viable alternatives in the biofuel industry
3. Outline the process involved in the production and commercialization of fresh and dry flowers for aesthetic purposes within the bioventure sector, highlighting key cultivation techniques, preservation methods, and market channels .
4. Defend the importance of incorporating *Spirulina*, *Pleurotus sajor-caju*, *Ganoderma* and *Lentinus edodes* in bioventure initiatives, citing their diverse applications in food, medicine, cosmetics, and biofuel production, and their potential contributions to sustainability and economic development .
5. Evaluate the economic viability and sustainability of bioventure ventures focused on drumstick and coconut cultivation and utilization, considering factors such as market demand and production costs

UNIT III

1. Compare coconut convenience food products and coconut shell based products.
2. Research the culinary and food products of banana
3. Categorize the types of external vacuum sealers.
4. Examine different techniques involved in packaging.
5. Compare the different materials that can be used in deep drawing
6. Investigate the common wrapping types
7. Organize the importance of choosing the right packaging materials.

8. Simplify the process of making value added products from amla
9. Compare the market trends and consumer preferences of banana and palm products.
10. Select the methods used for anti-corrosive packaging.

UNIT IV

1. Evaluate the advantages and disadvantages of synthetic woods in comparison to natural wood products, emphasizing their economic and environmental implications .
2. Investigate the economic importance of fuelwood in different regions, considering its role in energy production and its impact on local economies.
3. Outline the overall economic importance of pulp and wood products, considering their contribution to various industries, employment, and regional development .
4. Analyse the role of natural durability in determining the suitability of wood for various commercial applications.
5. Distinguish between non-pressure, pressure, and chemical processes used in wood preservation.
6. Examine the significance of identifying commercial wood species accurately, outlining the methods and criteria used in species identification and their implications for product quality and market value.
7. Outline the advantages and limitations of synthetic woods in comparison to natural wood products .
8. Defend the economic importance of marine plywood in construction and marine industries, analysing its unique properties, applications, and market demand .
9. Evaluate the economic significance of pulp and wood industries.

UNIT V

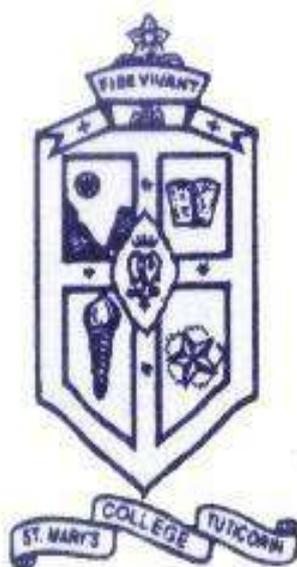
1. Analyse the essential steps involved in initiating a small-scale industry
2. Examine the role of SIDBI (Small Industries Development Bank of India) in supporting small-scale industries, analysing its initiatives, funding mechanisms, and contributions to entrepreneurship development .
3. Outline the advantages and challenges associated with small-scale industries (SSI), considering factors such as access to finance, market competition, regulatory compliance, and technological limitations
4. Defend the importance of government schemes such as NABARD, NCDC, MSME, and NSIC in fostering the growth and sustainability of small-scale industries .
5. Evaluate the significance of marketing strategies and entrepreneurial skills in small-scale industry development

ST. MARY'S COLLEGE (Autonomous)

(Re-accredited with 'A+' Grade by NAAC)

Thoothukudi-628001, Tamilnadu

(Affiliated to Manonmaniam Sundaranar University)



Question Bank

M.Sc., Microbiology

Academic Year -2021-23

PG Course Structure

Semester-I

Subject	Course Code	Course Title	Contact hours/ week	Credits	Max. marks		
					CIA	ESE	Total
Core-I	21PMIC11	Fundamentals of Microbiology	5	4	40	60	100
Core-II	21PMIC12	Microbial Diversity and classification	5	4	40	60	100
Core-III	21PMIC13	Biochemistry	4	4	40	60	100
Core IV	21PMIC14	Microbial Physiology	4	4	40	60	100
Core Practical I	21PMICR1	Laboratory in Fundamentals of Microbiology, Microbial diversity and classification	6	3	40	60	100
Core Practical II	21PMICR2	Laboratory in Biochemistry and Microbial physiology	6	3	40	60	100
Total			30	22			

Semester-II

Subject	Course Code	Course Title	Contact hours/ week	Credits	Max. marks		
					CIA	ESE	Total
Core- V	21PMIC21	Immunology	5	4	40	60	100
Core- VI	21PMIC22	Medical Microbiology	5	4	40	60	100
Core- VII	21PMIC23	Microbial genetics and Molecular biology	4	4	40	60	100
Core- VIII	21PMIC24	Marine Microbiology	4	4	40	60	100
Core Practical III	21PMICR3	Laboratory in Immunology and Medical Microbiology	6	3	40	60	100
Core Practical - IV	21PMICR4	Laboratory in Microbial genetics , Molecular biology and Marine Microbiology	6	3	40	60	100
Total			30	22+2			

It is mandatory for all I PG students to attend the course through Swayam Portal. Students who pass in MOOC through portals will get extra credit. Students who fail in MOOC can appear for supplementary exam and the institution will provide the certificate. No extra credits will be given.

Semester-III

Subject	Course Code	Course Title	Contact hours/ week	Credits	Max. marks		
					CIA	ESE	Total
Core-IX	21PMIC31	Industrial and Pharmaceutical Microbiology	5	4	40	60	100
Core- X	21PMIC32	Genetic Engineering	5	4	40	60	100
Core-XI	21PMIC33	Food and Dairy Microbiology	4	4	40	60	100
Core- XII	21PMIC34	Research Methodology	4	4	40	60	100
Core Practical- V	21PMICR5	Laboratory in Industrial and Pharmaceutical Microbiology, Genetic Engineering	6	3	40	60	100
Core Practical- VI	21PMICR6	Laboratory in Food and Dairy Microbiology, Research Methodology	6	4	40	60	100
Self Study Course /MOOC	21PMISS1/ 21PMIM31	Probiotics		+2			100
		Total	30	23+2			

Semester-IV

Subject	Course Code	Course Title	Contact hours/ week	Credits	Max. Marks		
					CIA	ESE	Total
Core -XIII	21PMIC41	Environmental Microbiology	4	4	40	60	100
Core- XIV	21PMIC42	Soil and Agricultural Microbiology	4	4	40	60	100
Core -XV	21PMIC43	Applied Microbiology	4	4	40	60	100
Core Practical - VII	21PMICR7	Laboratory in Environmental Microbiology, Soil and Agricultural Microbiology	6	3	40	60	100
Core Practical- VIII	21PMICR8	Laboratory in Applied Microbiology	6	3	40	60	100
Project	21PMIP41		6	5	40	60	100
		Total	30	23			

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc., Microbiology

SEMESTER – I

Core I – Fundamentals of Microbiology

Question Bank

Sub code: 21PMIC11

SECTION – A

(1 mark)

Choose the correct answer

UNIT -I

1. _____ is called as the father of microbiology.
a) Louis Pasteur b) Joseph Lister
c) **Antonie van Leeuwenhoek** d) Robert Koch
2. _____ is the father of antiseptic surgery.
a) Robert Koch b) Louis Pasteur
c) **Joseph Lister** d) Paul Ehrlich
3. Antonie van Leeuwenhoek discovered many small creatures are called as _____
a) Small organisms **b) animalcules**
c) little creatures d) none of these
4. Who developed the pure culture technique?
a) Louis Pasteur b) Robert Koch
c) Paul Ehrlich d) **Joseph Lister**
5. _____ is the father of medical microbiology.
a) Joseph Lister b) Robert Koch
c) **Louis Pasteur** d) Paul Ehrlich
6. Pasteurization technique was devised by _____
a) Robert Koch **b) Louis Pasteur**
c) Joseph Lister d) Antonie van Leewenhoek

7. Louis Pasteur developed the effective vaccines for _____
- a) Anthrax & polio b) **Rabies & Anthrax**
c) Polio & Rabies d) none of these.
8. Who developed the term microbiology, aerobic & anaerobic ?
- a) **Louis Pasteur** b) Robert Koch
c) Van Leeuwenhoek d) Joseph Lister
9. Louis Pasteur developed _____
- a) **Live attenuated vaccine** b) conjugate vaccine
c) Inactivated vaccine d) none of these
10. _____ demonstrated the role of bacteria in causing disease.
- a) Louis Pasteur b) Joseph Lister
c) Paul Ehrlich d) **Robert Koch**
11. _____ is known as the father of Immunology
- a) **Edward Jenner** b) Robert Koch
c) Paul Ehrlich d) Louis Pasteur
12. _____ discovered the cure for small pox
- a) Robert Koch b) Paul Ehrlich
c) Louis Pasteur d) **Edward Jenner**
13. _____ is the father of Soil Microbiology
- a) Robert Koch b) **Sergei Winogradsky**
c) Edward Jenner d) Louis Pasteur
14. _____ coined the name Virus
- a) **Martinus Beijerinck** b) Edward Jenner
c) Louis Pasteur d) Robert Koch
15. _____ pioneered the use of enrichment culture & selective media.
- a) Robert Koch b) Louis Pasteur
c) Beijerinck d) **Beijerinck & Winogradsky**

16. _____ discovered plant disease caused by small organisms.
a) Iwanowski b) winogradsky c) Beijerinck d) Louis Pasteur
17. _____ find an magic bullet an agent that would kill the disease agent without hurting the patient.
a) Winogradsky **b) Paul Ehrlich** c) Beijerinck d) Iwanowski
18. Penicillin was discovered by _____
a) Beijerinck b) Winogradsky **c) Alexander Fleming** d) Paul Ehrlich
19. _____ developed a vaccine in 1955 by treating the vaccine with formalin.
a) Sabin b) Fleming c) Louis Pasteur **d) Salk**
20. _____ did research on RNA & protein synthesis in Bacteria.
a) Jacob & Monad b) Avery & Macleod
c) Salk & Sabin d) Paul Ehrlich
21. Sabin developed _____
a) Live attenuated polio vaccine b) inactivated polio vaccine
c) conjugate vaccine d) non-oral vaccine
22. In 1944, DNA as genetic material was introduced by _____
a) Jacob & Monad **b) Avery & Macleod**
c) Paul Ehrlich d) Salk & Sabin
23. The classification of microorganisms contain _____ domains.
a) 3 b) 2 c) 4 d) 5
24. Which domain have membrane bound nucleus?
a) Eukarya b) Bacteria c) Bacteria & Archae d) Eukarya & Archae
25. The seven major levels of classification are
a) Domain, kingdom, phylum, order, class, family, genus, species.
b) Domain, Phylum, Kingdom, Order, class, family, genus, species.
c) Domain, kingdom, phylum, class, order, family, genus, species.
d) none of these.
26. Prokaryotes are _____

- a) unicellular & nucleus present **b) unicellular & nucleus absent**
- c) multicellular & nucleus absent d) multicellular & nucleus present
27. The word “karyo” refers to _____
- a) size b) maturity **c) nucleus** d) nucleolus
28. The eukaryotes contain _____ ~~ribosomes~~.
- a) 70s type **b) 80s type** c) 90s type d) 60s type
29. In eukaryotes microtubules _____ in flagella.
- a) present** b) absent c) partially present d) partially absent.
30. In prokaryotes respiration is by _____
- a) mitochondria b) chloroplast c) ribosomes **d) mesosomes.**
31. Cell size of Prokaryotes usually _____
- a) 1-10µm** b) 5-100µm c) 6-50µm d) 2-50µm
32. Natural classification was devised by _____
- a) Linnaeus** b) Woese c) Avery & Macleod d) none of these
33. _____ is used to determine the genus & species of a newly discovered prokaryote.
- a) polyphasic taxonomy** b) phenotypic classification
- c) phylogenetic classification d) none of these
34. Phylogeny is based on _____
- a) evolutionary development of species.** b) mutual similarity of phenotypes
- c) evolutionary relatedness of microbes d) none of these
35. _____ strain differ biochemically & physiologically.
- a) Morphovars b) serovars **c) biovars** d) all of these
36. Choose the statement is not true.
- a) the genus name should be italicized & capitalized
- b) the species name should be capitalized and italicized**
- c) the species name can be abbreviated after first use.
- d) none of these.

37. Nucleic acid hybridization measure _____

a) **amount of radioactive DNA attached to filter.**

b) the genomes present in nucleic acid.

c) specific r RNA fragments

d) none of these.

38. The sequences of _____ and _____ ribosomal RNA are used often in pylogenetic studies.

a) 16s & 15s b) 16s & 17s c) 18s & 15s **d) 16s & 18s**

39. Genomic finger printing does not involve _____

a) RNA sequencing **b) nucleotide sequencing**

c) DNA sequencing d) all of these

40. Archae differ from true bacteria in their cell wall structure & lack _____

a) **peptidoglycan** b) cell membrane c) cellulose d) none of these

41. Archae differ from bacteria in their cell wall structure and lack _____

a) rhodopsin b) chlorophyll **c) Bacteriorhodopsin** d) all of these

42. Protozoa cell wall is made up of _____

a) chitin **b) cellulose** c) peptidoglycan d) none of these

43 . _____ are non-motile.

a) amoeboids b) flagellates **c) sporozoa** d) none of these

44. _____ says that species are natural units.

a) **Julian Huxley, 1940** b) linneus, 1945

c) linneus, 1940 d) Julius Huxley, 1940

45. The trivial name for *Streptococcus pyogenes*

a) Group B streptococcus **b) Group A streptococcus**

c) streptococcus d) none of these

UNIT – II

46. Objective lenses have a NA that is variable from ____

a) **0.7 to 1.25**

b) 0.9 to 2.25

c) 5 to 10

d) 1 to 2

47. What kind of microscope is a fluorescence microscope?
a) dark field microscope **b) optical microscope** c) electron microscope d) light
48. What kind of lamp cannot illuminate the sample in fluorescence microscope?
a) Xenon arc lamp b) Mercury vapor lamp **c) halogen lamp** d) Nitrogen lamp
49. An electron microscope is a microscope that uses a beam of accelerated _____ as a source of illumination.
a) electrons b) protons c) positrons d) neutron
50. A scanning transmission electron microscope has achieved better than _____ resolution in annular dark-field imaging mode.
a) 50 pm b) 10 pm c) 20 pm d) 45 pm
51. A scanning transmission electron microscope has magnifications of up to about _____.
a) 5000X b) 11000X **c) 10,000,000X** d) 20000X
52. Electron microscopes use shaped _____ fields to form electron optical lens systems that are analogous to the glass lenses of an optical light microscope
a) uniform electric **b) magnetic** c) non uniform electric d) electric
53. Colorimeter is used to determine the concentration of a known solute in a given solution by the application of the _____, which states that the concentration of a solute is proportional to the absorbance.
a) Beer-Lambert's law b) ohm's law c) Moore's law d) None
54. Freeze drying, also known as _____.
a) Lyophilization b) sublimation c) drying d) cooling
55. A Gram stain is a test that checks for _____ at the site of a suspected infection
a) virus b) fungi **c) bacteria** d) protozoa
56. Acid fast staining is used to stain the following bacteria
a) *Mycobacterium tuberculosis* b) *Pseudomonas putida*
c) *Klebsiella pneumoniae* d) *Salmonella typhi*
57. Silver impregnation method is based on the formation of opaque intracellular deposits of silver chromate obtained by the reaction between _____ and silver nitrate (black reaction).
a) potassium nitrate b) sodium nitrate **c) potassium dichromate** d) sodium dichromate

58. What colour does metachromatic granules appear after staining?
a) **blue black** b) blue c) greenish yellow d) purple

59. Magnification of confocal microscope.
a) **1000x** b) 2000x c) 500x d) 1200x

60. What is the decolorizing agent in capsule staining?
a) ethanol b) iodine c) **copper sulfate** d) saffranin

UNIT-III

61. The medium used in membrane filter technique was _____
a. EMB agar b. **EMR-VP medium** c. Lactose broth d. Endo agar
62. Lysol is a _____
a. Sterilent b. **Disinfectant** c. Antiseptic d. Antifungal agent
63. Which of the following is a neutral stain?
a. Picric acid b. Giemsa c. **Neutral red** d. Malachite green
64. Peptone water medium is an example for _____
a. Synthetic medium b. **Semisynthetic medium**
c. Differential medium d. None of these
65. The method in which the cells are frozen dehydrated is called _____
a. Pasteurization b. Dessication c. Disinfection d. **Lypophilization**
66. The technique used to avoid all microorganisms is accomplished by _____
a. **Sterlization** b. Disinfection
c. Surgical sterilization d. Disinfection Sterilization
67. Thermal death time is _____
a. Time required to kill all cells at a given temperature
b. **Temperature that kills all cells in a given time**
c. Time and temperature needed to kill all cells
d. All of the above
68. A culture medium the exact composition of which is not known was called as ____
a. **Simple** b. Complex c. Defined d. Natural
69. Elek's gel diffusion test is used for the detection of _____
a. Tetani toxin b. Cholera toxin c. **Diophtheria toxin** d. Toxoid
70. Temperature required for pasteurization is _____
a. Above 150°C b. **Below 100°C** c. 110°C d. None of these
71. Separation of a single bacterial colony is called ____
a. **Isolation** b. Separation c. Pure culturing d. All of these
72. Which of the following is ionizing radiation?
a. U.V. rays b. IR c. **Gamma-rays** d. None of these
73. Which of the following induces dimerisation of thymine?

- a. X-rays b. **U.V. rays** c. IR rays d. None of these
74. When food material are preserved at a temperature just above freezing temperature, the process is called _____
- a. Freezing b. Pasteurisation c. **Chilling** d. Frosting
75. Which of the following method of sterilization has no effect on spores?
- a. **Drying** b. Hot air oven c. Autoclave d. None of these
76. *Treponema pallidum* can be best indentified using _____
- a. Fluorescence microscope
- b. **Bright field microscope**
- c. Dark field microscope
- d. Flourescence microscope
77. Autoclaving is carried at _____
- a. Dry heat b. Atmospheric pressure c. **120°C** d. All of these
78. Temperature in pasteurization is _____
- a. **62.8°C** b. 35.7°C c. 68.2°C d. 60.8°C
79. The bacterial culture prepared by pure culture method is _____
- a. **Inoculum** b. Suspension c. Dilution d. None of these
80. *Theobacillus thiooxidans* grow at pH _____
- a. 7.0 b. **1.0** c. 6.0 d. 9.5
81. Slow freezing requires the conditions at _____
- a. 0°C to 15°C for 15 min.
- b. – 6°C to – 10°C for 10 min.
- c. **– 15°C to 3 to 72 hrs.**
- d. None of these
82. Discontinuous heating is called _____
- a. Pasteurization b. Sterilization c. Fermentation d. **Tindalisation**
83. Isolation is _____
- a. Purification of culture
- b. Introduction of inoculum
- c. **Separation of a single colony**
- d. To grow microorganisms on surfaces
84. The condition required for autoclave _____
- a. 121°C temp.and 15 lbs. pressure for 20 min.
- b. 120°C temp.and 20 lbs. pressure for 30 min
- c. **150°C temp.for 1 hr.**
- d. 130°C temp for 2 hr.
85. Blood agar medium is _____
- a. Enrichment medium b. **Enriched medium**
- c. Selective medium d. Differential medium
86. Infrared radiation is a method of sterilization by _____

- a. Dry heat b. Moist heat c. Chemical method d. **Mechanical method**
87. Best method for getting pure culture is_____
- a. Streak-plate b. Agar slant c. **Both a & b** d. None of these
88. To transfer cultures from one place to another, the device used is_____
- a. Slant b. **Needle** c. Inoculation loop d. Autoclave
89. The bacterial culture prepared by pure culture is_____
- a. **Inoculum** b. Suspension c. Dilution d. None of these
90. Separation of a single colony is_____
- a. Pure-culturing b. **Isolation** c. Separation d. Both a and b
91. Growth period of the culture is_____
- a. Inoculation b. **Incubation** c. Incineration d. Isolation
92. At the temperature 160°C for one hour, complete sterilization occurs in_____
- a. Autoclave b. **Hot air oven** c. Laminar flow d. Incubator
93. In autoclave, the principle involved is_____
- a. Dry heat b. Moist heat c. Steam under pressure d. **Both b and c**
94. The spores of the bacteria which can withstand the moist heat effect also_____
- a. *Bacillus subtilis*
b. *Coxiella burnetti*
c. ***Bacillus stearothermophilus***
d. *Pseudomonas*
95. Factors on which disinfectivity of a disinfectant depends_____
- a. Concentration of the substance
b. Time of action
c. pH of the medium and temperature suitable for the chemical
d. **All of the above**
96. Aldehydes, which are most powerful disinfectants_____
- a. Formaldehyde b. Acetaldehyde c. Glutamal aldehyde d. **Both a and c**
97. Acridine dyes are more effective against_____
- a. **Gram positive** b. Gram negative
c. Mycoplasmas d. Ricktsiae
98. The sterilizing agent is_____
- a. **Ethelene oxide** b. Oxygen c. Nitrogen d. Carbon tetrachloride
99. Salts of heavy metals used as disinfectants are_____

- a. Thiomersal b. Phenyl mercury nitrate c. Mercurochrome d. **All of these**
100. Cultures are prepared by penetrating the inoculation loop with suspension into the medium, they are _____
- a. Stock cultures **b. Stabcultures**
c. Sub-cultures d. None of these
101. The principle involved in the streak plate method is _____
- a. Separation b. Streaking c. Isolation d. **Dilution**
102. Culture media for fungi are _____
- a. Potato dextrose agar (PDA) b. Sabouraud's agar
c. Czapekdox agar d. **All of the above**
103. Spores of actinomycetes are very sensitive, killed at room temperature of _____
- a. 52°C for 30 min. **b. 65°C for 30 min.**
c. 70°C for 30 min. d. 43°C for 30 min.
104. The term that is used for the bacteria which can withstand pasteurization but does not grow at higher temperatures _____
- a. Thermophiles b. Extreme thermophiles
c. Thermoduric d. Facultative thermophiles
105. On Mac Conkey's medium *E. coli* forms _____
- a. Colorless colonies b. Greenish pigmentation
c. Pink coloured colonies d. Medusa head appearance
106. *C. diphtheriae* requires _____
- a. LJ medium b. Mac Conkey's medium
c. Potassium tellurite medium d. PDA medium
107. Culture medium for *Mycobacterium tuberculosis* _____
- a. LJ medium** b. Mac Conkey's medium
b. Wilson blair medium d. None of these
108. Culture medium for clostridia spp. _____
- a. 76 Lower stein Jensen's medium b. Mac Conkey's medium
c. Robertson's cooked meat medium d. None of these
109. Culture medium used for fungus is _____
- a. Sabouraud's medium** b. Nutrient agar
c. Nutrient broth d. Minimal agar medium
110. For sterilization of fermentation equipment the method followed is _____

- a. Radiation b. Chemicals c. Heating d. **All of these**

UNIT-IV

111. Most prokaryotic have a rigid _____
a. Peptidoglycan **b. Cellwall** c. Nuclear d. envelop
112. Peptidoglycan contain_____
a. N-acetylmuramicacid b. Acetic acids c. Peptone d. proteins
113. The small subunit of prokaryotic ribosome contain one molecules of an RNA called ____
a. 12S b. 14S **c. 16S** d. 20S
115. The large subunit of prokaryotic ribosome contain two molecules_____
a. 24S b. 25S **c. 23S** d. 70S
116. Small ribosomal subunit_____
a. 20S b. 10S **c. 30S** d. 40S
117. Large ribosomal subunit_____
a. 40S b. 30S **c. 50S** d. 60S
118. Ribosome biogenesis is the process of making_____
a. Ribosomal **b. Ribosome** c. Prokaryotic d. nucleosome
119. A ribosome is a_____
a. Nuclear b. Cell wall **c. Cell organelles** d. membrane
120. Organisms that use radiant energy are called_____
a. **Phototrophs** b. Heterophs c. Autotrophs d. Lithotrophs
121. Organisms that use an organic from of carbon are called_____
a. Phototrophs **b. Heterophs** c. Chemotrophs d. Organotrophs
122. Organisms oxidation compounds are_____
A. Heterophs b. Autotrophs **c. Lithotrophs** d. Phototrophs
122. Organisms that use CO₂ as a sole source of carbon of for growth are called.....
a. Heterophs b. Lithotrophs **c. autotrophs** d. Phototrophs
123. _____ is an orderly increase in the quantity of cellular constituents
a. Curve b. Cell **c. Growth** d. inhibition
124. Indirect viable cell counts also called _____

- a. **Plate count** b. Election count c. Cell count d. Direct count

UNIT -V

125. How many types of Microorganisms are associated with human body_____
- a)Ten b)Five c) Four d) **Three**
126. Which organ is germ-free_____
- a)Lungs b) Liver c) **Uterus** d) kidney
127. First exposure to microbes occurs during the passage through _____
- a) **Birth canal** b) conjunctiva c)Skin d) Mouth
128. Which infection develop slowly but lasts for long period to time.
- a) Acute infection b) **Chronic infection** c) Systemic infection d) Mixed infection
129. What is the abbreviation of EID
- a) **Epidemiology infectious disease**
- b) Aadhaar enrollment ID
- c) Employee identification processing
- d) Electronic infusion device
130. Who is the first epidemiologist_____
- a) Antonie van Leeuwenhoek b) Carl Linnaeus
- c) Louis pasture d)**John snow**
131. The word epidemiology is originated from the_____
- a) Latin b) **Greek** c) French d) Chinese
132. What is the example of holoendemic.
- a) Dengue b) Rabies c) **Malaria** d) Influenza
133. The disease is constantly present at a high incidence called_____
- a) **Hyperendemic** b) Holoendemic c) Epidemic d)Endemic
134. Microbes that are always present on or within body is called_____
- a) Transient flora b) **Resident flora**
- c)passive immunization d) Normal flora

135. Microbes that live in or on the body for a period of time is called_____

- a) **Transient flora**
- b) Normal flora
- c) Hyperendemic
- d) Holoendemic

136. What is the abbreviation of CSF

- a) Comma separated file
- b) Critical success factor
- c) **Cerebrospinal fluid**
- d) Crowd sourced finding

137. What is the abbreviation of GIT

- a) Geographic Information Technology
- b) Global Information Tracker
- c) Group Inclusion Tour
- d) **Gastrointestinal Track**

138. Give the one example for acute infection

- a) Malaria
- b) **Influenza**
- c) Rabies
- d) Dengue

139. Many zoonotic diseases are characterized by_____

- a) Manual transmission
- b) Semi-automatic transmission
- c) **sporadic transmission**
- d) Contact transmission

SECTION – B

Answer the following in 50 words each

(2marks)

UNIT-I

1. What are Animalcules?
2. Define pure culture technique.
3. Define Pasteurization.
4. Write about any two contributors?
5. Write some contributions of Louis Pasteur.
6. Koch postulates.

7. Winogradsky column.
8. Write two contribution of Edward Jenner?
9. Define Antibiotics with e.g.
10. Polio Vaccine.
11. Write any 4 immune testing.
12. Write any 4 genotypic methods.
13. Give the categories of classification.
14. Write any 2 similarities of prokaryote and eukaryote.
15. Write any 2 differences between prokaryote and eukaryote.
16. Write about phenotypic classification.
17. Write about pylogenetic classification.
18. Define genus.
19. Define Species.
20. Binomial system of nomenclature.
21. Nucleic acid hybridization.
22. Nucleic acid sequencing.
23. Genomic fingerprinting.
24. What is pylogenetic tree?
25. Define nomenclature.

UNIT-II

26. Write the types of electron microscope?
27. Write any three disadvantages of electron microscope.
28. Write any five applications of electron microscope.
29. What are the essential parts of a colorimeter?
30. Give the stages of freeze drying?
31. What are the types of Romanoswsky stains?
32. What is giemsa staining?

33. Define silver impregnation.
34. Write about confocal microscope.
35. Write about microscope and it's principle.

UNIT- III

36. Give the methods of sterilization
37. Write the classification of disinfectants:
38. Define sterilisation and disinfection?
39. Classify disinfectant based on their mechanism of action.
40. What are various physical methods of sterilisation ?
41. How to test the efficacy of disinfectents?
42. Name some simple media.
43. Name some enriched media.
44. What are differential media?

UNIT-IV

45. Define peptidoglycan.
46. Write the synthesis of peptidoglycan.
47. Give the function of peptidoglycan.
48. Define ribosome biosynthesis.
49. Types of ribosome.
50. Define ribosome biogenesis.
51. Write the function of ribosome.
52. Define growth curve.
53. What is measurement of bacterial growth?
54. Give the method of measurement of cell mass.
55. What is synchronous growth?
56. Define direct microscopy count.
57. Define electronic counting chamber.
58. Define death phase.
59. Define lag phase.
60. Define stationary phase.

UNIT-V

61. What is mean by passive immunization and active immunization.
62. What are the bacteria present on human skin?
63. Give the short notes of antigenic shift and drift?
64. What is epidemiology?
65. Which types of Microorganisms is present in conjunctiva?
66. How virulence factors contribute to tissue damage?
67. Define human microbe interaction.
68. Define pathogenicity & Virulence.
69. What is pandemic disease?
70. What is chronic infection?

SECTION –C

Answer the following in 200 words each

(6marks)

UNIT-I

1. Write the contributions of Van Leeuwenhoek.
2. Write the contributions of Joseph Lister.
3. Write the contributions of Louis Pasteur.
4. Write the contributions of Robert Koch.
5. Koch's postulates
6. Write the contributions of Edward Jenner.
7. Write the contributions of Winogradsky.
8. Write the contributions of Beijerinck.
9. Give the characters of prokaryotic cells.
10. Give the characters of eukaryotic cells.

UNIT -II

11. Write the principle and applications of Dark field microscope.
12. Write the principle and applications of phase contrast microscope.
13. Write the principle and applications of fluorescence microscopy.

14. Write the principle and applications of transmission electron microscopy.
15. Write the principle and applications of scanning electron microscopy.
16. Write the principle and applications of confocal microscopy.
17. Write the principle and applications of colorimeter.
18. Write the principle and applications of spectrophotometer.
19. Write the working principle and applications of lyophilizers.
20. Give short note on Gram's staining.
21. Give short note on acid-fast staining.
22. Give short note on meta chromatic granules staining.
23. Give short note on nuclear staining.
24. Give short note on capsule staining.
25. Give short note on flagella staining.
26. Write silver impregnation method of giemsa staining.

UNIT – III

27. Explain the methods of sterilization.
28. Write the indicator microorganisms for sterilization methods.
29. Give short note on microbiological media
30. Give short note on enrichment media.
31. Give short note on enriched media.
32. Give short note on transport media.
33. Give short note on selective media.
34. Brief note on pure culture technique.
35. Write the methods of preservation and maintenance of cultures.
36. Role of disinfectants.

UNIT – IV

37. Give the structure and properties of bacteria.
38. Write biosynthesis of cellular components of bacteria.
39. What is sporulation and explain it's mechanism.
40. Give the nutrition requirement of bacteria.

41. Write short note on autotrophs and heterotrophs.
42. Explain about enrichment cultures.
43. Give a note on growth curve.
44. Write short note on batch culture.
45. Explain measurement of growth and enumeration of cells.
46. Write the techniques of pure culture.

UNIT-V

47. Write the difference between disease and infection.
48. Give the difference between pathogenicity and virulence.
49. Explain the recognition of an infectious disease in a population.
50. Give an account on recognition of an epidemic.
51. Write the virulence and mode of transmission of disease.
52. How to control the epidemic diseases?

SECTION –D

Answer the following in 500 words each

(12 marks)

UNIT-I

1. Elaborate the contributions of Antony Von Leeuwenhoek and Joseph Lister.
2. Discuss in detail about Koch's contributions and his postulates.
3. Explain the identification and characterization of microorganisms.
4. Koch's postulates
5. Describe the contributions of Edward Jenner.
6. Explain contributions of Winogradsky.
7. Write the contributions of Beijerinck.
8. Give a detailed account on the phenotypic classification.
9. Describe the taxonomic characters of classification.

UNIT-II

10. Briefly explain the working principle and applications of phase contrast and dark field microscopy.
11. Give a detailed account on SEM & TEM.
12. Discuss about Spectrophotometer and colorimeter.

13. Describe principle and applications of confocal microscopy.
14. Explain principle and applications of colorimeter.
15. Briefly explain meta chromatic granules staining.
16. Explain on nuclear staining.
17. Discuss on capsule staining.
18. Write elaborately on flagella staining
19. Briefly explain the staining techniques.

UNIT-III

20. Give a detailed account on sterilization methods.
21. Elaborate microbiological media.
22. Explain pure culture technique.
23. Give brief note on enrichment media.
24. Explain on enriched media.
25. Discuss about transport media.
26. Explain selective media.
27. Discuss the methods of preservation and maintenance of cultures.

UNIT-IV

28. Draw a neat sketch on the ultra structure of bacteria and explain it.
29. Explain sporulation mechanism and nutrition requirement of bacteria.
30. Explain measurement of growth and enumeration of cells.
31. Briefly explain the techniques of pure culture.
32. Explain about enrichment cultures.
33. Briefly explain growth curve.
34. Discuss batch culture.
35. Describe the different steps of growth curve.

UNIT-V

36. Discuss the difference between disease and infection.
37. Elaborate pathogenicity and virulence.
38. Explain the recognition of an infectious disease in a population.
39. Give an account on recognition of an epidemic.
40. Describe the virulence and mode of transmission of disease.

41. Write the difference between disease and infection.
42. Give the difference between pathogenicity and virulence.
43. Explain the recognition of an infectious disease in a population.
44. How to control the epidemic diseases? Briefly explain.

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc., Microbiology

SEMESTER – I

Core II – Microbial Diversity and Classification

Question Bank

Sub code: 21PMIC12

SECTION – A

(1 mark)

Choose the correct answer:

UNIT -I

1. _____ recognised two kingdoms of classification.
a)Ernest Haeckel **b)Linneus** c)Robert Whittaker d)Carl Woese
2. Two kingdoms of living things are _____
a)Plantae & Protista **b)Plantae &Animalia**
c)Animalia & Protista d)Carl Woese
3. _____ attempted a broader system of classification.
a)Carl Woese b)Robert Whittaker
c)Haeckel **c)all of these**
4. Three kingdom concept was proposed by _____
a)Carl Woese,1860's b)Ernest Haeckel,1890's
c)Ernest Heckel,1860's d)Carl Woese ,1890's
5. Three kingdoms contain _____
a)Plantae,protista,funghi b)funghi,animalia,plantae
c)plantae,protista,prokaryotae **d)Animalia,plantae,protista**
6. Who proposed five kingdom concept _____ in _____
a)Robert Whittaker,1959 **b)Robert Whittaker,1969**
c)Carl Woese,1959 d)Carl Woese,1969
7. Five kingdom concept includes, _____

a) Monera, protista, fungi b) Plantae c) Animalia **d) All of these**

8. Kingdom Protista are _____

a) Prokaryotic, unicellular **b) Eukaryotic, unicellular**
c) prokaryotic, multicellular d) Eukaryotic, multicellular

9. Three Domain system was proposed by _____

a) Whittaker in 1980's b) Carl Woese in 1980's
c) Whittaker in 1990's **d) Carl Woese in 1990's**

10. Three domain system includes, _____

a) Archae, bacteria, fungi b) Archae, fungi, plantae
c) Fungi, protista, archae **d) Archae, bacteria, eukaryote**

11. The domain classification containing six kingdoms are,

a) Eubacteria, protista, fungi, plantae, animalia & protozoa
b) Eubacteria, fungi, plantae, archae bacteria, animalia & protista
c) Fungi, Plantae, protozoa, algae, animalia, archaeobacteria
d) Archaeobacteria, eubacteria, fungi, protista, Animalia & algae

12. Carl Woese uses 16s ribosomal RNA as _____ in three domain classification.

a) chronometer b) carrier protein c) a&b d) none of these

13. _____ are considered as the oldest species of organisms on earth.

a) Bacteria **b) Archae** c) Eukarya d) none of these

14. The cell wall of _____ lacks peptidoglycan .

a) Bacteria & Eukarya **b) Archae & Eukarya**
c) Fungi & Archae d) Animalia & Archae

15. How much phyla does bacteria domain contains?

a) 5 b) 4 c) 3 d) 6

16. Which does belong to eubacteria domain?

a) Salmonella b) Giardia **c) Mycoplasma** d) E. coli

17. Bergey's manual of determinative Bacteriology published by

a) **David Hendricks, 1923** b) Whitman John Wiley, 1953

c) W. Hammer & Frank, 1953 d) M. Huntan & Frank in 1923

18. Bergey's manual came out in _____ volumes from _____ through _____

a) 5, 1984-1989 b) 3, 1964-1989 **c) 4, 1984-1998** d) 4, 1964-1989

19. The manual includes four divisions of kingdom prokaryote are, _____

a) Gracilicutes, Firmicutes, Tenericutes, Fungicutes

b) Gracilicutes, Firmicutes, Tenericutes, Mendocicutes.

c) Firmicutes, Angicutes, Tenericutes, Mendocicutes

d) none of these

20. In 9th edition of bergey's manual bacteria has been characterised into _____

Groups as 4 categories.

a) 25 **b) 35** c) 45 d) 55

21. The third category in 9th edition of bergey's manual includes _____ Species.

a) Mycoplasma b) Archaeobacteria c) Gram positive cocci d) none of these

22. Bergey's manual contains _____ volumes in 1st edition.

a) 5 **b) 4** c) 3 d) 2

23. The volume 2 includes _____ bacteria.

a) gliding b) archae c) G-ve d) none of these

24. The edition of Bergey's manual published by _____

a) Wilkins and Baltimore company b) William and Baltimore company

c) Wilkins and wolters company d) William and wolters company

25. In archae, _____ is present.

a) muramic acid b) pseudopodia **c) pseudomurein** d) none of these

26. _____ are involved in respiratory & photosynthetic electron transfer.

a) Polyamines **b) Cytochromes** c) Menoquinone d) Ubiquinone

27. Which one belongs to phenotypic technique?

a) Pyrolysis mass spectrometry b) DNA-DNA hybridization

c)RFLP d)16s r DNA based analysis

8. In nucleic acid base composition the absorbance of _____ UV light by DNA increases during strand separation .

a)250nm **b)260nm** c)280nm d)290nm

29. _____ is used to determine the source of hospital infection.

a)Nucleic acid sequencing b)DNA-DNA hybridization

c)16 r RNA sequencing **d)Genomic fingerprinting**

UNIT - II

30.Bacteria are _____celled organisms.

a) Single b) Multi c) Triple d) None of these.

31._____ are ubiquitous organisms.

a) Virus b) Algae c) Fungi d) **Bacteria**

32. Bacteria are classified into_____

a) 2 Groups b) 4 Groups **c) 5Groups** d) 3 Groups.

33. Bacteria lacks_____

a) Membrane bound organelles b) Chromosomes c) DNA d) shape.

34. Asexual modw of bacterial reproduction is called_____

a) Binary fission b) Budding c) Vegetative propagation d) Fragmentation.

35. Staphylococci are _____ organisms.

a)Gram +veb) Rod shaped c) Gram negatived) anaerobic

36. Gram positive bacteria gives positive result in_____

a)Negative stain b) **Gram Stain** c) Acid fast stain d) Simple stain.

37. Gram positive organisms are _____color on staining.

a)Pink b) Green c) Yellow d) **Blue**

38. Gram positive organisms are _____ shaped.

a) **Cocci** b) rod c) spiral d) comma

39. Incubation period of streptococcus is_____ days.

a)2-5 b) 7 c) 6 d) 5-7

40. Gram -ve bacteria appears in _____color, when viewed under microscope.

a)Pink b) blue c) yellow d) green

41. Clostridia are _____ rods.
 a) Aerobic b) **Anaerobic** c) Obligate aerobic d) None of these.
42. Corynebacterium are _____ and _____ organisms.
 a) Gram negative and aerobic b) **Gram positive and aerobic**
 c) Gram positive and anaerobic d) Gram negative and anaerobic.
43. Diphtheria is caused by _____.
 a) *Corynebacterium* b) *Clostridia* c) *Gonococci* d) *Streptococcus*.
44. Bacillus anthracis causes _____.
 a) **Anthraxis** b) Anthrax c) Diphtheria d) Helminthes.
45. _____ is aerobic non spore forming gram positive bacilli.
 a) *Corynebacterium* b) *monocytogenes* c) *lactobacillus* d) *clostridium*.
46. Gonococci is also known as _____.
 a) *Neisseria gonorrhoeae* b) *N. moraxella* c) *N. Kingella* d) *N. acinetobacter*.
47. Gonorrhoea is _____ disease.
 a) **STD** b) Airborne c) Droplet d) Vector.
48. Gram +ve spore forming bacilli.
 a) *Corynebacteria* b) ***Bacillus anthracis*** c) *Actinomyces* d) None of these.

UNIT -III

49. Plants which are not differentiated roots, stems and leaves are grouped under
 a. **Thallophytes** b. Gymnosperms c. Pteridophytes d. Spermatophyte
50. Asexual reproduction in Spirogyra
 a. Takes place by zoospore formation
 b. Has not been recorded
 c. takes place by hypospore formation
 d. **Takes place by aplanospore formation**
51. Agar-Agar is derived from
 a. Fungi b. **Algae** c. Bryophytes d. Gymnosperms
52. The number of flagella produced by motile cells in
 a. Members of the Rhodophyta is greater than members of the Phaeophyta
 b. **Members of the Phaeophyta is greater than members of the Rhodophyta**

- c. members of the Rhodophyta is exactly or approximately equal to members of the Phaeophyta
- d. None of the above
53. Starch is an energy storage material characteristic of
 a. Chlorophyta b. Chrysophyta c. Phaeophyta **d. Rhodophyta**
54. Heterocysts are found in
a. Nostoc b. Cystopus c. Ulothrix d. Aspergillus
55. What is the storage product of most algae?
 a. Cellulose b. Glycogen c. **Starch and oil** d. Fat
56. In Ulothrix, reduction division takes place at the time of
a. Germination of zygote
 b. Formation of spores
 c. formation of gametes
 d. Formation of zoospores
57. Agar, which is the solidifying agent in many bacterial culture media, is part of the cell wall of
 a. Chlorophyta b. Chrysophyta c. Pyrrophyta **d. Rhodophyta**
58. Number of flagella produced by motile cells in
 a. Members of the phaeophyta is greater than members of the Oomycota
 b. Members of the Oomycota is greater than members of the Phaeophyta
c. members of the Phaeophyta is approximately equal to members of the Oomycota
 d. None of the above
59. Characteristics used to place algae into divisions include all of the following except
 a. Form of storage material
 b. Flagella number and location
 c. accessory pigments used in photosynthesis
d. All of the above
60. Which of the following is correct?
 a. All members of photolithotrophic autotrophs are also members of algae, but not all members of algae are members of photolithotrophic autotrophs
b. All members of algae are also members of photolithotrophic autotrophs, but not all members of photolithotrophic autotrophs are members of algae
 c. All members of photolithotrophic autotrophs are members of algae, and all members of algae are members of photolithotrophic autotrophs
 d. No member of photolithotrophic autotrophs is a member of algae
61. Zooxanthellae are algal symbiont that live within coral reef animals. These algae belong to
 a. Chlorophyta b. Chrysophyta
c. Pyrrophyta **d. Rhodophyta**
62. Algae is a non valid taxonomic term that refers to

- a. **Eukaryotic organisms that have chlorophyll a and produce O₂**
 b. Well developed cellular structure including a conducting system
 c. Both (a) and (b)
 d. None of the above
63. Filaments of Ulothrix are_____
- a. Branched **b. Unbranched**
 c. brick-shaped d. Girdle-shaped
64. Which is a rich source of protein?
- a. Nostoc b. Anabaena **c. Spirulitia** **d. Oscillatoria**
65. Red colour of the red algae is due to_____
- a. Y-phycoyanin b. Xanthophyll c. Carotene **d. Y-phycoerythrin**
66. Algae are classified into 6 groups, technically known as _____
- a. Categories **b. Divisions** c. Genera d. Domains
67. Cyanobacteria name has been given to_____
- a. Mycoplasma **b. Myxophyceae**
 c. Myxomycetes d. Schizomycetes
68. Spirogyra differs from moss-protonema in having_____
- a. Pyrenoids** **b. Branched filaments**
 c. discoid chloroplasts d. Rhizoidal branches
69. Simplest type of reproduction in plants is found in_____
- a. Ulothrix b. Nostoc **c. Chlamydomonas** **d. Spirogyra**
70. Parasitic alga is _____
- a. Cephaleuros** b. Ulothrix c. Spirogyra d. Chlamydomonas
71. The algae Chlamydomonas demonstrates a complex life cycle that switches between haploid and diploid forms. This life cycle is called_____
- a. The sexual-asexual exchange
 b. The transposition cycle
c. an alternation of generations
 d. Algal transformation
72. The _____ is the vegetative body of algae.
- a. Mycelium
 b. Pseudoplasmodium
 c. is scattered the least by smoke or fog
d. Thallus
73. Which algal division never produces motile, flagellated cells among any of its members?
- a. Chlorophyta b. Chrysophyta c. Phaeophyta **d. Rhodophyta**
74. *Chlamydomonas* and *Volvox* are similar because_____
- a. They both are motile
 b. They are members of the Chlorophyta
c. Both (a) and (b)

- d. None of these
75. All algae possess_____
- a. Nuclei b. Chloroplasts c. **Both (a) and (b)** d. None of these
76. Bioluminescence is a phenomenon associated with_____
- a. Chrysophyta b. Phaeophyta c. **Pyrrophyta** d. Chlorophyta
77. The number of members of the division Phaeophyta that live in freshwater habitats
- a. Is greater than the number of members of the division Chlorophyta that live in freshwater habitats
- b. Is lesser than the number of members of the division Chlorophyta that live in freshwater habitats**
- c. is equal to the number of members of the division Chlorophyta that live in freshwater habitats
- d. None of the above
78. Which algal division is divided up into three main groups consisting of the golden-brown algae, the yellow-green algae and the diatoms?
- a. Chlorophyta b. **Chrysophyta** c. Phaeophyta d. Pyrrophyta

UNIT - IV

79. First experimentally demonstrated virus was _____
- a. Rabies virus b. Alpha virus. c. Insect virus. **d. Tobacco mosaic virus**
80. Virus I'd grouped into how many families _____
- a. **21** b. 20 c. 22 d. 25
81. Adenovirus was first isolated in _____
- a. 1985 b. 1965 c. 1945 **d. 1935**
82. _____ is short for cytoplasmic polyhedrosis virus
- a. Cyto virus b. Nuclear. **c. Cypovirus** d. DNA virus
83. Virus is a Latin word which means _____
- a. Poison** b. Swine flu c. Flavi virus d. Sweet
84. Some common example of DNA virus _____
- a. **Parvovirus** b. Alpha virus c. Baculovirus
85. Which is largest plants virus _____
- a. Tobacco mosaic virus **b. Citrus Triesteza virus**
- c. Foot and mouth disease virus d. CaMV
86. Smallest plant virus _____
- a. Satellite Tobacco Necrosis virus** b. Small pox virus
- c. Citrus Triesteza virus d. CaMV

87. Largest animal virus_____

a. **Foot and mouth disease virus** b. Parvovirus c. baculovirus d. Retrovirus

88. Smallest animal virus_____

a. **Small pox virus** b. Citrus virus c. Necrosis virus d. Rabies Virus

89. The plant virus range size is_____

a. 12nm to 3000nm **b. 17nm to 200nm** c. 15nm to 4000nm d. 42nm to 44nm

90. The animal virus range size is_____

a. **20-350nm** b. 30-4000nm c. 10-330nm d. 15nm to 40nm

91. The virus are smallest diseases causing agent in_____

a. **Living organisms** b. Living things c. Foot d. Mouth

92. Virus transmitted through respiratory route_____

a. Hepatic **b. Swine flu** c. Hiv d. Rabies

93. Virus transmitted through faeco-oral route_____

a. **Hepatitis A** b. Swine flu c. Alklaine d. Retro

94. Virus transmitted through sexual contact_____

a. Swine flu **b. Retro virus** c. Necrosis virus d. Rabies virus

UNIT- V

95. The term protozoa mean_____

a) **First animals** b) first plants c) First microorganisms d) none of these

96. Protozoa were specified as_____

a) Multicellular **b) Unicellular** c) Both a&b d) none of these

97. Protozoa they do not have a_____

a) Capsule b) Genetic material **c) cell wall** d) Filament

98. The largest protozoa are called_____

a) Xenophyophores b) Laminarales c) Ecosphered) Trichomonads

99. Protozoa size range from _____
- a) 55-60 micrometer b) 10-20 micrometer c) 25-30 micrometer d) **10-55 micrometer**
100. Protozoa prefer living in _____ place
- a) Dry b) **Moist and aquatic** c) Heat d) High heat
101. The transition of a trophozoite to a cyst is called _____
- a) Excystation b) Xenophyphores c) **Encystation** d) protozoa
102. The transition back to a trophozoite is called _____
- a) Encystation b) **Excystation** c) Amoeboids d) Trichomonads
103. The mode of nutrition of protozoa is _____
- a) **Heterotrophic** b) Autotrophic c) saprotrophic d) phototrophic
104. Protozoa take food into the cell at a point called _____
- a) cell membrane b) Nucleus c) **Cytostome** d) Cytoplasm
105. Which enzymes is digest the food in protozoa?
- a) lipases b) **Lysosomal** c) Ligases d) Lyases
106. protozoa digest their food in space called _____
- a) plasmodium b) Excystation c) Encystation d) **vacuoles**
107. While protozoa chewing down the food the protozoans produce and release _____
- a) Oxygen b) Carbon dioxide c) **Nitrogen** d) ATP
108. How many types of locomotory organelles protozoa have _____
- a) **Three** b) One c) Two d) five
109. Give any one example for free living protozoa _____
- a) plasmodium b) Amoeba c) Trypanosoma d) **Euglena**
110. Give any one example for parasitic protozoa _____
- a) Ameoba b) **Plasmodium** c) Trypanosoma d) Euglena
111. Aerobic protozoa cannot live without _____

a) **Oxygen** b) Nitrogen c) carbon dioxide d) Hydrogen

112. Protozoa can survive in the absence of oxygen is called_____

- a) Aerobic protozoa b)Hydrogenesis
c) **Anaerobic protozoa** d) psychrophiles

113. Who discovered *Leishmania donovani*

- a) Antonie van Leeuwenhoek b) **Leishman and Donovan**
c) Carl Woese d) Watson and crick

114. Which media is used to identify leishmaniasis

- a) MacConkey agar b) Nutrient agar
c) **Novy-MacNeal-Nicola medium(NNN)** d)Eosin methylene blue agar (EMB)

115. Fatal vector borne parasitic disease called_____

- a) Malaria b) Dengue c) Typhoid Fever d) **Leishmaniasis**

116. Giardia is a parasite that cause the diarrheal illness known as

- a) **Giardiasis** b) Leishmaniasis c)Chikungunya d) Malaria

117. Giardia were first described by_____

- a) Nicolas b) Watson and crick c) Carl Linnaeus d) **Antonie van Leeuwenhoek**

118. Which is protected the giardia for to survive in the outside the body for long periods_____

- a) **Outer shell** b) Inner shell c) Membrane d) Cytosomal

119. *Giardia microtia* viewed under the_____microscope

- a) Dark field b) Electron c) **light** d) Base contrast

120. Trichomonas was discovered by_____

- a) Carl Woese b) Nicolas c) Carl Linnaeus d) **Alfred francosis Donne**

121. Helminthiasis also known as_____

- a) Eye infection b) **Worm infection** c) Animal infection d) vaginal infection

12. Write short note on FTIR.
13. Write short note on RFLP.
14. Write short note on DNA DNA hybridisation
15. What is pylogenetic tree?
16. Write about 16r DNA sequencing

UNIT- II

17. List out two characteristics of bacteria.
18. Classify bacteria.
19. What is mean by taxonomy?
20. What is gram +ve bacteria? Give one example.
21. List out some difference between aerobic and anaerobic respiration in bacteria with example.
22. Write the functions of plasma membrane?
- 23.** What is spinae?
24. Write any two advanced spectrophotometry technique?
25. What are saprophytes?
26. Write any four selective media for Neisseria spp?
27. What is gas gangrene?
28. Examples of gram +ve spore forming organisms?
29. What are the types of flagella arrangement?
30. What is chemo taxis?
31. Write about Corynebacterium?

UNIT- III

- 32.** State the general characteristics of algae.
33. Briefly outline the types of algae.
34. State 4 examples of algae.
35. How are algae useful?
36. Are algae bacteria or a plant?
37. Are algae toxic to humans?

38. What are algal blooms?
39. Define fungi?
40. Characteristics of fungi?
41. Classification of fungi?
42. Define thallus.
43. Write a note on Cyanobacteria.
44. Rhodophyta – brief note
45. What is the major classification of fungi?
46. Write the taxonomical classification of aspergillus?
47. What is aspergillosis?
48. Define VAM fungi?
49. What is mycorrhiza and explain its types?
50. Write any four species of Aspergillus.
51. What are the stages of infection occurs in Candidiasis.
52. What is stipe?
53. Write any two economic importance of algae?.
54. Explain the processing of alginate making?
55. What are Kelps?

UNIT- IV

56. Define virus.
57. What is viral genome?
58. What is viral symmetry?
59. What is insect virus?
60. Define cypovirus.
61. What are nomenclature of virus and taxonomic group?
62. Define virion.
63. Classification of rhabdo virus??
64. Structure of rhabdo virus?
65. Explain any two groups of Baltimore classification of viruses.
66. Give a short note on virion?
67. Write the structure of CaMV.
68. Write about morphology of adeno virus?
69. What are prions?
70. What is tobacco mosaic virus?
71. What is rabies and what is the causative agent?

72. Define HIV?
73. Write the significance of insect virus?

UNIT- V

74. What is protozoa? Give any five characteristics of protozoa?
75. Give the short notes of free living protozoa and parasitic protozoa?
76. What is the difference between aerobic and anaerobic protozoa ?
77. What is the definition of leishmaniasis?
78. What is Giardia?
79. Give the short notes of Trichomonas.
80. Write treatment of Trichomoniasis.
81. Define Helminths.
82. Write the treatment worm infection?
83. Classify Trichomonas.
84. Write the virulence factors of Giardia.
85. What is encystation and excystation?
86. Write a note on promastigotes.
87. What are paramylon bodies?
88. What is mean by costa?
89. Give a note on soft ticks.
90. Write about the parts of *Taenia solium*?
91. Define arthropod vectors.
92. Write the diagnosis for leishmenia
93. Write about Ascaris and its diseases.

SECTION –C

Answer the following in 200 words each

(6marks)

UNIT-I

1. Explain Haeckel's three kingdom concept.
2. Explain Whittaker's five kingdom concept.
3. Give a brief notes on three domain concept of Carl Woese basis of microbial classification.
4. Write the salient features of bacteria according to Bergey's manual of determinative bacteriology.
5. Explain phenotypic classification.
6. Explain phylogenetic classification.
7. Explain genotypic classification.
8. Give the Classical characteristics of microorganisms.
9. Give the molecular characteristics of microorganisms.
10. Write a note on 16SrRNA sequencing.

UNIT-II

11. Give the ultra structure of bacteria.
12. Give the general characters of bacteria.
13. Explain the Classification of bacteria.
14. Give the structure and characteristics of *Staphylococci*.
15. Give the structure and characteristics of *Streptococci*
16. Give the structure and characteristics of *Gonococci*
17. Give the structure and characteristics of *Corynebacteria*.
18. Give the structure and characteristics of *Actinomyces*.
19. Give the structure and characteristics of *Bacillus*.
20. Give the structure and characteristics of *Clostridia*.

UNIT III

21. Write the general characters and morphology of fungi.
22. Explain the classification of fungi.
23. Explain the structure and cell differentiation of *Aspergillus sp.*
24. Explain the structure and cell differentiation of *Candida sp*
25. Explain the structure and cell differentiation of *Agaricus sp.*
26. Give a detailed account on ectomycorrhizae.
27. Give a detailed account on endomycorrhizae.
28. Explain VAM.
29. Distribution and general characteristics of algae.
30. Explain thallus and its structure.
31. Write the classification of algae.
32. Write a short note on BGA.

33. Write a short note on Euglenophyta
34. Write a short note on Chrysophyta
35. Write a short note on Phaeophyta
36. Write a short note on Rhodophyta.

UNIT IV

37. Explain the classification of virus.
38. Write the nomenclature and properties of virus.
39. Explain the structure and characteristics of CaMV.
40. Explain the structure and characteristics of TMV.
41. Explain the structure and characteristics of Adenovirus.
42. Explain the structure and characteristics of HIV.
43. Explain the structure and characteristics of Rhabdo virus.
44. Explain the structure and characteristics of NPV.
45. Explain the structure and characteristics of CPV.

UNIT -V

46. Give a brief note on *Entamoeba sp.*
47. Give a brief note on *Leishmania sp.*
48. Give a brief note on *Giardia sp.*
49. Give a brief note on *Trichomonas sp.*
50. Write the pathogenesis of *Taenia solium*.
51. Explain about *Ascaris lumbricoides*.
52. Write short notes on tick.
53. Write short notes on mosquitoes.

SECTION –D

Answer the following in 500 words each

(12 marks)

UNIT- I

1. Explain the taxonomic classification of microorganisms.
2. Briefly explain the Bergey's system of classification.
3. Explain the phenotypic classification of microorganisms.
4. Write the salient features of bacteria according to Bergey's manual of determinative bacteriology.
5. Give the Classical characteristics of microorganisms
6. Explain the genotypic classification of microorganisms.
7. Explain phenotypic classification.
8. Explain phylogenetic classification.
9. Explain genotypic classification.
10. Give a detailed account on the molecular characterization of microorganisms.

UNIT-II

11. Write a brief account on general characters, classification, nomenclature and properties of bacteria.
12. Give a detailed account on the gram positive non spore forming bacilli.
13. Give a detailed account on the gram positive spore forming bacilli.
14. Give the structure and characteristics of *Corynebacteria*.
15. Describe the structure and characteristics of *Actinomyces*.
16. Give the ultra structure of bacteria.
17. Give the general characters of bacteria.
18. Explain the Classification of bacteria.
19. Give the structure and characteristics of *Staphylococci*.
20. Give the structure and characteristics of *Streptococci*

UNIT-III

21. Write a brief account on Mycorrhizae.
22. Explain the classification of fungi.
23. Explain the structure and cell differentiation of *Aspergillus sp.*
24. Explain the structure and cell differentiation of *Candida sp*
25. Explain the structure, classification, nutrition and reproduction of algae.
26. Give a detailed account on ectomycorrhizae.
27. Give a detailed account on endomycorrhizae.
28. Explain VAM.
29. Distribution and general characteristics of algae.
30. Explain thallus and its structure.
31. Write the classification of algae.
32. Write the economic importance of algal biotechnology.

UNIT- 4

33. Give a detailed account on the classification, nomenclature and properties of Virus.
34. Explain the structure and characteristics of plant virus with example.
35. Explain the structure and characteristics of animal virus.
36. Explain the structure and characteristics of NPV.
37. Explain the structure and characteristics of CPV.
38. Explain the classification of virus.
39. Explain the structure and characteristics of insect virus.

UNIT -5

40. Give a detailed account on pathogenesis, transmission, life cycle, lab diagnosis, treatment for *Entamoeba sp.*
41. Give a detailed account on pathogenesis, transmission, life cycle, lab diagnosis, treatment for *Leishmania sp.*
42. Explain the pathogenesis, transmission, lab diagnosis treatment for Cestodes and Nematodes.
43. Describe *Trichomonas sp.*
44. Write the pathogenesis of *Taenia solium.*
45. Explain about *Ascaris lumbricoides.*

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc., Microbiology

SEMESTER – I

Core III – Biochemistry

Question Bank

Sub code: 21PMIC13

SECTION – A

(1 mark)

Choose the correct answer:

UNIT 1

- Building blocks of nucleic acids are _____
a) **Nucleotides** b) Nucleosides c) Amino acids d) Histones
- Identify the purine base of nucleic acids in the following.
a) Cytosine b) Thymine c) Uracil **d) Adenine**
- How many base pairs are there in one full turn of the DNA double helix?
a) 4 **b) 10** c) 16 d) 24
- Which of the following are not the components of RNA?
a) Thymine b) Adenine c) Guanine d) Cytosine
- Which of the following statements is true?
a) Sugar component of a nucleotide is ribose
b) Sugar component of a nucleotide is deoxyribose
c) The bases in nucleotides are attached to a pentose sugar moiety by a glycosidic linkage
d) The sugar molecule of the nucleotide is in L-configuration
- What is the composition of nucleoside?
a) a sugar + a phosphate
b) a base + a sugar
c) a base + a phosphate
d) a base + a sugar + phosphate
- What is the composition of nucleotide?
a) a sugar + a phosphate
b) a base + a sugar
c) a base + a phosphate
d) a base + a sugar + phosphate

8. Group of adjacent nucleotides are joined by _____

a) **Phosphodiester bond**

b) Peptide bond

c) Ionic bond

d) Covalent bond

9. The sugar molecule in a nucleotide is _____

a) **Pentose**

b) Hexose

c) Tetrose

d) Triose

10. The two strands in a DNA double is joined by _____

a) Co-valent bond

b) **Hydrogen bond**

c) ionic bond

d) phosphodiester bond

UNIT-2

11. An example of polar amino acid is _____

(a) Alanine (b) Leucine (c) Arginine (d) Valine

12. The amino acid with a nonpolar side chain is _____

(a) Serine (b) Valine (c) Asparagine (d) Threonine

13. An example of chromoprotein is _____

(a) **Hemoglobin** (b) Sturine (c) Nuclein (d) Gliadin

14. An example of scleroprotein is

(a) **Zein** (b) Keratin (c) Glutenin (d) Ovoglobulin

15. Casein, the milk protein is

(a) Nucleoprotein (b) Chromoprotein (c) **Phosphoprotein** (d) Glycoprotein

16. An example of phosphoprotein present in egg yolk is

(a) **Ovoalbumin** (b) Ovoglobulin (c) Ovovitellin (d) Avidin

17. A simple protein found in the nucleoproteins of the sperm is

(a) **Prolamine** (b) Protamine (c) Glutelin (d) Globulin

18. Pulses are rich in

(a) Lysine (b) **Methionine** (c) Tryptophan (d) Phenylalanine

19. The 3 D structure of protein can be determined by _____

a) Nuclear magnetic resonance b) X ray crystallography c) **both a and b** d) spectroscopy.

20. The primary structure of protein represents _____

a) **linear sequence of amino acids joined by peptide bond**

b) 3-dimensional structure of protein

c) helical structure of protein

d) sub unit structure of protein

21. The most common secondary structure is _____

a) **α -helix** b) β -pleated sheet

c) β -pleated sheet parallel d) β -pleated sheet non parallel.

22. Myoglobin is a _____

a) protein with primary structure.

b) protein with secondary structure.

c) **protein with tertiary structure.**

d) protein with quaternary structure

23 . Fibrous protein such as silk fibroin consists of polypeptide chains arranged in _____

a) α -helix b) **β -pleated sheet** c) β -helix d) α -pleated.

24. α -helix has _____

a) 3.4 amino acid residues / turn

b) **3.6 amino acid residues / turn**

c) 3.8 amino acid residues / turn

d) 3.0 amino acid residues / turn

UNIT -3

25. Enzymes are _____

a) Carbohydrate

b) RNA

c) **Proteins**

d) Fats

26. The term enzymes are coined by _____

a) Pasteur

- b) Buchner
- c) Urey Miller
- d) Kuhne**

27. Fat is hydrolysed by the enzyme known as _____

- a) Trypsin
- b) Lipase**
- c) pepsin
- d) Amylase

28. Enzymes _____

- a) Do not require activation energy
- b) Do not change requirement of activation energy
- c) Increase requirement of activation energy
- d) Lowest requirement of activation energy**

29. Allosteric enzyme possesses _____

- a) Active site and an allosteric site
- b) Active site and two types of allosteric sites**
- c) Active site and three types of allosteric sites
- d) Three types of allosteric sites

30. Enzyme generally have _____

- a) Same pH and temperature optima**
- b) Same pH but different temperature optima
- c) Different pH but same temperature optima
- d) Different pH and different temperature optima

31. The enzyme which forms the peptide bond is known as _____

- a) Carbonic unhydrase
- b) Peptidase
- c) Carbohydrase
- d) Peptidyltransferase**

32. "Lock and key" theory of enzyme action was proposed by _____

- a) Fischer**
- b) Koshland
- c) Kuhne
- d) Arrhenius

33. Koshland's theory of enzyme action is known as _____

- a) Reduced fit theory
- b) Lock and key theory
- c) Induced fit theory**

d) Enzyme coenzyme theory

34. The enzymes involved in feedback inhibition are called _____

a) Allosteric enzymes

b) Holoenzymes

c) Apoenzymes

d) Coenzymes

UNIT - 4

35. Biomolecules simply refer to as “Staff of life” in the given _____

a) Protein b) Lipids **c) Carbohydrate** d) Vitamins

36. In carbohydrates special functional groups are present in the given following:

a) Alcohol & Carboxyl groups

b) Aldehyde & Ketone groups

c) Hydroxyl groups & Hydrogen groups

d) Carboxyl groups & Others

37. The majority of the monosaccharides found in the human body are of _____

a) L-type **b) D-type** c) DL-types d) None of the above

38. The simplest carbohydrate is _____

a) Dihydroxy acetone **b) Glyceraldehyde** c) Glucose d) Gulose

39. Examples of Epimers _____

a) Glucose & Galactose b) Glucose & Ribose c) Mannose & Glucose **d) a & c**

40. “Lobry de Bruyn Alberda Van Ekenstein transformation” is the reaction of _____

a) Glucose with mild alkali

b) Lactose with enzyme

c) Sucrose with diluted acid

d) Starch with iodine

41. Fermentation is the degradation of complex organic substances into simpler ones by the activity of living cells through the agency of _____

a) Acid b) Alkali c) Oxidizing substances **d) Enzymes (Zymase)**

42. The undermentioned compound is an acid mucopolysaccharide _____

a) Dicumarol b) EDTA **c) Hyaluronic acid** d) Glycogen

43. Turanose is _____

- a) Reducing disaccharides of glucose and fructose
 b) Non reducing disaccharide
c) 7-methyl sugar
 d) a deoxy sugar
44. One of the following has reducing properties_____
- a) **Glucuronic acid** b) Gluconic acid c) Glucaric acid d) Mucic acid
45. One of the following will answer “Molisch test” _____
- a) Protein b) Lipids **c) Mucoproteins** d) Flavo proteins
46. The red precipitate formed when glucose is heated with “Benedict’s reagent” is_____
- a) **Cupric hydroxide** b) Cuprous hydroxide c) Cupric oxide d) cuprous oxide
47. Digitonin is a _____
- a) Protein **b) Glycoside** c) Lipid d) Alkaloid
48. The following Sugar exhibits inversion of optical rotation on heating with dilute acid _____
- a) Sucrose b) Glucose c) Fructose **d) Lactose**
49. One of the following does not have Sulfuric acid groups_____
- a) Heparin **b) Hyaluronic acid** c) Chondroitin sulfate d) Kerato sulfate
50. The end product of hydrolysis of “Starch” by amylase is _____
- a) Soluble starch **b) Glucose** c) Dextrins d) Maltose
51. Example for “Fructosan” is _____
- a) Starch **b) Inulin** c) Cellulose d) Chitin
52. The reagent used for distinguishing a reducing monosaccharide from a reducing disaccharide is _____
- a) Benedict’s reagent **b) Barfoed’s reagent** c) Fehling’s reagent d) Selwinoff’s reagent
53. Fructose and Glucose can be distinguished by _____
- a) Selwinoff’s reagent** b) Benedict’s reagent c) Fehling’s reagent d) Barfoed’s reagent
54. “Concept of tetrahedral carbon atom” are first introduces by _____
- a) Tarnet **b) Van’t Hoff and Le Bel** c) Bayer d) Lowry

UNIT -5

55. Lipids are important constituents of _____
- a) Nucleus b) ribosome c) both a & b **d) biological membranes**

56. Which of the following is the derived lipids?
 a) Fats b) oils c) **steroids** d) waxes
57. Essential fattyacids are _____
 a) Linoleic acid b) Arachidoic acid c) Linolenic acid **d) All the above**
58. The synthesis of glucose from fat is called _____
 a) Glycolysis b) Krebs cycle c) Saponification **d)Gluconeogenesis**
59. The following is not a phospholipid
 a) Sphingomyelin b) Lecithin c) cephalein **d)cerebroside**
60. _____ is a phospholipid
 a) **Lecithin** b) Cholesterol c) Sterol d) Steroid
61. High content of triglycerides are seen in _____
 a) LDL b) HDL c) VLDL **d) Chlomicrons**
62. Liquid form of triglycerides at ordinary room temperature are called _____
 a) **Oils** b) soild c) fats d) none of these
63. Phytosterol include _____
 a) ergosterol b) stigmasterol **c) both a & b** d) cholesterol
64. Which of the following is not a derivative of cholesterol?
 a) Steroid hormones b) **Vitamin E** c) Bile salts d) Vitamin D

SECTION – B

Answer the following in 50 words each

(2marks)

UNIT-1

- 1) Define Chargaff's rule
- 2) Comment on Ribose and deoxyribose
- 3) Mention the Hydrogen bonds in DNA
- 4) Define Nucleoside

- 5) Describe different forms of DNA
- 6) Define Transfer RNA
- 7) Write short notes on Purine bases of plants
- 8) Explain Complementary base pairs
- 9) Define DNA denaturation
- 10) Define hnRNA.

UNIT-2

- 1) Define protein
12. Define amino acid
13. Define zwitter ion
14. Classify protein
15. Classify amino acid
16. Define peptide
17. Define polypeptide
18. Classify peptide
19. List any four essential amino acid
20. List any four non essential amino acid

UNIT-3

- 21) Define enzymes.
- 22) Define enzyme inhibition.
- 23) What are co enzymes.
- 24) Define isoenzymes.
- 25) Define specificity of enzymes.
- 26) Define allosteric enzymes.
- 27) Define K_m and explain the effect of substrate concentration on enzyme activity.
- 28) Define Competitive and non competitive inhibitions

UNIT-4

- 29) What are carbohydrates?
- 30) Write any 4 functions of carbohydrates.

- 31) Define glucose.
- 32) Draw the cyclic structure of glucose.
- 33) What is hexose?
- 34) What are monosaccharides?
- 35) Give the properties of monosaccharides.
- 36) Write the functions of monosaccharides.
- 37) What is mean by oligosaccharides?
- 38) What are polysaccharides?
- 39) Write the types of polysaccharides.

UNIT-5

- 40) What are lipids?
- 41) What are fatty acids?
- 42) Give note on saturated fatty acids.
- 43) Give the types of unsaturated fatty acids.
- 44) What is mean by triacyl glycerol?
- 45) Define saponification.
- 46) What are sterols?
- 47) Write note on cholesterol.
- 48) Give a short note on prostaglandins.
- 49) What are glycolipids?
- 50) Write the function of lipids.

SECTION –C

Answer the following in 200 words each

(6marks)

UNIT-1

1. Explain the Functions and components of nucleic acids
2. Write an account of nomenclature of nucleotides
3. Discuss the types of DNA structure
4. Explain the importance of RNA
5. Explain the Watson and Crick model of DNA

UNIT-2

6. Write short notes on amino acid classification.
7. Distinguish between essential and non-essential amino acids.

8. Write a note on Zwitter ion.
9. Define iso-electricpoint .
10. Explain the general properties of protein.
11. Define peptide and classify it.
12. Classify protein on the basis of their biological functions.
13. Classify protein on the basis of their shapes.
14. Write down the biological functions of the proteins.
15. Classify protein on the basis of their complexity

UNIT-3

16. Explain the determination of Michaelis Menten constant
17. Explain the nature of Enzymes
18. Discuss about Physiochemical properties of enzymes
19. Describe Cofactors
20. Explain the active site of enzymes

UNIT – 4

21. Give a brief note on carbohydrates.
22. Write the functions of carbohydrates.
23. Bring out the functions of monosaccharides.
24. State the biological significance of glucose.
25. Explain the structure of dextrose.
26. Describe the classification of monosaccharides.
27. Give a brief note on oligosaccharides.
28. Write short note on polysaccharides.
29. Give the functions of polysaccharides.
30. Discuss briefly the difference between homo and hetero polysaccharides.

UNIT -5

31. Explain the structure of lipids.
32. What are fatty acids? Explain.
33. Differentiate between simple and compound lipids.

34. Give a brief note on derived lipids.
35. Write the classification of fatty acids.
36. What are essential fatty acids? Write briefly.
37. Give the types of fatty acids.
38. Give a note on Sterols.
39. Write short note on cholesterol.
40. Give a short note on prostaglandins.

SECTION –D

Answer the following in 500 words each

(12 marks)

UNIT-1

1. Describe the structure of DNA.
2. Name different RNAs and discuss their structure.
3. Write an account of structure and function of nucleotides.
4. Describe the structure of nitrogenous bases present in nucleic acids.
5. “The backbone of nucleic acid structure -phosphodiester bridge.”—justify

UNIT-2

6. Explain secondary structure of protein and Ramachandran’s plot.
7. Define protein and classify it.
8. Define aminoacids and classify it.
9. Explain the primary, secondary, tertiary and quaternary structures of protein.
10. What is a peptide linkage? Classify peptide and write the structure of glycyl glycine.
11. Give the functions of protein.
12. Differentiate between essential and non- essential amino acids
13. Classify proteins on the basis of their biological functions.

UNIT-3

14. Explain nomenclature and classification of enzymes with suitable examples.
15. Explain in detail the different types of enzyme inhibitions with suitable examples.

16. Write briefly on the role of coenzymes in enzyme action
17. Explain the different theories proposed for mechanism of enzyme substrate complex formation.
18. Explain factors affecting enzyme activity

Unit – 4

19. Define and classify carbohydrates with suitable examples. Add a note on the functions of carbohydrates.
20. Describe the structure and functions of mucopolysaccharides.
21. Give an account of the structural configuration of monosaccharides, with special reference to glucose.
22. Discuss the structure and functions of three biochemically important disaccharides.
23. Define polysaccharides and describe the structure of three homopolysaccharides.

UNIT- 5

24. Write an account of classification of lipids with suitable examples.
25. Describe the structure and functions of phospholipids.
26. Discuss the saturated and unsaturated fatty acids of biological importance, along with their structures.
27. Describe the structure of steroids. Add a note on the functions of cholesterol.
28. Elaborate the functions and biochemical significance of lipids.

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI – 628 001.

I M.Sc. Microbiology-Semester I

CORE –IV - Microbial Physiology - 21PMIC14

Question Bank

Choose the correct Answer

(1 Mark)

SECTION –A

UNIT I

1. The process of synthesizing ATP from ADP and Pi coupled with the electron transport chain is known as _____
a) substrate level phosphorylation b) **Oxidative phosphorylation** c) both a & b
d) phosphorylation
2. The degradative process is known as _____
a) anabolism b) **catabolism** c)metabolism d)amphiblistism
3. _____ is the world's smallest motor
a) ATP kinase b) ATP dehydrogenase c) **ATP synthase** d) GTP synthase
4. _____ is used to denote a chemical reaction which liberates chemical free energy
a) **exergonic** b) exothermic c)endergonic d)endothermic
5. TCA stands for
a) Triple citric acid b) **Tri carboxylic Acid** c) tri citrate acid d) tetra citric acid
6. Succinate is the product of _____reduction
a) **Fumarate** b) ethanol c) acetate d) chlorophyll
7. _____ is produced during the anaerobic catabolism of organic substances
a) Electron b) **Methane** c) Fumarate d) ethanol
8. Succinate is oxidised by _____ to fumerate
a) fumarase b) **succinate dehydrogenase** c) fumarate dehydrogenase d) succinase
9. Oxaloacetate is converted into phosphoenol pyruvate by _____
a) PEP kinase b) PEP dehydrogenase c) **PEP carboxy kinase** d) PEP synthase
10. Gluconeogenesis occurs mainly in the _____
a) **Cytosol** b) adipose tissue c) plasma membrane d) both a and b

11. TCA cycle operates only under _____ conditions

- a) Anaerobic b) sulphur c) CO₂ d) **aerobic**

12. Fumarate is converted to Malate by _____

- a) **Fumarase** b) malate synthase c) fumarate kinase d) fuming dehydrogenase

UNIT II

13. The log phase is also known as _____

- a) Death phase b) lag phase c) **Exponential phase** d) stationary phase

14. The non specific penetration of substances into the cell is called as _____

- a) **passive diffusion** b) active diffusion c) facilitated diffusion d) group translocation

15. Decline phase is otherwise known as

- a) **Death phase** b) lag phase c) Exponential phase d) stationary phase

16. ABC transporters stands for _____

- a) **ATP binding cassette** b) ATP binding carrier c) ATP bound cassette d) ATP bound carrier

17. GSP stands for

- a) **General Secretion Pathway** b) General Stimulatory pathway c) GTP Secretion Pathway d) GTP Stimulatory Pathway

UNIT III

18. _____ is a flavoprotein

- a) **NADH** b) FeS c) Co Q d) Cytochrome

19. Inner mitochondrial membrane is highly folded to form _____

- a) **Cristae** b) mesosomes c) ribosomes d) cristacean

20. _____ is the world's smallest molecular motor

- a) ATP reductase b) ATP synthase c) ATPase d) **both b and c**

21. ETC stands for _____

- a) **Electron Transport Chain** b) Electricity Transfer chain c) Electron transfer chain d) Electron transfer cell

22. Nitrate ammonification is carried out by _____
 a) curved bacteria b) *E.coli* c) bacilli d) Gram +ve
23. The reduction of sulphur is carried out by _____
 a) *D.acetoxidans* b) *E.coli* c) bacilli d) Gram +ve
24. The organisms which reduce oxygen are said to be _____
 a) **aerobic** b) anaerobic c) facultative aerobes d) facultative anaerobes

UNIT IV

25. The fermentation of glucose to ethanol by yeast proceeds via _____ pathway
 a) TCA b) glycolysis c) **fructose-biphosphate** d) both band c
26. The normal yeast fermentation has been designated as _____ fermentation
 a) Nitrogen b) **Neuberg's first** c) sulphur d) fumarate
27. _____ fermentative lacto bacteria produce pure lactate
 a) **Homo** b) anaerobic c) both a and b d) facultative aerobic
28. The butanol fermentation is carried out by _____
 a) *Clostridium* b) *D.acetoxidans* c) *E.coli* d) bacilli
29. In *Bifidobacterium* _____ type of fermentation is carried out.
 a) Homo lactic acid fermentation b) **Hetero lactic acid fermentation** c) butanol d) acetate
30. _____ are rumen and intestinal bacteria of ruminants
 a) *Propionibacteria* b) *Lactobacillus* c) *E.coli* d) yeast
31. _____ is a luminous bacteria
 a) *E.coli* b) *Vibrio harveyi* c) *Photobacterium* d) **both b and c**
32. _____ is a luminous bacteria
 a) *E.coli* b) *Vibrio harveyi* c) *Propionibacteria* b) *Lactobacillus*
33. Luciferin is converted to light by _____
 a) **Luciferase** b) luciferic acid c) luciferin dehydrogenase d) luciferin kinase
34. Hydroxy butyryl CoA is converted to crotonyl CoA by _____
 a) **Crotonase** b) **butyryl** dehydrogenase c) crotonyl coA synthase d) crotonyl dehydrogenase

UNIT V

35. _____ absorb light in the spectral region of 400 – 550 nm
a) **Carotenoids** b) toxins c) chlorophyll d) poison
36. The bacteria responsible for the formation of root nodules _____
a) **Rhizobium** b) *Clostridium* c) *D.acetoxidans* d) *E.coli*
37. _____ is a luminous bacteria
a) Rhizobium b) *Clostridium* c) *D.acetoxidans* d) ***P.phosphoreum***
38. _____ the ability to emit light
a) **Bioluminescence** b) contagious c) nif gene d) legumes
39. _____ is carry out oxygenic photosynthesis
a) Rhizobium b) *Clostridium* c) *D.acetoxidans* d) ***Cyanobacteria***
40. Purple bacteria is carried out _____ Photosynthesis
a) **Anoxygenic photosynthesis** b) oxygenic photosynthesis c) sulphur d) nitrogen
41. Chlorophyll is present in _____
a) Mitochondria b) **thylakoid** c) cytoplasm d) plasma membrane
42. _____ is a purple colour pigment
a) **carotenoid pigments** b) Chlorophyll c) Bacteriochlorophyll d) Phycobilosome
43. *Alpha-* and *Betaproteobacteria* are _____
a) **Purple Nonsulfur Bacteria** b) Purple sulfur Bacteria c) Green Nonsulfur Bacteria
b) d) Green sulfur Bacteria
44. In Halobacterium _____ pigment is present
a) **bacteriorhodopsin** b) **carotenoid pigments** c) Chlorophyll d) Bacteriochlorophyll

SECTION –B

Answer in about 50 words each:

2 Marks

UNIT I

1. Define glycolysis
2. Explain about the energetic of TCA cycle.
3. What are oxidative phosphorylation? Give a example
4. What is substrate level phosphorylation? Give an example
5. Define Anabolism
6. Define catabolism

7. Write a short notes on Coenzyme Q
8. Comment on FAD & NAD
9. Comment on Ferridoxin and FeS
10. What is meant by linear pathway? Give an example
11. What is meant by irreversible pathway? Give an example
12. What is meant by branched pathway? Give an example
13. Distinguish between anabolism and catabolism
14. Define calvin benson cycle
15. What is meant by gluconeogenesis
16. Expand TCA
17. Write a short note on glycolysis

Unit-II

18. Comment on lag phase
19. Give a short notes on log phase
20. How will you measure the growth of a cell?
21. Define active transport method
22. Define passive transport method
23. Define facilitated transport method
24. Comment on group translocation
25. What is meant by stationary phase?
26. Write about exponential phase
27. Write a short notes on decline phase

Unit-III

28. Define anaerobic respiration.
29. Define electron transport chain.
30. List out the various electron carriers and enzymes involved in ETC.
31. Define dissimilatory nitrate reduction
32. Comment on denitrification
33. Brief account on nitrate respiration

34. Write the importance of denitrification
35. Give a short note on sulphate reduction

Unit-IV

36. Define homo lactic fermentation
37. Define hetero lactic fermentation
38. Comment on alcoholic fermentations of yeasts and bacteria
39. Write the steps involved in the normal fermentation of glucose by yeast
40. Write about Neuberg's fermentation formulae
41. Write a short notes on uses of yeast
42. Describe *Propionibacteria*
43. Comment on acryloyl-CoA pathway
44. Define mixed acid fermentation
45. Define formic acid fermentation
46. Define bioluminescence
47. Give some examples for luminous bacteria
48. Comment on bacterial luminescence
49. Comment on luminescence in animals

Unit-V

50. Define photosynthesis
51. Comment on oxygenic photosynthesis
52. Write a short note on cyanobacteria
53. Define nif genes
54. Describe chlorophylls
55. Define carotenoids
56. Define bacterio rhodopsin
57. Define Halobacteria
58. Comment on anoxygenic photosynthesis

SECTION –C

Answer in about 200 words each :

6 Marks

Unit-I

1. Explain about glycolysis
2. Explain about the energetic of TCA cycle.
3. What is substrate level phosphorylation? Give an example
4. What is meant by linear pathway? Give an example
5. What is meant by irreversible pathway? Give an example
6. What is meant by branched pathway? Give an example
7. Distinguish between anabolism and catabolism
8. Explain about glycolysis
9. Describe about TCA cycle
10. Explain about gluconeogenesis
11. Describe about Calvin-Benson cycle.

UNIT II

1. Explain about growth curve
2. How will you measure the growth of a cell ?
3. Explain about active transport method
4. Describe about passive transport method .
5. Give an explanation about facilitated transport method
6. Comment on group translocation

UNIT III:

1. Explain about nitrate respiration
2. Write about sulphate respiration
3. Describe about sulphur respiration
4. Give a short notes on carbonate respiration
5. Give an explanation on fumarate respiration
6. Write about iron respiration.
7. Describe about oxidative phosphorylation? Give some examples
8. Give a short note on electron transport chain.
9. List out the various electron carriers and enzymes involved in ETC.

10. Comment on FAD & NAD
11. Comment on Ferridoxin and FeS

UNIT IV:

1. Explain about alcoholic fermentation by yeasts
2. Write about alcoholic fermentation by bacteria-
3. Describe about ethanol formation.
4. Describe about Homo-fermentative Lactic acid fermentation
5. Give a explanation on Hetero fermentative Lactic acid fermentation
6. Give a short notes on propionic acid fermentation
7. Explain about formic acid fermentation
8. Write about butyric acid
9. Explain about butanol fermentation
10. Explain about homo acetate fermentation.

Unit-V

1. Write about regulation of photosynthetic pigments
2. Write a notes on chlorophylls and carotenoids
3. Describe nif genes
4. Explain about bioluminescence
5. Differentiate between oxygenic and anoxygenic photosynthesis
6. Write about cyanobacteria
7. Write about carotenoids
8. Explain about bacterio rhodopsin
9. Write a short notes on nitrogen fixation
10. Write about purple bacteria
11. Write about green bacteria

SECTION –D

Answer in about 400 words each :

12 Marks

UNIT I

1. Explain about glycolysis
2. Explain about the energetic of TCA cycle.

3. What is substrate level phosphorylation? Give an example
4. What is meant by linear pathway? Give an example
5. What is meant by irreversible pathway? Give an example
6. What is meant by branched pathway? Give an example
7. Distinguish between anabolism and catabolism
8. Explain about glycolysis
9. Describe about TCA cycle
10. Explain about gluconeogenesis
11. Describe about Calvin-Benson cycle.

UNIT II

1. Explain about growth curve.
2. How will you measure the growth of a cell ?
3. Explain about active transport method
4. Describe about passive transport method .
5. Give an explanation about facilitated transport method
6. Comment on group translocation
7. Write about protein secretion in gram negative bacteria
8. Give a short note on Sec dependent pathway

UNIT III:

1. Explain about nitrate respiration
2. Write about sulphate respiration
3. Describe about sulphur respiration
4. Give a short notes on carbonate respiration
5. Give an explanation on fumarate respiration
6. Write about iron respiration.
7. Describe about oxidative phosphorylation? Give some examples
8. Give a short note on electron transport chain.
9. List out the various electron carriers and enzymes involved in ETC.
10. Comment on FAD , NAD, Ferridoxin and FeS

UNIT IV:

1. Explain about alcoholic fermentation by yeasts
2. Write about alcoholic fermentation by bacteria-
3. Describe about ethanol formation.
4. Describe about Homo-fermentative Lactic acid fermentation
5. Give an explanation on Hetero Lactic acid fermentation
6. Give a short notes on propionic acid fermentation
7. Explain about formic acid fermentation
8. Write about butyric acid
9. Explain about butanol fermentation
10. Explain about homo acetate fermentation.

Unit-V

1. Explain about various types of photosynthetic pigments
2. Write a notes on chlorophylls and carotenoids
3. Explain about bioluminescence
4. Differentiate between oxygenic and anoxygenic photosynthesis
5. Write about cyanobacteria
6. Write about carotenoids
7. Explain about bacterio rhodopsin
8. Write a short notes on nitrogen fixation
9. Write about purple bacteria
10. Write about green bacteria
11. Explain about oxygenic photosynthesis
12. Explain about anoxygenic photosynthesis

Photosynthesis occurs in

- a. Chloroplast
- b. Golgi body
- c. Endoplasmic reticulum
- d. Nucleus

2. The optimum temperature for photosynthesis is

- a. 25-35°C
- b. 10-15°C
- c. 35-40°C
- d. 20-25°C

Also Read: [Photosynthesis](#)

3. Photorespiration occurs in

- a. Four cell organelles
- b. Two cell organelles
- c. One cell organelle
- d. Three cell organelle

4. Reduction of NADP occurs in

- a. Oxidative photophosphorylation
- b. Cyclic photophosphorylation
- c. Non-cyclic photophosphorylation
- d. None

5. Kranz anatomy is found in the leaves of

- a. Wheat
- b. Mustard
- c. Potato
- d. Sugarcane

Also Read: [Light Reaction](#)

6. Peroxisomes are involved in which type of reactions

- a. Calvin cycle
- b. Glyoxylate cycle
- c. Glycolate cycle
- d. Bacterial photosynthesis

7. Photorespiration involves oxidation of

- a. PGA
- b. RuBP
- c. Chlorophyll a
- d. Both a and b

8. C3 and C4 plants differ with respect to

- a. Number of ATP molecules consumed
- b. First product
- c. The substrate which accepts carbon dioxide
- d. All

Also Read: [Photorespiration](#)

9. In Calvin cycle, 1 molecule of glucose is formed from

- a. $6\text{CO}_2 + 30\text{ATP} + 12\text{NADPH}$
- b. $6\text{CO}_2 + 12\text{ATP}$
- c. $6\text{CO}_2 + 18\text{ATP} + 12\text{NADPH}$
- d. $6\text{CO}_2 + 18\text{ATP} + 30\text{NADPH}$

10. Where does the light reaction takes place?

- a. Grana
- b. Stroma
- c. Cytoplasm
- d. Endoplasmic reticulum

11. Electrons from the excited chlorophyll molecules of PS-II are first accepted by

- a. Pheophytin
- b. Ferredoxin
- c. Cytochrome f
- d. Cytochrome b

Also Read: [Electron Transport Chain](#)

12. Non-cyclic photophosphorylation results in the production of

- a. NADH
- b. NADPH
- c. ATP
- d. ATP and NADPH

13. DCMU inhibits

- a. PS-I
- b. PS-II
- c. Oxidative phosphorylation

- d. It destroys chloroplast

Also Read: [Glycolysis](#)

14. Maximum photosynthesis occurs in

- a. Blue light
- b. Red light
- c. White light
- d. Green light

15. The first acceptor of CO₂ in C₄ plants is

- a. Aspartic acid
- b. Malic acid
- c. Oxaloacetic acid
- d. Phosphoenolpyruvate

16. The first product of C₄ pathway is

- a. PGA
- b. DHAP
- c. Oxaloacetate
- d. Phosphoenolpyruvate

Also Read: [TCA cycle](#)

17. The two pigment system theory of photosynthesis was proposed by

- a. Aron
- b. Blackman
- c. Hill
- d. Emerson

18. H₂ donor during photosynthesis is

- a. ATP
- b. NADP
- c. NADPH
- d. NADH

Also Read: [Photosynthesis in Higher Plants](#)

19. The minerals involved in splitting reaction during photosynthesis is

- a. Potassium and manganese
- b. Magnesium and chlorine
- c. Potassium and chlorine
- d. Manganese and chlorine

20. The water-soluble photosynthetic pigment is

- a. Chlorophyll a
- b. Xanthophyll
- c. Anthocyanin
- d. Chlorophyll b

Also Read: [Calvin cycle](#)

Answer Key

1- a	2- d	3- d	4- c	5- d	6- c	7- b	8- d	9- c	10-
11- a	12- d	13- b	14- b	15- d	16- c	17- d	18- c	19- d	20-

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI – 628 001.

M.Sc. Microbiology-Semester II

CORE –I - Immunology – 21PMIC21

Question bank

Section A

(1 mark)

Unit-I

- _____ is the process of weakening the virulence of pathogenic organisms without losing the capacity to induce immunity.
a) **Attenuation** b) Vaccination c) avirulent d) opsonisation
- Innate immunity is otherwise known as _____.
a) artificial immunity b) **native immunity** c) active immunity d) passive immunity
- The outer layer of skin is _____.
a) **Stratum corneum** b) cortex c) medullar d) capsule
- The secretions of the sebaceous and sweat glands act as _____.
a) **antiseptics** b) anti inflammation c) anti cancer d) killer
- Ts cells are _____ cells
a) **Regulatory T cells** b) active T c) secretory T d) hypersensitivity T
- Macrophages are derived from _____.
a) **monocytes** b) erythrocytes c) lymphocytes d) easinophiles
- T cells mature in the _____.
a) **thymus** b) spleen c) MALT d) tonsils
- B cells mature in the _____ in birds
a) bone marrow b) **bursa of fabricius** c) MALT d) tonsils
- _____ is a primary lymphoid organ
a) **thymus** b) spleen c) MALT d) tonsils
- _____ is the outer layer of thymus
a) medulla b) **cortex** c) cap d) meducapsule
- _____ is the removal of thymus
a) **thymectomy** b) thymictology c) dethymus d) thyrotomy
- The development of blood cells from stem cells is called _____

- a) haemopoiesis b) stemopoiesis c) steropoiesis d) lymphopoiesis
13. In mammals, the B cells develop in the _____
 a) bursa of fabricius b) MALT c) tonsils d) **bone marrow**
14. _____ is a secondary lymphoid organ
 a) **lymph nodes** b) bursa of fabricius c) thymus d) bone marrow
15. Spleen is a _____ lymphoid organ
 a) **secondary** b) primary c) passive d) active
16. Thymus is a _____ lymphoid organ
 a) **primary** b) secondary c) passive d) active
17. MALT _____
 a) mucous associated lymphoid tissue b) **mucosa associated lymphoid tissue**
 c) mucous associated lymph tissue d) mucous albuolar lymphoid tissue
18. White pulp is also known as _____
 a) **malpighian follicle** b) molar follicle c) molecule follicle d) maltose follicle

UNIT-II

19. _____ can pass through the placenta
 a) **IgG** b) IgM c) IgA d) IgE
20. _____ is a type of light chain of Ig
 a) alpha b) **kappa** c) mu d) gamma
21. The light chain is linked to a heavy chain by a _____ bonds
 a) **Interchain disulfide** b) intrachain disulfide c) wander vaals d) J chain
22. _____ is the specific site of antigen which binds with antibody.
 a) paratope b) canatope c) **epitope** d) exotope
23. _____ is the specific site of antibody which binds with antigen.
 a) canatope b) epitope c) exotope d) **paratope**
24. The MHC of mouse is called as _____
 a) **H-2** b) HLA c) MHC 1 d) MHC 2
25. The MHC of man is called as _____
 a) **HLA** b) H-2 c) MHC 1 d) MHC 2
26. MHC abbreviation _____

- a) **Major Histocompatibility Complex** b) Minor Histocompatibility Complex
 c) Major Histo Complex d) a) Major Histocompatibility
27. _____ are responsible for transplantation antigens
 a) B cells b) **MHC** c) T cells d) hapten
28. _____ is called as an incomplete antigen
 a) **Hapten** b) anti antigen c) antiserum d) avidity

UNIT-III

29. ELISA stands for _____
 a) **Enzyme Linked Immuno Sorbent Assay** b) Enzyme Liable Immuno Sorbent Assay
 c) Enzyme Linked Immuno Soluble Assay d) Enzyme Linked Immuno Sorbent Array
30. RIA stands for _____
 a) **Radio Immuno Assay** b) Ratio Immuno Assay c) Radio Immuno Array
 d) Radio Immunity Assay
31. _____ is the binding capacity of antibodies to combine with multivalent antigen
 a) **avidity** b) affinity c) affectivity d) attenuatoin
32. _____ is the binding capacity of antibodies to combine with univalent antigen
 a) **affinity** b) avidity c) affectivity d) attenuatoin
33. Binding of two antibodies to two antigen molecules is called _____
 a) **bonus effect** b) binding effect c) bond effect d) affinity effect
34. Lysis of RBC is called _____
 a) **haemolysis** b) RBC lysis c) blood cell lysis d) lympholysis
35. _____ is a dissolution of a cell
 a) haemolysis b) RBC lysis c) **Cytolysis** d) lympholysis
36. The phenomenon of emitting radiation by antibodies labeled with fluorescent dyes is called _____
 a) fluorescent immune b) **immunofluorescence** c) immuneblot d) immune assay
37. _____ is an immune serum that neutralizes toxins
 a) **antitoxin** b) exotoxin c) endotoxin d) toxoid

38. If the blood sample is clumped with antiserum A the sample belongs to Group _____
 a) AB b) B c) A d) O
39. If the blood sample is clumped with antiserum B the sample belongs to Group _____
 a) AB b) B c) A d) O
40. The bridging leads to the formation of a _____ which forms the precipitate.
 a) clumps b) **lattice** c) agglutination d) reactin
41. In Western blot , to prevent the digestion of the sample by its own enzymes _____ should be added.
 a) protease and phosphatase b) **anti protease and phosphatase** c) protease and lipase d) anti protease and lipase
42. Immuno electrophoresis was first coined by _____
 a) Jenner b) Louis Pasteur c) **Grabar and Williams** d) Koch and Williams
43. RIEP was developed by _____
 a) Jenner b) Louis Pasteur c) Grabar and Williams d) **Laurell**

UNIT-IV

44. The factors causing hypersensitivity are called _____
 a) **Allergens** b) hypersense agent c) hyposense agent d) hypersense factor
45. In clinical terms, hypersensitivity is called _____
 a) easinophilia b) ameabiosis c) **Allergy** d) malphigia
46. _____ is an immediate type hypersensitivity
 a) **Anaphylaxis** b) ameabiosis c) easinophilia d) malphigia
47. _____ hypersensitivity is due to the interactions of antibodies and cell associated antigens
 a) **Type II** b) Type I c) Type IV d) Type III
48. The agglutination or lysis of recipient blood due to mismatched blood group is called _____
 a) **transfusion reaction** b) transfer reaction c) transport reaction d) fusion reaction
49. A blood group persons contain _____ antigen
 a) A b) B c) AB d) Nil

50. O blood group person is called as _____
 a) uni donor b) **universal donor** c) Universal recipient d) uni recipient
51. _____ blood group person is called Universal recipient
 a) **AB** b) O c) A d) B
52. _____ is a haemolytic disease caused by the reaction of Rh antigen and Rh antibody
 a) **Erythroblastosis foetalis** b) Erythrolysis c) RBC lysis d) blood lysis

UNIT-V

53. _____ have been used in the treatment of Gram negative sepsis a) **antiendotoxin monoclonal antibodies** b) exotoxin antibodies c) antiendotoxin d) antiexotoxin monoclonal antibodies
54. _____ are curved, gram negative bacilli with polar flagellae.
 a) **Vibrios** b) *S.aureus* c) *Salmonella* d) *E.coli*
55. The agent used for active immunization is loosely termed _____
 a) **Vaccine** b) antibody c) antiantibody d) antiantigen
56. BCG stands for _____
 a) *Bacillus cox* Guerin b) **Bacillus calmette-Guerin** c) *bacillus coccus* Guerin d) *Bordettela calmette-Guerin*
57. AIDS stands for _____
 a) **Acquired immune deficiency virus** b) arrest immune deficiency virus c) acquired immune disease virus d) atlast immune deficiency virus
58. HIV stands for _____
 a) **Human immunodeficiency virus** b) Herpes immune deficiency virus c) Hepatitis immunodeficiency virus d) histamine immunodeficiency virus
59. The disease caused by the defects in the immune system is called _____
 a) immuno deficiency diseases b) HIV c) hepatitis d) auto immune disorders

Section B

Answer the following in about 50 words:

(2 Marks)

Unit-I

1. List the four characteristic attributes of Adaptive immunity.
2. Name three features of a secondary immune response that distinguish it from a primary immune response.
3. Name the primary and secondary lymphoid organs.
4. Describe the functions of various secondary lymphoid organs.
5. What is the function of Bone marrow?
6. What are the two primary roles of the thymus?
7. Name different types of mucosa associated lymphoid tissue
8. What is haemopoiesis and where it occurs?
9. What is the function of memory cells?
10. Differentiate between humoral and cellular immunity
11. Write two features of skin that make it an effective mechanical barrier to block the entry of microbial pathogens.
12. Differentiate between lysosome and phagosome.
13. Define acquired immunity
14. Differentiate between innate and acquired immunity.
15. Name two primary and two secondary lymphoid organs
16. Expand MALT and GALT
17. Name the organ responsible for haemopoiesis and equivalent organ in birds
18. What is average size of thymus in adults and in old age?
19. What are the two major groups of cells involved in acquired immunity.
20. Draw a cross section of portion of thymus.
21. Name two encapsulated and highly organized organs secondary lymphoid organs.
22. Where the lymph nodes are located and what function they perform?
23. Draw a cross section of portion of lymph node.
24. What are the functions of three distinctive portions of lymph nodes?
25. Give the examples of GALT lymphoid organs.
26. Where are peyer's patches located?

27. Write two characteristic features of mature B-lymphocytes.
28. What is the main function of natural killer cell?
29. What is most important difference b/w plasma cell and memory cell?
30. Why the antibody mediated is called humoral immunity?
31. Draw diagrams of eisonophils ,basophils and neutrophils?
32. What are T_H cells?

Unit-II

33. Name the region of antigen where antibody binds.
34. Name the different types of immunoglobulins.
35. Write down the functions of complement
36. What is hinge region in antibody structure
37. Name different pathways of complement system.
38. What is the function of IgA?
39. Give two examples of opsonins
40. Define antigens
41. Define antibody
42. What is epitope?
43. Which part of antigen molecule and antibody molecule interact with each other to form antigen antibody complex?
44. Define antibody affinity
45. Define antibody avidity
46. Differentiate between avidity and affinity.
47. What are adjuvants?
48. Which class of antibody is mainly involved in allergic reactions?

Unit-III

49. Differentiate between agglutination and precipitation.
50. Write the full form of ELISA.
51. write the principle of RIA
52. Expand ELISA,RIA

53. Define ODD
54. Write about immune blot
55. What is meant by immunodiffusion
56. Write a short notes on immunofluorescence.

Unit-IV

57. Name two Autoimmune disorders.
58. What are autoimmune diseases? Give some examples.
59. Define hypersensitivity
60. Define immediate type of hypersensitivity
61. Define delayed type of hypersensitivity
62. Write about auto immune process
63. What is meant by transplantation immunity
64. Write a short notes on tumour immunology
65. Write the types of hypersensitivity

Unit-V

66. In AIDS, Which kind of lymphocytes are affected.
67. Name the causative agent of AIDS.
68. What are monoclonal antibodies?
69. Define vaccine
70. Write about any two type of vaccine
71. Write the schedule of immunization
72. Give two examples for immune deficiency diseases.
73. Define monoclonal antibodies

Section C

Answer the following in about 200 words:

(5 Marks)

Unit-I

1. Write down the differences between Innate and Adaptive immunity.
2. Discuss the various functions of T cells.

3. Draw well labeled diagram of lymph nodes
4. What is meant by humoral immunity and what are the components involved
5. What are different T cell antigen receptors and list their functions.
6. What is meant by cell mediated immunity and explain about the different components involved in it.
7. What is meant by macrophages ? Explain its function
8. What is meant by innate immunity and explain about its importance in newly born baby.
9. Explain about the acquired immunity.
10. Write notes on bone marrow and spleen
11. Explain Macrophages and role of Macrophage inhibition factor

Unit-II

12. Draw the well labeled diagram of structure of immunoglobulin.
13. Discuss the various functions of Antibodies.
14. Discuss in brief the classical pathway of complement activation
15. Describe the various properties of antigen.
16. Discuss about the different classes of immunoglobulin and explain about their role in immunity.
17. Write a short notes on : MHC I and MHC II
18. Write notes on Classical and alternate pathway
19. Comment on Complement fixation reaction
20. Write notes on Opsonins and Opsonocytophagic reactions.
21. Write notes on HLA

Unit-III

22. Describe the principle of Radio immuno assay.
23. How affinity and avidity are related to the strength of antigen antibody interactions?
24. Explain different types of forces that causes antigen – antibody interactions?
25. Write notes on Immunoblot
26. Comment on Immunoelectron microscopy
27. Explain ouchterlony technique
28. Explain about agglutination and precipitation
29. Explain about t Immunoblotting

Unit-IV

30. Briefly discuss Type 2 hypersensitivity.
31. What are the reasons for the occurrence of autoimmune disorders?
32. Discuss the consequences and regulation of type I hypersensitivity?
33. Define tumor antigens and give their significance in immunology?
34. Comment on tumor therapies
35. Comment on any two autoimmune disorders.
36. Write notes on type III and IV Hypersensitivity
37. Write a short notes on transplantation immunity
38. Explain about immediate type Hypersensitivity reactions
39. Explain about delayed type Hypersensitivity reactions
40. Draw the structure of HIV. Which parts contribute to pathogenicity?
41. Write a short note on rheumatoid arthritis.

Unit-V

42. Discuss the various applications of monoclonal antibodies.
43. Applications of monoclonal antibodies in biomedical research
44. Write notes on Vaccine and its types
45. Write about current basic immunization schedule.

Section – D

Answer the following in about 400 words each:

(10 Marks)

Unit-I

1. Explain the main characteristics of adaptive immune response.
2. Discuss the various parts of innate immune response.
3. Discuss in detail the secondary lymphoid organs and their functions.
4. Draw the structure of B cell receptor.
5. Discuss the various cell mediated immune responses in body that arise after infection
6. What is meant by immunity and explain about the various components involved in the immune system.
7. What is meant by hematopoiesis and explain its role in the generation of various immune cells.

8. Discuss about various types of cell mediated defense mechanism.
9. Discuss about the B cell mediated immunity and explain about the basic structure of immunoglobulin.

Unit-II

10. Explain the different types of antibodies.
11. Explain the structure and functions of MHC class 1 and class 2 molecules.
12. Define antibody and describe about their structure in detail with a neat diagram?
13. Explain the Complement System?
14. Explain about MHC
15. Explain about the classification of Immunoglobulins based on their Heavy chain.
16. Explain about complement fixation reaction
17. Explain about Classical and alternate pathway

Unit-III

18. Explain the different types of Immuno electrophoresis
19. Explain the principle and applications of Radial and double immunodiffusion.
20. Enumerate antigen antibody reactions. Describe the principle methodology and clinical applications of agglutination reactions.
21. Explain different types of antigen – antibody interactions?
22. Explain about Immuno blot
23. Explain about immunofluorescence.
24. Explain about RIA
25. Describe about Flow cytometry
26. Write in detail about complement fixation

Unit-IV

27. Explain Type I hypersensitivity. What are the main allergens and their diagnosis?
28. Discuss the various proposed mechanisms of Autoimmunity.
29. What is agglutination? Which of the diagnostic tests are based on agglutination?
30. Discuss the different localized autoimmune disorders.

31. Classify and define hypersensitivity. Describe type II hypersensitivity.
32. Describe the cancer therapy in detail?
33. Explain in detail about Transplantation related to immunology
34. Explain in detail about Auto immune disorders
35. Explain the mechanism of infection and replication of HIV in human body.
36. Explain – immune response in AIDS
37. Comment on Immune deficiency diseases

Unit-V

38. Discuss the hybridoma technology used for the production of monoclonal antibodies.
39. Explain in detail about monoclonal antibody production
40. Explain in detail about the production of vaccines
41. Describe in detail about Immunotherapy of infectious diseases
42. Define Immunization, types and its principles
43. Explain about vaccine therapy

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc., Microbiology

SEMESTER – II

Core VI - Medical Microbiology

Question Bank

Subcode:21PMIC22

SECTION – A

Choose the correct answer

(1 mark)

UNIT-I

1. The term endotoxin was coined by _____
a) **Pfeiffer** b) Pasteur c) Robert Hoke d) None of these
2. ----- is added as an anticoagulant
a) Sodium dodecyl sulphate b) **Sodium Polyanetholsulfonate**
c) Sodium potassium sulphate d) All the above
3. The study of structural and functional manifestation of disease is called _____
a) Pathogen b) Infection c) **Pathology** d) None of these
4. Edema factor is also called as _____
a) OF b) Factor I c) **Both A & B** d) None of these
5. Which of the following CANNOT be transmitted via infectious droplets?
a) Rubella b) Common cold c) Influenza d) **None of the above**
6. Lyme disease is transmitted to humans through _____
a) Touching an infected person b) Kissing an infected person
c) Having sex with an infected person d) **None of the above**
7. How does Ebola spread from human to human?
a) **Spreads through direct contact with blood and bodily fluids**
b) Spreads through inhaling infected droplets
c) Spreads through contaminated water
d) None of the above
8. *Nipah henipa* virus is a _____ borne virus
a) Water b) **Bat** c) Air d) None of the above
9. If a disease jumps from a non-human animal to a human, then it is termed as _____

a) Zoonotic disease b) Infectious disease c) Congenital disease d) Iatrogenic disease

10. Perinatal transmission is said to occur when a pathogen is transmitted from _____

- a) Non-human to human b) Infected to uninfected
c) Mother to infant d) All of the above

UNIT-II

11. Which pathogen causes Pneumonia disease?

- a) *Haemophilus influenza* b) *Salmonella typhi*
c) *Myxovirus influenza* d) *Bordetella pertussis*

12. Which vaccine is given to prevent Pneumonia?

- a) Salk vaccine b) BCG vaccine c) pneumococcal vaccine d) TAB vaccine

13. Which of the following statement is incorrect regarding Pneumonia?

- a) Fluid accumulation in alveoli b) Lips and Nails turn bluish
c) Fever and chills d) Blood in faeces

14. Diphtheria commonly affects which age group?

- a) Above 10 years b) Below 5 years c) Adults d) Above 60 years

15. 'Kali Khasi' is the common name of which disease?

- a) Tetanus b) Whooping cough c) Leishmania d) Typhoid

16. *Clostridium tetani* releases which type of toxins which further cause tetanus?

- a) Botulinum toxin b) Muscarin c) Dioxin d) Tetanospasmin

17. Which of the following is the combined vaccine given to children for protection against Tetanus, Whooping cough and Diphtheria?

- a) DPT vaccine b) BCG vaccine c) TAB vaccine d) HIB vaccine

18. Which of the following is incorrect regarding Typhoid disease?

- a) *Mycobacterium leprae* causes Typhoid
b) Infection through contaminated food and water
c) Symptoms include High fever, weakness, constipation and loss of appetite
d) Intestinal perforation and death may occur in severe cases.

19. Which of the following is a set of bacterial diseases?

- a) Malaria, poliomyelitis, mumps b) Mumps, cholera, typhoid
c) Plague, Leprosy, Diphtheria d) Measles, Tuberculosis, Tetanus

20. Widal test is used for the susceptibility of _____.

- a) Typhoid b) Cholera c) Malaria d) Cholera

UNIT-III

21. The non-living characteristic of viruses is _____
a) ability to multiply only inside the host b) ability to undergo mutation
c) **ability to be crystallized** d) ability to cause diseases in the host
22. This virus contains both DNA and RNA _____
a) Polio virus b) Herpes virus c) Cyanophage d) **Leukovirus**
23. The region in the body where polio virus multiplies is _____
a) Muscle cells b) Nerve cells c) **Intestinal cells** d) None of the above
24. Interferons curb infection of _____
a) Fungi b) Bacteria c) Cancer d) **None of these**
25. This virus, for the first time, was synthesized in the form of non-living crystals _____
a) Pox virus b) Flu virus c) **Tobacco mosaic virus** d) Bacteriophage
26. Causative of Chickenpox is _____
a) Bacteriophage T-2 b) **Varicella virus** c) SV-40 virus d) Adenovirus
27. Tetanus germs produce a toxin. It affects _____
a) jaw bones b) involuntary muscles
c) **voluntary muscles** d) both voluntary and involuntary muscles
28. This is a viral disease _____
a) Rickets b) Measles c) **Beri-beri** d) Syphilis
29. This is a communicable disease _____
a) **Rabies** b) Cancer c) Alkaptonuria d) Phenylketonuria
30. Hydrophobia or rabies is a disease caused by _____
a) Protozoan b) Nematode c) **Virus** d) Helminth

UNIT-IV

31. *Entamoeba histolytica* differs from amoeba is not having a _____
a) Nucleus b) **Contractile vacuole** c) Food vacuole d) None of these
32. The scaly annular skin lesions are generally called as _____
a) Candida b) **Tinea** c) Ascaris d) None of these
33. _____ can grow in hair and skin only.
a) **Trichophyton** b) Epidermophyton c) **Microsporium** d) None of these

34. Fungi infects only man is called _____
 a) **Anthropophilic** b) Zoophilic c) Geophilic d) None of these
35. Which of the following is the largest virus?
 a) **Megavirus chilensis** b) Arbo virus c) Herpes virus d) Mumps virus
36. Which of the following statements are true about the capsomeres?
 a) **It is an individual unit of the capsid** b) It is a viral protein for replication
 c) It is a unit of nucleic acid in viruses d) All of the above
37. Which of the following statements are true about the peplomers?
 a) It is an individual unit of capsids
 b) **It is a spike-like projection on the enveloped viruses**
 c) It is a projection on the viral membrane
 d) It is a spike-like projection on the capsids
38. Which of the following is not an RNA virus?
 a) **Retrovirus** b) Enterovirus c) Rhabdovirus d) Adenovirus
39. Bacteriophages that induce bacterial cell lysis are called _____.
 a) Viroids b) Lysogenic phages c) **Virulent phages** d) Temperate phages
40. Which of the following are the main functions of the capsid?
 a) Determines the antigenic specificity of the virus
 b) Protects genetic material from nuclease attack
 c) **Both A and B**
 d) None of these

UNIT -V

41. _____ cannot penetrate the outer membrane of G-ve bacteria
 a) Streptomycin b) Azithromycin c) **Penicillin G** d) Rifampicin
42. The plasmid resistance genes are transferred to progeny cells through _____.
 a) Transformation b) Transduction c) Conjugation d) **All the above**
43. Example of semisynthetic antibiotics is _____.
 a) Streptomycin b) **Ampicillin** c) Acyclovir d) Rifampicin
44. _____ agar is used for the susceptibility testing of non fastidious bacteria.
 a) Nutrient b) **Muller Hinton** c) Cetrimide d) EMB
45. In Amoeba and Paramecium, the cell organelle for osmoregulation is _____

- a) nucleus b) body surface c) contractile vacuole d) pseudopodia
46. Which class does the malarial parasite belong to?
 a) dinophyceae b) sarcodina c) ciliate d) sporozoa
47. Protozoa are classified on the basis of _____
 a) locomotory organelle b) shape c) number of nuclei d) size
48. Organ of defense in protozoans is _____
 a) statocysts b) trichocysts c) otocysts d) nematocysts
49. Which of the following is not a characteristic feature of protozoans _____
 a) binary fission b) contractile vacuole
 c) cell membrane as an outer body covering d) pseudopodia
50. Which of the following class of protozoa does not generally contain contractile vacuole?
 a) Sporozoa b) Rhizopoda c) Flagellata d) Ciliata

SECTION -B

Answer the following in 50 words each

(2marks)

UNIT-I

1. Write about modes of transmission of microbes.
2. Give examples of fomite borne diseases?
3. Define virulence and virulence factor
4. What are exoenzymes?
5. Define toxins
6. Write about the mechanism of endotoxin.
7. Define combination therapy?
8. Define prophylaxis
9. Give examples of beta lactam antibiotics.
10. Give examples of anti fungal drugs.

UNIT-II

11. Write about haemolysin.
12. Abbreviate TSST and explain
13. What is impetigo?
14. What are the stains for granules in *Corynebacterium*?
15. Write about media for *Corynebacterium*?

16. Define diphtheria toxin
17. What are the virulence factors of *Klebsiella*?
18. What is string test?
19. Write about thyphoid.
20. Define salmonellosis.

UNIT-III

21. Write the morphology of dengue virus.
22. What is poliomyelitis?
23. Write about clinical manifestation of polio virus?
24. Write about herpes virus?
25. Name the drugs used to treat herpes virus?
26. What are the types of hepatic virus?
27. Write about small pox infection?
28. What causes AIDS?
29. Write about the pathogenecity of rubella virus?
30. Abbreviate SARS and explain about its infection?

UNIT -IV

31. List out the types of *Histoplasmosis*.
32. Write short note n *Trichophyton*.
33. Write the morphology of *Taeniasolium*.
34. Define trophozoite and cyst
35. Types of giardia based on host specificity
36. Explain the 2nd stage of growth of *Ascaris lumbricoides*
37. Write about morphology of *Crypyococcous*
38. What are the clinical types of dermatophytes?
39. Define microspora.
40. What is opportunistic mycosis?

UNIT -V

41. What is mean by Drug resistance?
42. Define Probiotics.
43. Name any two bacteriostatic antibacterials with their function

44. Explain bactericidal antibiotics with example.
45. Name the types of drug resistance
46. Explain Stokes method?
47. What are the bacterial resistance strategies?
48. Define efflux pumps.
49. What are beta lactams? Give examples.
50. Differentiate intrinsic resistance and acquired resistance.

SECTION – C

Answer the following in 200 words each

(6marks)

UNIT – I

1. Give a short note on pathogenesis of microbial diseases.
2. Write the signs of microbial diseases.
3. Write the symptoms of microbial diseases.
4. Write short note on virulence factors.
5. Bring out the treatment of microbial infections.
6. Explain the prevention and control measures of microbial infections.
7. Explain the mode of transmission of microbes.
8. Briefly explain the immunity of microbial diseases.
9. How to collect the blood sample for the diagnosis of infection.
10. Explain the preliminary process of clinical pathogens.

UNIT – II

11. Write the characteristics of *Staphylococci*.
12. Give the characteristics of *Bacillus*.
13. Write the important characters of *Clostridium*.
14. Write the characteristics of *Corynebacterium*.
15. Bring out the characteristics of *Salmonella*.
16. Write the characteristics of *Klebsiella*.
17. How to diagnose *Vibrio* species?
18. Write the characteristics of *Pseudomonas*.
19. Give a note on Gas gangrene.
20. Write a short note on tetanospasmin.

UNIT- III

21. Write the Elek immunodiffusion test for *C.diphtheriae*?
22. What is String test?
23. Write the composition of ORS.
24. What are measles?
25. What is herpes labialis?
26. Write short note on Influenza virus.
27. Write short note on Swine flu virus.
28. Give short note on Poliovirus.
29. Write short note on Dengue.
30. Write short note on Rubella.

UNIT IV

31. What are the criteria used in classifying fungi and what are its divisions?
32. Give Dengue fever with emphasis on casual organism, vector and control measures.
33. Explain the clinical types of Candida.
34. Give the Macroscopic techniques in Parasitology.
35. Explain floatation techniques.
36. Explain sedimentation techniques.
37. Give the medical importance of Giardia.
38. Explain the floatation method in Parasitology.
39. Give short note on *Entamoeba*.
40. Give short note on *Taenia*.

UNIT-V

41. Explain the bacteriostatic antibacterials with their functions.
42. Explain the bactericidal antibacterials with their functions.
43. Explain the mechanism of drug resistance.
44. Classify the antimicrobials with their mode of action.
45. Give a brief account on antiviral drugs with their mode of action.
46. Briefly explain the antifungal drugs with their mode of action.
47. Give a brief account on antiprotozoan drugs with their mode of action.
48. Explain the methods of drug sensitivity.

49. Write an essay on general features of antimicrobial drugs.
50. How probiotics used as therapeutic agents?

SECTION -D

Answer the following in 500 words each

(12 marks)

UNIT- I

1. Explain the sources and mode of transmission of microbial pathogens.
2. Elaborately discuss about the pathogenesis with neat diagram.
3. Briefly explain the immunity of microbial diseases.
4. Give a detailed account on the virulence and virulence factors.
5. How to collect and transport the clinical pathogens?
6. Explain the antimicrobial drugs to treat the infection.
7. Explain the prevention and control measures of microbial infections.
8. Briefly explain the preliminary process of clinical pathogens.
9. Give a brief account on signs and symptoms of microbial infections.
10. Explain the analytical process of clinical pathogens.

UNIT -II

11. Discuss characteristics, classification, and pathogenesis of *Staphylococci*.
12. Give a brief account on *Corynebacterium*
13. Describe pathology, diagnosis, treatment, prevention and control measures of *Salmonella*
14. Discuss *Vibrio*.
15. Write a detailed account on *Pseudomonas*
16. Give a detailed account on *Clostridium* causing diseases.
17. Explain the pathogenesis and lab diagnosis of *Mycobacteria*.
18. Briefly discuss about *Klebsiella*.
19. Give an account on *Bacillus*.
20. Explain the virulence, virulence factors and toxins produced from *Clostridia*.

UNIT -III

21. Give a detailed account on Pox virus.
22. Discuss Herpes virus
23. Explain Orthomyxovirus
24. Describe Paramyxovirus

25. Give a detailed account on Enterovirus
26. Explain briefly about Arbovirus
27. What is hepatitis? Write in brief Hepatitis B virus, its spread and control.
28. Define HIV and explain it.
29. Give a detailed account on SARS.
30. How to spread dengue and chikungunya? Explain briefly.

UNIT-IV

31. What is dermatophytosis? Discuss in detail the culture characteristics of etiological agents.
32. Explain the clinical types, cultural characteristics and therapy of *Candidiasis*.
33. Give a detailed account on *Histoplasmosis*.
34. Give a detailed account on *Cryptococcosis*.
35. Give a detailed account on opportunistic mycoses.
36. Explain medical importance of *Entamoeba*.
37. Give a brief account on *Taenia*
38. Discuss about *Ascaris*.
39. Explain medical importance of *Giardia*.
40. Explain the floatation and sedimentation techniques in parasitology.

UNIT -V

41. What is drug resistance? Write in brief the origin of drug resistance.
42. Explain the mechanism of drug action.
43. Explain the classification of antimicrobial agents.
44. Classify the antimicrobials with their mode of action.
45. Briefly explain the mechanism of drug resistance.
46. Explain the in vivo methods of testing drug sensitivity.
47. Explain the in vitro methods of testing drug sensitivity.
48. Briefly explain the tube dilution method of drug sensitivity.
49. How probiotics acts as therapeutic agents? Explain it.
50. Briefly explain probiotics.

Question Bank

Section – A

(1 Mark)

Choose the best answer:

Unit I

- DNA is a _____
a) Carbohydrate b) Amino acid c) **Nucleic acid** d) Protein
- _____ provided the first evidence that DNA is the hereditary material.
a) Meischer b) **Griffith** c) Avery d) Lederberg
- The colony of *Diplococcus* having glistening appearance is called _____
a) **Smooth** b) Regular c) Rough d) Irregular
- The colony of *Diplococcus* having irregular appearance is called _____
a) Smooth b) Regular c) **Rough** d) Irregular
- Double helical model of DNA was proposed by _____
a) Zinder & Ledreberg b) **Watson & Crick**
c) Hershey & Chase d) Meselson & Stahl
- DNA finger printing was invented by _____
a) **Alec Jeffreys** b) Stanford c) Edwin d) Saiki et al
- Melting of DNA is denoted as _____
a) **T_m** b) t_m c) M_t d) m_t
- Separation of complementary strands of DNA is called _____
a) Renaturation b) **Denaturation** c) Naturation d) Annealing
- Rejoining of two complementary strands of DNA is called _____
a) **Renaturation** b) Denaturation c) Naturation d) Annealing
- Polymerization is carried out by _____
a) **DNA polymerase** b) Primase c) Gyrase d) Helicase
- DNA replicates in _____ mode.
a) Conservative b) Disruptive c) **Semi conservative** d) Dispersive
- The direction of DNA synthesis is _____
a) 3'-5' b) 5'-5' c) **5'-3'** d) 3'-3'

13. DNA strand synthesized in 5'-3' direction is called _____ strand.
a) Lagging b) Sense c) **Leading** d) Antisense
14. _____ strand is also called as Okazaki fragment
a) **Lagging** b) Sense c) Leading d) Antisense
15. Lagging strand was first described by _____
a) Arthur Kornberg b) Lederberg c) J. Cairns d) **Reiji Okazaki**
16. Primer is synthesized by _____
a) Polymerase b) Helicase c) Gyrase d) **Primase**
17. Replication of DNA starts at a specific sequence called _____
a) Promoter b) Restriction site c) **Origin of replication** d) Operator
18. The process of activation of deoxyribonucleotides by using ATP is called _____
a) Replication b) Dephosphorylation c) **Phosphorylation** d) Carboxylation
19. Replication terminates at _____ site.
a) tus b) tus- tur c) **Ter** d) 13 mer
20. 5'-3' exonuclease activity is carried out by _____
a) DNA Polymerase II c) **DNA Polymerase I**
b) DNA Polymerase III d) DNA Polymerase alpha
21. Cellular DNA exists as a _____
a) Double helix b) Circular DNA c) **Supercoil** d) Coil
22. Super helical form produced due to under winding is right handed and called _____
a) Positively supercoiled b) Relaxed c) **Negatively supercoiled** d) Strained
23. Super helical form produced due to over winding is left handed and called _____
a) **Positively supercoiled** b) Relaxed c) Negatively supercoiled d) Strained
24. Linking number is represented as _____
a) **L** b) l c) I d) I
25. Two DNA molecules that differ from each other only in a topological property are called _____
a) Isomers b) Radio isomers c) Isotopes d) **Topoisomers**
26. _____ is a measure of DNA superhelicity.
a) Specific linking number b) Twist c) **Writhe** d) Linking number
27. Enzymology of DNA replication was first studied by _____

- a) **Arthur Kornberg** b) J. Cairans c) Lederberg d) Reiji Okazaki
28. DNA Polymerase I was isolated by _____
- a) **Arthur Kornberg** b) J. Cairans c) Lederberg d) Reiji Okazaki
29. Enzymes and proteins required for DNA replication is collectively called as _____
- a) **Replicon** b) **Replisome** c) Replication fork d) Replication unit
30. Enzymes that add successive nucleotides to a growing DNA strand are called _____
- a) **DNA Polymerases** b) DNA ligases c) RNA polymerases d) DNA gyrases
31. DNA polymerase III is a _____
- a) Core enzyme b) **Holo enzyme** c) Sub enzyme d) Sub unit
32. Molecular weight of DNA polymerase I is _____ Daltons.
- a) 9,00,000 b) **1,90,000** c) 1,20,000 d) 5,00,000
33. Molecular weight of DNA polymerase II is _____ Daltons.
- a) 9,00,000 b) 1,90,000 c) **1,20,000** d) 5,00,000
34. Molecular weight of DNA polymerase III is _____ Daltons.
- a) **9,00,000** b) 1,90,000 c) 1,20,000 d) 5,00,000
35. DNA polymerase III is also called as _____
- a) Primase b) Gyrase c) Helicase d) **Replicase**
36. The _____ subunit of DNA polymerase III recognizes the template strand.
- a) **Beta** b) Epsilon c) Delta d) Theta
37. _____ can join the ends of two fragments of DNA.
- a) **DNA Ligase** b) Primase c) DNA Gyrase d) Helicases
38. _____ are called as unwinding protein.
- a) DNA Ligase b) Primase c) DNA Gyrase d) **Helicases**
39. Stress in DNA is relieved by _____
- a) DNA Ligase b) Primase c) **Swivelases** d) Helicases
40. _____ stabilizes and protects the separated strands of DNA.
- a) **SSBP** b) SNP c) rep proteins d) Polymerase

Unit II

41. _____ inhibit the enzyme dihydrofolate reductase.
- a) Actinomycin – D b) 5- Fluorouracil c) **Methotrexate** d) Chloramphenicol
42. _____ is an alkylating agent.
- a) UV b) X-ray c) Methotrexate d) **Nitrosoguanidine**

43. Methotrexate is used as an _____
 a) Antiviral agent b) Antifungal agent c) **Anticancer agent** d) Antibacterial agent
44. 5- Fluorouracil inhibit the activity of _____
 a) Dihydrofolate reductase c) **Thymidylate synthase**
 b) Gyrase d) Helicase
45. Dimeration is caused by _____
 a) X-rays b) Cosmic rays c) **UV rays** d) IR rays
46. The loss of purine from DNA strand is called _____
 a) Dehydration b) **Depurination** c) Decarboxylation d) Dephosphorylation
47. Addition of alkyl group to nitrogenous base is called _____
 a) **Alkylation** b) Methylation c) Dimeration d) Oxidation
48. The error missed by the editing enzymes DNA polymerase I and DNA polymerase III are corrected by _____
 a) Very short patch repair c) **Mismatch repair**
 b) Excision repair d) Base excision repair
49. Excision repair is also called as _____
 a) Light repair b) Mismatch repair c) **Dark repair** d) Photoreactivation
50. The repair pathway in which the undamaged parental DNA is copied to produce a normal daughter molecule is called _____
 a) SOS repair c) **Recombinational repair**
 b) Very short patch repair d) Mismatch repair
51. SOS repair is also called _____
 a) Nucleotide excision repair c) **Error prone repair**
 b) Light repair d) Dark repair

Unit III

52. In m- RNA, 'm' stands for _____
 a) Mitochondrial b) **Messenger** c) Mutated d) Methylated
53. In r- RNA, 'r' stands for _____
 a) Recombinational b) Repaired c) **Ribosomal** d) Restricted
54. In t- RNA, 't' stands for _____
 a) **Transfer** b) Transcriptional c) Translational d) Telomeric
55. The r- RNA is present in _____

- a) Mitochondria b) Nucleus c) Ribosome d) Cytoplasm
56. The formation of RNA from DNA templates is called _____
a) Replication b) Translation c) **Transcription** d) Attenuation
57. Transcription is carried out by the enzyme called _____
a) DNA polymerases b) **RNA polymerases** c) Reverse transcriptase d) Primases
58. Direction of transcription is _____
a) **5'-3'** b) 3'-5' c) 3'-3' d) 5'-5'
59. The alpha subunit of RNA polymerase is coded by _____ gene.
a) rpo B b) rpo C c) **rpo A** d) rpo D
60. The beta subunit of RNA polymerase is coded by _____.
a) rpo A b) **rpo B** c) rpo D d) rpo C
61. The sigma subunit of RNA polymerase is coded by _____.
a) rpo A b) rpo B c) rpo C d) **rpo D**
62. The site where RNA synthesis is started is called _____.
a) Operation b) **Promoter** c) Origin d) Repressor
63. _____ is a stretch of nucleotides in DNA that is transcribed into a single functional RNA molecule.
a) Translation unit b) **Transcription unit**
c) c) Replication unit d) Post transcriptional unit
64. In prokaryotes the transcription unit is called _____.
a) Gene b) **Operon** c) Promoter d) Attenuator
65. In eukaryotes the transcription unit is called _____.
a) **Gene** b) Operon c) Promoter d) Asenuator
66. Pribnow box was discovered by _____.
a) Lederberg b) **David Pribnow** c) Arthur d) Cairans
67. The transcribed RNA molecule is called _____.
a) m-RNA b) r- RNA c) t- RNA d) **RNA transcript**
68. The protein involved in termination of transcription is called _____.
a) TUS b) **Rho** c) SSBP d) Helicases
69. _____ m- RNA molecule contains the codes of a single cistron.
a) Polycistronic b) **Monocistronic** c) Multicistronic d) Tricistronic
70. _____ m- RNA molecule contains the codes of more than one cistron.
a) **Polycistronic** b) Monocistronic c) Multicistronic d) Tricistronic

71. Actinomycin -D is also called as _____
a) Erythromycin b) **Dactinomycin** c) Myostatin d) Chloramphenicol
72. The effect of control exerted by leader sequence is called _____
a) **Attenuation** b) Antitermination c) Replication d) Transcription
73. The part of leader m-RNA comprising regions 3 and 4 and a string of eight U is called _____
a) **Attenuator** b) Leader c) Repressor d) Operator
74. The suppression of termination is called _____
a) Attenuation b) Transcription c) **Antitermination** d) Translation
75. Aminoacids are activated by the enzyme called _____
a) Phosphorylase b) Pyrophosphate
b) Polymerases d) **Aminoacyl t-RNA synthetase**
76. The ribosome binding site on m-RNA is called _____
a) Operator b) Promoter c) Attenuator d) **Shine-Dalgarno Sequence**
77. The initiation codon on m-RNA is called _____
a) UAA b) UGA c) AGA d) **AUG**
78. P site is also called _____
a) **Donor site** b) Aminoacyl site c) Acceptor site d) Termination site
79. A site is also called _____
a) **Acceptor site** b) Donor site c) Aminoacyl site d) Termination site
80. Peptide bond formation is catalysed by _____
a) Amino acyl t-RNA transferase c) **Peptidyl transferase**
b) Dephosphorylase d) Phosphorylase
81. The movement of t-RNA from the A-site to P-site leaving the A-site vacant is called _____
a) Transcription b) Translation c) Termination d) **Translocation**
82. The enzyme responsible for translocation is called _____
a) Transcriptase b) **Translocase** c) Primase d) Transferase
83. A large translation unit with several ribosomes attached to one m-RNA is called _____
a) **Polysome** b) Monosome c) Autosome d) Ribosome
84. As translation proceeds, polypeptide chain gets, transported to _____
a) Mitochondria b) Cytoplasm c) Plasma membrane d) **Endoplasmic reticulum**

85. The role of endoplasmic reticulum in protein processing and sorting was demonstrated by _____
- a) **George Palade** b) Alec Jeffreys c) Lederberg d) Cairns
86. _____ is a set of closely linked genes regulating a metabolic pathway in prokaryotes.
- a) Gene b) **Operon** c) Promoter d) Operator
87. The operon hypothesis was put forward by _____
- a) Watson & Crick b) Meselson & Stahl c) **Jacob & Monod** d) Hershey & Chase
88. If the presence of a particular regulatory factor increases gene expression then the gene is said to be under _____
- a) Negative regulation c) Coordinate repression
b) Catabolite repression d) **Positive regulation**
89. If the presence of a particular regulatory factor increases gene expression then the gene is said to be under _____
- a) Negative regulation c) Coordinate repression
b) Catabolite repression d) **Positive regulation**
90. If the presence of a particular regulatory factor reduces gene expression then the gene is said to be under _____
- a) Positive regulation c) Coordinate repression
b) Catabolite repression d) **Negative regulation**
91. Lac operon is responsible for the metabolism of _____
- a) Lactone b) **Lactose** c) Lecithin d) Lactate
92. Lac operon consists of 3 structural gene namely _____
- a) a,b,c b) z,x,e c) **z,y,a** d) m,n,o
93. The protein product of ara E is _____
- a) Arabinose isomerase c) Arabinose transport protein
b) L- ribulokinase d) **Arabinose permease**
94. The additional level of control in trp operon is _____
- a) Antitermination b) **Attenuation** c) Positive control d) Negative control
95. The cap present at the 5' end of m-RNA is _____
- a) 7- Ethyl Guanosine c) **7- Methyl Guanosine**
b) 7- Methyl Adenosine d) 7- Ethyl Adenosine

96. Addition of polyadenylate to the 3' end of primary m-RNA transcript is called _____
- a) **Polyadenylation** b) Polyaddition c) Capping d) Splicing
97. Polyadenylation is carried out by the enzyme _____
- a) DNA Polymerase c) **Polyadenylate polymerase**
b) RNA Polymerase d) Primase
98. The process of cutting out introns from primary RNA transcript and rejoining of exons is called _____
- a) **RNA Splicing** b) Capping c) Methylation d) Trimming

Unit IV

99. The sudden heritable change in nucleotide sequence of an organism is called _____
- a) Repression b) Suppression c) **Mutation** d) Transversion
100. The process that produces a mutation is called _____
- a) Repression b) Suppression c) **Mutagenesis** d) Transversion
101. The agent which causes mutation is called _____
- a) Mutant b) **Mutagen** c) Revertant d) Suppressor
102. The phenomenon by which the mutant organism regains its wild type phenotype is called _____
- a) Suppression b) **Reversion** c) Mutation d) Mutagenesis
103. The term mutation was first used by _____
- a) **Hugo de vries** b) Chargaff c) Lederberg d) Cairns
104. A mutation that overcomes the effect of another mutation is called _____
- a) Reversion b) Demutation c) **Suppression** d) Substitution
105. Mutant can be isolated by _____ technique.
- a) Serial dilution b) **Replica plating** c) Streak plate d) Spread plate
106. The organism undergoing reversion is called _____
- a) **Revertants** b) Mutant c) Mutagen d) Suppressor
107. _____ are extra chromosomal DNA
- a) **Plasmids** b) B- DNA c) Z- DNA d) Junk DNA
108. Plasmid integrated with chromosome is called _____
- a) Polysome b) **Episome** c) Ribosome d) Monosome
109. Plasmids can be amplified using _____ -

- a) Tetracycline b) **Chloramphenicol** c) Erythromycin d) Actinomycin
110. Col plasmid codes for the synthesis of _____
 a) Collagen b) **Colicin** c) Cholesterol d) Cellulose
111. The plasmid responsible for its transfer is called _____ plasmid.
 a) R b) **F** c) Col d) Col E1
112. Plasmids are _____
 a) **Self replicating** b) Non self replicating c) Non replicating d) Dependent replicating
113. Transposons are also called as _____
 a) Sleeping genes b) Stationary genes c) **Jumping genes** d) Suicide genes
114. Transposons were first identified by _____
 a) Shapiro b) Bhukari c) **McClintock Barbara** c) Mizurchi
115. _____ described the nomenclature of transposable elements in prokaryotes,
 a) **Campbell et al** b) Towbin et al c) Williams et al d) Southern et al
116. Transposons were first identified in _____
 a) Wheat b) **Maize** c) Black gram d) Bengal gram
117. _____ recognizes the ends of transposons and connects them to target target site.
 a) Replicase b) Resolvase c) Topoisomerase d) **Transposase**
118. _____ provides site specific recombination function.
 a) Replicase b) **Resolvase** c) Topoisomerase d) Transposase
119. _____ is the gene which encodes the enzyme Transposase.
 a) **tnpA** b) tnpB c) tnpC d) tnpR
120. _____ is the gene which encodes the enzyme resolvase.
 a) tnpA b) tnpB c) **tnpR** d) tnpD

Unit V

121. The uptake of naked DNA by a bacterium is called _____
 a) Transduction b) **Transformation** c) Conjugation d) Ingestion
122. The ability of a bacterium to undergo transformation is called _____
 a) **Competence** b) Acceptance c) Supression d) Reversion
123. Transformation was discovered by _____
 a) Lederberg b) Norton c) **Griffith** d) Avery

124. The exchange of genetic material from one bacterium to another through sex pili is called _____
- a) Transduction b) Transformation c) **Conjugation** d) Ingestion
125. Conjugation is mediated by _____ plasmid.
- a) R b) **F** c) Col d) Col E1
126. Colicin is produced by _____ plasmid.
- a) R b) F c) **Col** d) Col E1
127. In conjugation the genetic material is transferred through _____
- a) Plasma membrane b) **F pili** c) Cell wall d) Pores
128. Transfer of genetic material from one bacterium to other through bacteriophage is called _____
- a) **Transduction** b) Transformation c) Conjugation d) Ingestion
129. Specialized transduction is also called as _____ transduction
- a) Generalised b) **Restricted** c) Simple d) Co transduction
130. Transformation was discovered by _____
- a) Lederberg b) Tatum c) **Fredrick Griffith** d) Johann
131. Transduction was discovered by _____
- a) **Norton & Ledrberg** b) Arthur c) Fredrick d) Watson
132. The phages that reproduce by using a lytic cycle are called _____
- a) Lysogen b) **Virulent phage** c) Prophage d) Lysogeny
133. A defective phage that carries bacterial DNA is called a _____
- a) **Transducing particle** b) Lysogen c) Lysogeny d) Prophage

Section - B

(2 marks)

Answer the following in 50 words each:

Unit I

1. Define Nucleic acids.
2. What is a genetic material?
3. Define DNA.
4. Define RNA.
5. What are the properties of genetic material?
6. Define replication of DNA.
7. What is the role of DNA polymerase in DNA replication?

8. Why DNA replication is considered to be complex?
9. Define Semi conservative mode of replication of DNA.
10. Mention any four enzymes which are involved in DNA replication.
11. Define denaturation.
12. What is renaturation?
13. Define melting of DNA.
14. Define hyper chromic effect.
15. Define hypo chromic effect.
16. Define Tm.
17. What is proof reading?
18. What is super helicity?
19. Define linking number.
20. What is a topologically strained DNA?
21. What is a topologically relaxed DNA?
22. What is negative supercoiling?
23. What is positive supercoiling?
24. Define supercoiling.
25. Define specific linking number.
26. Define Writhe.
27. Define twist.
28. Define topoisomerases.
29. What are the modes of DNA replication?
30. What is DNA replicase system?
31. Define replisome.
32. What is DNA polymerase?
33. What are the types of DNA polymerase in prokaryotes?
34. What are the types of DNA polymerase in eukaryotes?
35. What is the role of DNA Ligase?
36. What is the role of polynucleotide ligase?
37. What are the proteins associated with DNA replication?
38. Define helicase.
39. Define topoisomerases.
40. Define SSBP.
41. Define primases.

Unit II

42. What is methotrexate?
43. What are alkylating agents?
44. What is 5- fluorouracil?
45. What is DNA damage?
46. Define dimeration.
47. Define alkylation.
48. What is oxidative damage?
49. Define pyrimidine dimer.
50. Define DNA repair mechanism.
51. What is thymine dimer formation?
52. What is SOS repair system?
53. Define DNA repair.
54. Define Base excision repair.
55. Define recombinational repair.
56. List down the various types of DNA damage.
57. Mention about Photo reactivation.
58. List down the types of DNA repair mechanisms.
59. What is nucleotide repair mechanism?
60. What is error prone repair?
61. What is dark repair?

Unit III

62. Define r- RNA.
63. Define t- RNA.
64. Define m- RNA.
65. Define Transcription.
66. What are the basic apparatus in transcription?
67. What are the types of RNA polymerases?
68. Mention the inhibitors of transcription.
69. List out enzymes involved in transcription.
70. Define promoter.
71. What is RNA polymerase?
72. Define Transcription unit.
73. What is pribnow box?

74. What is primary transcript?
75. What is translation?
76. What is 30S preinitiation complex?
77. Define Shine- Dalgarno sequence.
78. Define translocation.
79. What is poly ribosome complex?
80. Define polysome.
81. What is signal hypothesis?
82. Write about the inhibitors of translation.
83. Define operon.
84. Name any 4 operon systems.
85. List down the structural genes involved in Lac operon with its role.
86. Define negative regulation.
87. Define positive regulation.
88. Define methylation of RNA.
89. Define Splicing.
90. What is capping of m- RNA?
91. What do you mean by polyadenylation of m- RNA?

Unit IV

92. Define mutation.
93. What is mutagenesis?
94. Write about silent mutation.
95. Define mutation rate.
96. What is base analogue mutation?
97. Mention few types of mutation.
98. Define mutagen.
99. Define mutant.
100. Define revertants.
101. What is spontaneous mutation?
102. What is suppression?
103. What are physical mutagens?
104. Define carcinogenicity testing.
105. List down some of the chemical mutagens.
106. Define plasmid.

107. Mention the types of plasmid.
108. Mention any four properties of plasmid.
109. What is the role of F- Plasmid?
110. Define Transposons.
111. Mention the types of transposons.
112. List down the classes of Transposons.
113. What are IS elements?
114. Define Transposition.
115. Define complex transposon.
116. Define composite transposon.

Unit V

117. Define transformation.
118. Define natural competence.
119. Define artificial competence.
120. What is conjugation?
121. Define Hfr conjugation.
122. Define col factors.
123. Define colicins.
124. Illustrate conjugation with a neat sketch.
125. What is generalized transduction?
126. What is specialized transduction?
127. List down types of transduction.
128. What is called transduction?
129. Define co transduction.
130. Define HFT.
131. Define LFT.
132. What is transduction mapping.

Section – C

(6 marks)

Answer the following in about 200 words:

Unit I

1. Prove that DNA is the genetic material.
2. Write short notes on Nucleic acids.
3. Explain about Griffith's experiment.

4. Discuss about the current concepts of molecular biology and microbial genetics.
2. Explain the historical aspects of molecular biology and microbial genetics.
3. Describe the melting of DNA.
4. Write about the modes of replication.
5. Write about Conservative mode of DNA replication.
6. Comment on semi conservative mode of replication.
7. Explain about the proof reading mechanism of DNA replication.
8. Comment on superhelicity and linking number.
9. Write notes on topological properties of DNA.
10. List out the features of DNA.
11. Write about Enzymology of DNA synthesis.

Unit II

12. Explain about inhibitors of DNA replication.
13. Write about types of DNA damage.
14. Discuss about DNA repair mechanism.
15. Explain about mismatch repair mechanism.
16. Write short notes on error prone repair mechanism.
17. Comment on recombinational repair.
18. Discuss about excision repair.
19. Explain about Nucleotide excision repair.
20. Describe about Base excision repair mechanism.
21. Write about very short patch repair.
22. Explain in detail about SOS repair.
23. Describe Dark repair.

Unit III

24. Comment on Transcription.
25. Write down the general principles and basic apparatus of transcription.
26. Explain the initiation, elongation, and termination of transcription.
27. Give an account on enzymology and inhibitors of transcription.
28. Give an account on translation.
29. Differentiate transcription and translation.
30. Comment on Controlled termination.
31. Explain negative regulation with an example.
32. Explain positive regulation with an example.

33. Explain regulation by attenuation.
34. Write about his operon.
35. Describe about Lac operon.
36. Explain about trp operon.
37. Comment on ara operon.
38. Give an account on post transcriptional modifications.
39. Write about splicing mechanism.
40. Describe the maturation and processing of m-RNA.
41. Describe the maturation and processing of t-RNA.
42. Describe the maturation and processing of r-RNA.

Unit IV

43. Comment on Mutation.
44. Write short notes on types of mutation.
45. Write about spontaneous mutation.
46. Explain about mutagens and mutants.
47. Give an account on mutant isolation.
48. Explain about mutagenesis.
49. Describe the types of mutagenesis.
50. Comment on Supression and revertants.
51. Describe about plasmids.
52. Comment on properties of plasmids.
53. Explain about types of plasmids.
54. Write about the transfer of plasmid.
55. Describe the replication of plasmid.
56. Write in detail about the detection of plasmid.
57. Explain the nomenclature of Transposons.
58. Explain the mechanism of transposition.
59. Briefly explain the classes of transposons.

Unit V

60. Discuss about Transformation.
61. Discuss about natural and artificial competence.
62. Write about transformation in *E.coli*.
63. Explain about transformation in *Bacillus* sp.

64. Explain about conjugation.
65. Give an account on transformation mapping.
66. Explain about bacterial conjugation.
67. Elaborate the structure and function of F- plasmid.
68. Describe about interrupted and uninterrupted mating.
69. Comment on conjugation in *E. coli*.
70. Explain colicins and col factors.
71. Comment on transduction.
72. Give an account on generalized transduction.
73. Write about specialized transduction with a neat sketch.
74. Describe about Co transduction.

Section – D (12 marks)

Answer the following in 500 words:

Unit I

1. Explain about experimental evidence which proves DNA as genetic material.
2. Discuss the historical aspects and current concepts of molecular Biology.
3. Discuss about 3 modes of replication of DNA.
4. Explain in detail about DNA replication.
5. Explain about hyperchromicity effect and melting of DNA.
6. Elaborate the features of DNA.
7. Comment on enzymology of DNA synthesis.

Unit II

8. Describe about inhibitors of DNA replication.
9. Explain about DNA damage.
10. Comment on SOS repair system with a sketch.
11. Write in detail about types of excision repair mechanism.
12. Give a detailed account on recombinational repair mechanism.
13. Discuss about methyl directed mismatch repair.
14. Explain in detail about nucleotide excision repair mechanism of DNA.
15. Comment on Base excision repair mechanism.
16. Explain about Mismatch repair mechanism.
17. Describe about thymine dimer formation.
18. Write about very short patch repair.

Unit III

19. Explain in detail about Transcription mechanism.
20. Explain about controlled termination.
21. Describe about Protein synthesis with a neat sketch.
22. Explain about Lac Operon.
23. Discuss about arabinose operon.
24. Give a detailed account on Trp operon.
25. Differentiate transcription and translation.
26. Describe about inhibitors of transcription and translation.

Unit IV

27. Explain in detail about Mutation.
28. Discuss about types of mutation.
29. Explain about mutagenesis.
30. Explain in detail about mutagens.
31. Describe about mutant isolation.
32. Write an essay on spontaneous mutation.
33. Explain about plasmids.
34. Describe about types of plasmids.
35. Discuss about replication of plasmids.
36. Comment on properties of plasmids.
37. Elaborately explain detection of plasmid.
38. Explain the transfer of plasmid.
39. Write an essay on Transposons.
40. Explain the structure of composite transposons.
41. Write about the classes and nomenclature of transposons.

Unit V

42. Describe about Bacterial transformation.
43. Elaborate about the mechanism of transformation in *E. coli*.
44. Elaborate about the mechanism of transformation in *Bacillus sp.*
45. Explain about transformation mapping.
46. Explain in detail about conjugation.
47. Explain in detail conjugation mapping.
48. Describe the conjugation in *E.coli*.
49. Write an essay on Transduction.

50. Discuss about types of transduction.
51. Compare conjugation and transformation.
52. Differentiate transformation and transduction.
53. Describe about transduction mapping.
54. Give a detailed account on Transduction.

Section – A

(1 Mark)

Choose the best answer:

Unit I

- Picoplankton size ranges from
a) 0.02 - 0.20 μ m b) 0.02-2.0 μ m c) 2-20 μ m d) 0.2-20 mm
- Two parts of waves
a) Spring & neap b) flow & ebb tide c) semi diurnal & diurnal tide d) crest and trough
- When the moon's orbit is farthest from the earth is called as
a) perigee b) Perihelion c) apogee d) aphelion
- _____ is boundary separating two liquid layers of different densities.
a) pycnocline b) Drift c) Gyre d) none of these.
- Density of ocean water at the sea surface is about
a) 1057kg/m³ b) 1560kg/m³ c) 1027 kg/m³ d) none of these
- _____ is called golden algae.
a) dinoflagellate b) diatoms c) mesoplankton d) none of these.
- _____ are temporary planktons.
a) Mesoplankton b) Mexoplankton c) Holoplankton d) Femtoplankton
- _____ is a Zooplankton.
a) Silico flagellates b) diatoms c) bluegreen algae d) siphonophores.
- The word plankton means
a) floaters b) drifters c) dwellers d) all of these.
- The chemical composition of seawater is
a) 96.5%water & 2.5%salt b) 97%water & 3%salts. c) 95%water & 4%salts
d) 91.5%water & 1.5%salt.

Unit II

- Mesopelagic is a layer of ocean at a depth of
a) 500 to 1000 m b) 600 to 1200 m c) 700 to 1000 m d) 400 to 1200 m

12. _____ zone can also be called lower midnight.
 a) Bathyal b) **abyssal** c) shallow sea d) none of these
13. _____ made of limestone and shaped like hubcaps.
 a) dinoflagellates b) diatom c) **coccolithophores** d) none of these
14. Chemical that provides what is needed for Organism to live and grow.
 a) **nutrients** b) carbon c) air d) water
15. The movement of cold, nutrient rich water from deep in the ocean to the surface.
 a) run off b) **upwelling** c) marine snow d) none of these
16. Particles of organic matter that fall from the surface of the ocean to the deeper water.
 a) upwelling b) run off c) **marine snow** d) none of these.
17. Almost 75 % of mercury in marine environment originated from natural source like
 a) **eroding ores** b) fishes c) corals d) marshes.
18. Benthos includes organisms like
 a) sealion b) dolphins c) **star fish** d) all of them.
19. Microbes involved in nitrification process
 a) *Thiobacillus denitrificans* b) *Nitrobacter* c) *micrococcus* d) all of them
20. Groups of marine life includes
 a) Nekton b) plankton c) benthos d) **all of the above.**

Unit III

21. Where are coral reefs found ?
 a) up north within the polar climate b) down south within the polar climate
 c) **near the equator** d) next to rainforest
22. Which environment has historically been the most stable?
 a) Desert b) **coral reef** c) tundra d) tropical rain forest
23. What type of shore is most biologically diverse?
 a) Sandy beach b) Mud flat c) Salt marsh d) **Rocky shore**
24. What part of a coral reef is above a depth of 20 meters?
 a) **Buttress zone** b) Supralittoral zone c) Hermatypic zone d) Bathyal zone
25. A coastal body of water connected to the ocean and supplied with fresh water from a river is an _____.
 a) Shelf b) Inlet c) **Estuary** d) Atoll
26. What is the type of exoskeleton formed by corals?
 a) Hydrogen Calcite b) **Calcium Carbonate** c) Limestone d) Phosphate

27. What is the term for all of the biotic and abiotic components of a system?
 a) **Ecosystem** b) ecotone c) biome d) community
28. This ecosystem constitutes a systematic link between terrestrial and marine ecosystems
 a) Mango forests b) **Mangrove forests** c) Evergreen forests d) Rain forests
29. The habitat for *Actinomyces israelii* is
 a) anal cavity b) skin c) genital track d) **oral cavity**
30. Which is not a threat to coral reefs?
 a) coral mining b) large amounts of nitrogen c) **trash** d) global warming

Unit IV

31. Which is the most input of waste causing marine pollution?
 a) Pesticides b) **Pipes directly discharge waste into the sea**
 c) Death of aquatic organisms d) Climatic conditions
32. Which of the following is the greatest volume of waste discharge to water?
 a) Spillage from oil pipelines b) **Sewage** c) Nuclear waste d) Spillage from tankers
33. Which of the following way is used to reduce the pollution load on marine water?
 a) Manual cleaning of pollutants b) Damping the pollutants during winter
 c) **Introducing sewage treatment plants** d) Ban the license of industries which are near to the sea
34. This bioremediation technique includes mixing contaminated water and soil, fertilizers and carbon dioxide in a bioreactor to stimulate biodegradation
 a) Composting b) **Slurry-phase bioremediation** c) In situ hybridization
 d) Biopile treatment
35. **Bioremediation**
 a) usage of microbes to create new organisms
 b) usage of anaerobic bacteria to create new antibiotics
 c) **usage of microbes to destroy environmental pollutants**
 d) usage of aerobic bacteria to create new vaccines
36. What are the sources of radioactive waste in marine environment?
 a) e-waste b) nuclear waste c) military waste d) **all of the above**

37. Due to high demand of oil across globe it is transferred in billions of barrels and sometimes lead to

- a) Benefits b) success c) discovery d) spills

38. Plastic decomposes after

- a) 100 years b) 10 years c) 1000 years d) 1 year

39. This is not an indigenous microbe used for bioremediation

- a) *Pseudomonas aeruginosa* b) *Piscirickettsia salmonis* c) *Phanerochaete sordida* d) *E. coli*

40. A process using microbes to convert toxic industrial wastes to less toxic or non-toxic compounds is

- a) Precipitation b) Complement fixation c) Bioconversion d) **Bioremediation**

Unit V

41. "Blue Revolution" is related with the following

- a) Food grain production b) Oil seed production c) **Fish production** d) Milk production

42. Dinoflagellates belong to

- a) Monera b) **Protista** c) Fungi d) Animalia

43. Agar-agar is obtained from

- a) Green Algae b) **Red Algae** c) Brown Algae d) Yellow green Algae

44. What is the term used for breeding fishes in ponds and tanks?

- a) horticulture b) agriculture c) **pisciculture** d) viticulture

45. In which of the following organisms the cell wall is made up of two overlapping shells?

- a) Slimemolds b) **chrysophytes** c) dinoflagellates d) euglenoids

46. Phycocolloids are present in cell wall of _____

- a) Blue green algae b) Red algae c) **brown algae** d) Green algae

47. Which of the following protozoans show bioluminescence?

- a) opaline b) paramecium c) entamoeba d) **noctiluca**

48. Food reserve in dinoflagellates is _____

- a) fucoxanthin b) **starch** c) mannitol d) alginic acid

49. Embryo is not formed in thallophyta due to _____

- a) gametic meiosis b) zygotic meiosis c) gametic mitosis d) zygotic mitosis

50. Which of the following pigments are not present in dinoflagellates?

- a) chlorophyll a b) fucoxanthin c) chlorophyll b d) chlorophyll c

Section - B

(2 marks)

Answer the following in 50 words each:

Unit I

1. Define plankton.
2. Classify plankton based on their size.
3. Write about diatoms.
4. Define zoo plankton.
5. Write three examples of phytoplankton.
6. Write any two advantages and disadvantages of phytoplankton.
7. What is meant by neap tide?
8. Explain magnitude of tides.
9. Write about ocean currents.
10. What is pycnocline?

Unit II

11. Write about phosphorus cycle.
12. Write about carbon cycle.
13. Write about sulphur cycle.
14. Define marine snow.
15. What is meant by sink and source?
16. Give the importance of nutrient cycle.
17. Give the role of microorganisms played in nutrient cycles
18. Write about nitrogen cycle.
19. Define shallow sea system.
20. Give the ecology of coastal sea microorganisms.

Unit III

21. Define estuaries.
22. Define coral polyps.
23. What are the types of coral reefs?
24. Write the importance of marine actinomycetes
25. Give any two importance of coral reefs.
26. Define salt marshes.
27. What are the threats to coral reefs?
28. What are the zones of the sea?
29. Define mangroves.
30. Write about species interaction.

Unit IV

31. Define marine pollution.
32. Write about properties of heavy metal.
33. Write about the toxic effects of mercury.
34. What are the natural sources of radioactive wastes?
35. Define bioindicators.
36. Explain the role of microbes in pollution abatement.
37. What are the causes of thermal marine pollution?
38. What are biotic effects?
39. Define bioremediation.
40. Define biodegradation.

Unit V

41. Name some fishery products.
42. How is fish oil prepared?
43. Define phycocolloids
44. What is algin?
45. Name some bacterial diseases in fish.
46. Name some viral diseases in fishes.

47. Write about fungal infection in fishes.
48. What are dinoflagellates?
49. Define saxitoxin.
50. Draw the structure of tetrodotoxin.

Section – C (6 marks)

Answer the following in about 200 words:

Unit I

1. Classify the Marine microbes.
2. Write about plankton and its types.
3. Describe phytoplankton.
4. Describe zooplankton.
5. Write the advantages and disadvantages of zooplankton.
6. Write the beneficial and harmful effects of phytoplankton.
7. Define tides.
8. Explain the physical properties of marine water.
9. Explain the chemical properties of marine water.
10. Write in detail a) salinity b) dissolved oxygen.

Unit II

11. Write short note on role of microorganisms in carbon cycle.
12. Give short note on role of microorganisms in nitrogen cycle.
13. Write short note on role of microorganisms in sulphur cycle.
14. Write short note on role of microorganism in Phosphorus cycle.
15. Explain about ecology of coastal microorganism.
16. Write about ecology of Shallow sea microorganisms.
17. Write about ecology of deep sea microorganisms.
18. Write the importance of coastal, shallow and deep sea microbes.
19. Write the significance of coastal, shallow and deep sea microbes.
20. Diversity of microorganism – Explain.

Unit III

21. Write short note on estuaries.
22. Write note on salt marshes.
23. Give an account on mangroves.
24. Write short note on coral reef.
25. Give short note on threats and conservation of coral reef.
26. Discuss about conservation of mangroves.
27. Give elaborate note on actinomycetes in the mangrove and coral environment.
28. Give the types of coral reefs.
29. Discuss about the species interaction.
30. Give the importance of coral reef.

Unit IV

31. Write the sources of heavy metal pollution
32. Discuss about the control measures of heavy metal pollution
33. Write the sources of thermal pollution
34. Discuss about the control measures of thermal pollution
35. Elaborate note on microbial biodegradation
36. Write short note on bioremediation of heavy metals
37. Write the effects of radioactive pollution
38. Give a note on control measures of radioactive pollution
39. Role of microbes in pollution abatement – Explain
40. Discuss about biofouling

Unit V

41. List out the fishery products.
42. Explain dinoflagellates.
43. Write in detail about phycocolloids.
44. How to prepare fish meal?
45. How will you prepare fish oil?
46. Write short notes on saxitoxin.
47. Write notes on tetrodotoxin.
48. How marine microorganism act as a source of biomedical resources.
49. Dinoflagellates act as a source of bioactive molecules - Explain.

50. Write about the microbial diseases of marine microorganisms.

Section – D

(12 marks)

Answer the following in 500 words:

Unit I

1. Explain in detail about the properties of marine water
2. Classification of marine microorganisms - Explain
3. Give a detailed account on physical properties of marine environment
4. Write in elaborate of waves
5. Give a detailed account on chemical properties of marine environment
6. Give the types of ocean currents
7. Write about the impacts of marine microorganisms
8. Elaborate about temperature of ocean
9. Write in detail about salinity
10. Write in detail about dissolved oxygen

Unit II

11. Write about Ecology of coastal, shallow and deep sea microorganisms.
12. Write short note on carbon cycle and nitrogen cycle and the role of microorganism in it.
13. Write short note on Phosphorus and Sulphur cycle and the role of microorganisms in it.
14. Write about ecology and importance of coastal microbes.
15. Explain the importance and significance of marine ecology.
16. Write about the role of microorganisms in nutrient cycle.
17. Write about Ecology and importance of deep sea microorganisms.
18. Write about Ecology and importance of Shallow sea microorganisms.
19. Write in detail about the diversity of marine microorganisms.
20. Write short note on Carbon and phosphorus cycle and role of microorganisms in it.

Unit III

21. Discuss about coral reefs
22. Write in brief about ecology and types of coral reefs
23. Write in elaborate about salt marshes.
24. Discuss in detail about mangroves

25. Give in detail about threats and conservation of ecosystem
26. Write in detail about estuaries
27. Give the importance of coral reefs
28. Explain about species interaction
29. Explain in detail about adaptation of coral reefs
30. Write in detail about actinomycetes in the coral environment

Unit IV

31. Write about the sources, effects and control measures of heavy metal pollution.
32. Give in brief about oil pollution.
33. Write about the sources, effects and control measures of radioactive pollution.
34. Explain the sources, effects and control measures of thermal pollution.
35. Write about the sources, effects and control measures of a) heavy metal pollution
b) Radioactive pollution.
36. Write about the sources, effects and control measures of a) thermal pollution b) oil pollution.
37. Write a detail account on biofouling.
38. Write a detailed account on bio remediation of heavy metal.
39. Write a detail account on microbial biodegradation of hydrocarbon.
40. Write a detailed account on microbial indicators of pollution.

Unit V

41. Write in detail about fishery product.
42. Give an account on phycocolloids.
43. Write detailed account on microbial diseases, diagnosis and control.
44. Write about Marine microorganisms as a source of biomedical resources.
45. Give detailed account on dinoflagellates as a source of bioactive molecules.
46. Write about the chemistry of marine toxins.
47. Explain about Saxitoxin.
48. Give in detail about pharmacology of marine toxins.
49. Write in brief about tetrodotoxin.
50. How will you prepare fish meal and fish oil?

Question Bank

Section – A

(1 Mark)

Choose the best answer:

Unit I

- _____ allows further sorting out of microorganisms obtained from primary screening.
a) Isolation b) Preservation **c) Secondary screening** d) Strain improvement
- _____ is the by-product of dairy industry.
a) Molasses b) Bagasse c) Cheese **d) Whey**
- _____ is the by-product of sugar industry
a) Molasses b) Corn steep liquor c) Malt d) ethanol
- Peptone is an/a _____ source
a) inorganic carbon b) organic carbon c) inorganic nitrogen **d) organic nitrogen**
- _____ is a novel technique for strain improvement.
a) DNA hybridization b) Cross hybridization **c) Genome shuffling** d) PCR
- The stainless steel grade used in construction of bioreactors is_____
a) 318 L b) 317 L **c) 316 L** d) 320 L
- Rushton turbine is also known as _____
a) Disc type b) Tube type c) Plate type d) Hollow type
- _____ method is used commonly for sterilizing air.
a) Heating **b) Filtration** c) Chemical d) Radiation
- In batch fermentation, during log phase there is _____ increase in bacterial population.
a) double **b) exponential** c) reciprocal d) algorithmic
- _____ is method used to disrupt cells
a) Ultrasonication b) Dessication c) Centrifugation d) Grinding

Unit II

- Streptomycin is an antibiotic _____
a) aminoacyl **b) aminoglycoside** c) glycopeptide d) cyclic
- _____ is a bio preservative.
a) Nisin b) PHB c) Lysine d) protease

13. Protease is an/a _____ enzyme
 a) **extracellular** b) intra ellular c) intercellular d) innercellular
14. _____ is a beta lactam containing antibiotic
 a) Streptomycin b) **Penicillin** c) Vancomycin d) Gentamycin
15. _____ is a Polyhydroxyalkanoates
 a) Polyhydroxyvalerate b) Polyhydroxycitrate
 c) **Polyhydroxybutyrate** d) Polyhydroxyacetate
16. Xanthan is used as a _____
 a) **food additive** b) food packaging material c) acidity regulator d) preservative
17. _____ is a polycyclic antibacterial peptide
 a) Auxin b) PHB c) Xanthan d) **Nisin**
18. Vitamin B12 consists of ring _____
 a) imidazole b) **corrin** c) lactam d) pyrrole
19. Chymosin is a milk clotting _____ enzyme
 a) **proteolytic** b) lipolytic c) amylolytic d) nucleolytic
20. _____ is the most abundant and the basic auxin natively occurring and functioning in plants
 a) Gibberlic acid b) Nisin c) PHA d) **Indole-3-acetic acid**
21. _____ is the father of vaccination
 a) **Edward Jenner** b) Louis Pasteur c) Lister d) Beijerinck
22. _____ is a predominant precursor of citric acid
 a) Lactose b) Fructose c) **Glucose** d) Sucrose
23. Trisodium citrate is used as a _____
 a) detergent b) **blood preservative** c) stabilizer d) flavouring agent
- Unit III**
24. *Rhizobium* is having _____ association with leguminous plants
 a) **symbiotic** b) asymbiotic c) associative d) non associative
25. NPV belongs to the family of _____
 a) **Baculoviruses** b) Herpesviruses c) Flaviviruses d) Rhabdovirus
26. _____ is used as a fungal bio-control agent.
 a) ***T. viridae*** b) *A. flavus* c) Mucor d) *P. notatum*
27. *Trichoderma* belongs to the family _____
 a) Basidiomyceae b) **Monilliaaceae** c) Deuteromyceae d) Ascomycae
28. _____ a virus most frequently considered as controlling insect

- a) NPV b) TMV c) CMV d) HIV
29. *Trichoderma viridae* belongs to the order _____
- a) Myxomycota **b) Ascomycota** c) Basidiomycota d) Deuteromycota
30. The technique of seed dressing with bacteria is _____
- a) bacterization** b) algalization c) curing d) inoculation
31. The pleomorphic forms of bacteria present inside the root nodules is _____
- a) capsule b) slime **c) bacterioids** d) cortex
32. The medium used for the mass production of *Azotobacter* inoculant is _____
- a) Pikovaskaya b) okans c) YEMA **d) Jensen**
33. The control of disease by using a biological agent is _____
- a) Biopesticides** b) Biofertilizers c) Bioleaching d) Biodegradation
34. The commercial trade name of *B. thuringiensis* is-----
- a) DIPEL** b) TAI VIRIDAE c) NPV d) CMV

Unit IV

35. Penicillin inhibits _____ synthesis
- a) cell wall** b) protein c) DNA d) nucleotide
36. In pharmaceutical product development there are _____ stages
- a) 4** b) 5 c) 3 d) 6
37. Antibiotics which inhibit bacterial growth are called _____
- a) bacteriostatic** b) bactericidal c) bacteriocidal d) bacteriostasis
38. Antibiotics which kill bacteria are called _____
- a) bacteriostatic **b) bactericidal** c) bacteriocidal d) bacteriostasis
39. Antibiotics effective against only a limited range of organisms are called _____ antibiotics
- a) narrow spectrum** b) broad spectrum c) wide spectrum d) limited spectrum
40. Antibiotics effective against a wide range of organisms are called _____
- a) narrow spectrum **b) broad spectrum** c) wide spectrum d) limited spectrum
41. Example of fillers is _____
- a) peanut hull** b) bagasse c) starch d) cassava
42. _____ are used to promote powder flow of tablet
- a) flavours **b) glidants** c) disintegrants d) lubricants
43. _____ are used to prevent tablet ingredients from clumping together
- a) Lubricants** b) Glidants c) Excipients d) disintegrants

44. _____ are designed to delay absorption
a) Tablets b) Gels c) **Capsules** d) Ointments
45. The vehicle of an ointment is called _____
a) **ointment base** b) base c) matrix d) cream
46. The method percolation is also called as _____
a) hot process b) heat process c) **cold process** d) chill process

Unit V

47. _____ is an ideal preservative for pharmaceutical products.
a) **Chlorobutanol** b) Ethanol c) Methanol d) Isopropanol
48. _____ are compounds that inhibit growth of microorganisms in pharmaceutical Products
a) **Antimicrobial preservatives** b) Chemical preservatives
c) Antibiotics c) Bio preservatives
49. _____ are chemical substances used to increase shelf life of drugs
a) **Preservatives** b) Excipients c) flavours d) colour
50. _____ is an example of antioxidants
a) **Vitamin E** b) Sorbates c) Citric acid d) EDTA
51. _____ is a natural preservative
a) Nitrites b) **Neem oil** c) Methyl paraben d) Benzoates
52. In chemical spoilage _____ of the ingredients may change
a) **molecular structure** b) stability c) physical property d) chemical property
53. _____ is the major source of contamination in pharmaceutical products
a) Salt b) **Water** c) Sugar d) Flavouring agent
54. Test of sterility is done by _____ method
a) **membrane filtration** b) microbial limit c) PET d) HET
55. Microbial stability of a formulation is based on _____
a) concentration of its preservatives b) nature of its preservatives
c) property of its preservatives d) **effectiveness of its preservatives**
56. The concentration of the test organism in PET should be _____ cells per ml or gram
a) **$10^5 - 10^6$** b) $10^6 - 10^8$ c) $10^3 - 10^4$ d) $10^8 - 10^9$

Section - B

(2 marks)

Answer the following in 50 words each:

Unit I

1. Define Industrial Microbiology.
2. Define Screening.
3. What is strain improvement?
4. List the Characteristics of an ideal production strain.
5. What is fermentation?
6. Define agitation.
7. List down the methods employed in strain improvement.
8. Define industrial sterilization.
9. What is downstream processing?
10. Define Batch fermentation.
11. Define Fed-Batch fermentation.
12. Define Continuous fermentation.
13. What is a fermenter?
14. Draw the structure of a fermenter.
15. What is a stirrer?
16. What is an impeller?
17. What are baffles?
18. What is the role of a stirrer?
19. What is the role of an impeller?
20. What is the role of a baffle?
21. List down some examples of by products from industries.

Unit II

22. What are the applications of Alcohol?
23. What are the applications of Acetone?
24. Define Xanthan gum.
25. Define PHB.
26. List the types of amylases.
27. Define Biopolymers.
28. Outline the biosynthesis of Riboflavin.
29. Outline the Cyanocobalamin.

30. What are Beta lactam antibiotics?
31. Write few examples of Beta lactam antibiotics.
32. What are auxins?
33. What is IAA?
34. What are Gibberellins?
35. Define Synthetic vaccines.
36. What is rennet?
37. What is microbial rennet?
38. What is chymosin?
39. Draw a flow chart for production of citric acid

Unit III

40. Draw a flow chart for the production of Bacterial bio fertilizer.
41. Draw a flow chart for the production of *Rhizobium* bio fertilizer.
42. Draw a flow chart for the production of *Azotobacter* bio fertilizer.
43. Define biofertilizers.
44. Define biopesticides.
45. Define BT.
46. What is NPV?
47. Define Baculovirus.
48. What is *Trichoderma viride*?
49. What is Polyhedron?
50. What is Polyhedrin?
51. Define symbiosis.

Unit IV

52. List down few properties of antimicrobial agent.
53. What are Synthetic antibiotics?
54. What are Semi synthetic antibiotics?
55. What are natural antibiotics?
56. List down some types of antibiotics.
57. List down some of the pharmaceutical formulations.
58. Define tablet.
59. Define capsule.
60. Define gel.
61. Define ointment.

62. Define therapeutic level.
63. Define toxic level.
64. What is ointment base?
65. What are excipients?
66. List some of the excipients.
67. What is therapeutic agent?

Unit V

68. What is preservative efficacy?
69. What is preservative stability?
70. What are the objectives of preservation?
71. List out the properties of an ideal preservative.
72. List out the factors affecting microbial spoilage of pharmaceutical products.
73. Define microbiostatic.
74. Define microbiocidal.
75. What are antioxidants?
76. Write about chemical spoilage of pharmaceutical products.
77. Write about physicochemical spoilage of pharmaceutical products.
78. Write about biological spoilage of pharmaceutical products.
79. List out the sources of spoilage of pharmaceutical products.

Section – C

(5 marks)

Answer the following in about 200 words:

Unit I

1. Discuss about historical account of microbes in industrial microbiology.
2. Write about isolation of industrially important microorganism.
3. Write about preservation of industrially important microorganism.
4. Illustrate about sterilization carried out in industries.
5. Explain the process of strain improvement.
6. Summarize the media formulation for Fermentation process.
7. Analyze the design of a Fermenter.
8. Give a brief account on types of fermenter.
9. Estimate the growth kinetics in Batch Fermentation.
10. Discuss about fed-batch fermentation.
11. Discuss about continuous fermentation.
12. Write about agitation and aeration in a fermenter.

13. Describe the raw materials used in media formulation.
14. Explain about downstream processing.

Unit II

15. Describe the industrial production of Alcohol.
16. Describe the industrial production of Acetone.
17. Give a brief account on production of Citric acid.
18. Give a brief account on production of Acetic acid.
19. Explain the process of production of Xanthan gum.
20. Explain the process of production of PHB.
21. Summarize the production of Protease.
22. Summarize the production of Amylase.
23. Summarize the production of Microbial rennet.
24. Analyze the industrial production of Streptomycin.
25. Analyze the industrial production of Penicillin.
26. Analyze the industrial production of Cephalosporin.
27. Explain the production of Riboflavin.
28. Explain the production of Cyanocobalamin.
29. Explain the industrial production of Lysine.
30. Explain the industrial production of Glutamic acid.
31. Explain the production of auxins.
32. Explain the production of Gibberellins.
33. Explain the industrial production of antibiotics.
34. Describe the production of recombinant vaccines.
35. Describe the production of synthetic vaccines.
36. Describe the industrial production of proteins using bacteria.
37. Describe the industrial production of proteins using yeast.

Unit III

38. Explain about the preparation of bio fertilizer using *Rhizobium*.
39. Explain about the preparation of bio fertilizer using *Azotobacter*.
40. Describe the preparation of fungal bio pesticide.
41. Describe the preparation of bacterial bio pesticide.
42. Describe the preparation of viral bio pesticide.
43. Explain about Baculoviruses.
44. Write about the mass production of bio fertilizer.

45. Write about the isolation of *Rhizobium*.
46. Write about the isolation of *Azotobacter*.
47. List down the applications of bio fertilizers.
48. List down the applications of bio pesticides.

Unit IV

49. Write the properties of antimicrobial agents.
50. Explain the types of chemotherapeutic agents.
51. List down the types of antibiotics.
52. Explain the mode of action of antibiotics.
53. Describe antibacterial antibiotics.
54. Describe antifungal antibiotics.
55. Describe antiprotozoal antibiotics.
56. Describe antiviral antibiotics.
57. Describe antibacterial antibiotics.
58. Write an essay on pharmaceutical formulations.
59. Explain the formulation of tablets.
60. Explain the formulation of gels.
61. Explain the formulation of ointments.
62. Explain the formulation of medicinal syrup.
63. Explain the formulation of capsule.
64. Describe the development of a pharmaceutical product.

Unit V

65. List down the types of spoilage of pharmaceutical products.
66. Explain the sources of microbial contamination in pharmaceutical products.
67. Explain the types of microbial contamination in pharmaceutical products.
68. Write about the assessment of microbial contamination in pharmaceutical products.
69. Write about the assessment of spoilage in pharmaceutical products.
70. Explain the characters of an ideal preservative.
71. Elaborate the antimicrobial preservatives used in pharmaceutical products.
72. Elaborate the properties of antimicrobial preservatives used in pharmaceutical products.
73. Explain the factors affecting microbial spoilage of pharmaceutical products.
74. Write about preservative system used in pharmaceutical products.

Section – D

(10 marks)

Answer the following in 400 words:

Unit I

1. Discuss about the use of microbes in industrial microbiology from ancient times.
2. Examine the methods of Industrial Sterilization.
3. Outline the process of DSP.
4. Give a detailed account on primary and secondary screening.
5. Estimate the growth kinetics in Batch Fermentation.
6. Write about isolation and preservation of industrially important microorganism.
7. Explain the process of strain improvement of industrially important microorganisms.
8. Summarize the raw materials and media formulation for Fermentation process.
9. Enunciate the design and operation of a Fermenter.
10. Compare the growth kinetics in Batch, Fed-batch and Continuous Fermentation.
11. Discuss the instrumentation and control system in a fermenter.
12. Describe about the types of fermenter.

Unit II

13. Outline the production process of PHB
14. Examine the production of Nisin.
15. Illustrate the production of bio preservatives.
16. Analyze the industrial production of solvents.
17. Explain the process of production of Xanthan gum.
18. Summarize the production of Protease.
19. Summarize the production of Amylase.
20. Summarize the production of Microbial rennet.
21. Explain the production of vitamins.
22. Explain the industrial production of Lysine.
23. Explain the industrial production of Glutamic acid
24. Explain the industrial production of hormones.
25. Enunciate the industrial production of organic acids.
26. Explain the industrial production of Penicillin.
27. Explain the industrial production of Cephalosporin.
28. Analyze the industrial production of Streptomycin.
29. Describe the production of synthetic and recombinant vaccines.
30. Elaborate the industrial production of protein using bacteria and yeast.

Unit III

31. Write an essay on bio fertilizer.
32. Write an essay on bio pesticide.
33. Explain about the preparation of *Rhizobium* bio fertilizer.
34. Explain about the preparation of *Azotobacter* bio fertilizer.
35. Discuss the preparation of bio pesticide using *Trichoderma viride*.
36. Describe the preparation of bio pesticide using *Bacillus thuringiensis*.
37. Describe the preparation of bio pesticide using NPV.
38. Compare and contrast bio fertilizer and bio pesticide.
39. “*Rhizobium* is a best biofertilizer” – Justify.
40. *Azotobacter* is a best biofertilizer” – Justify.

Unit IV

41. Give a detailed account on antimicrobial agents.
42. Explain the types of chemotherapeutic agents.
43. Explain the types of antibiotics and their mode of action.
44. Elaborate an account on various pharmaceutical formulations.
45. Discuss the formulation of tablets.
46. Discuss the formulation of gels.
47. Discuss the formulation of ointments.
48. Discuss the formulation of medicinal syrup.
49. Discuss the formulation of capsule.
50. Explain the stages of development of a pharmaceutical product.

Unit V

51. Describe the types of spoilage of pharmaceutical products and factors affecting it.
52. Explain the sources of microbial contamination in pharmaceutical products.
53. Discuss about the spoilage of pharmaceutical products.
54. Explain the types of microbial contamination in pharmaceutical products.
55. Discuss the assessment of microbial contamination in pharmaceutical products.
56. Discuss the assessment of spoilage in pharmaceutical products.
57. Give a detailed account on preservation of pharmaceutical products.
58. Write an essay on use of antimicrobial preservatives in pharmaceutical products.
59. Elaborate the properties of antimicrobial preservatives used in pharmaceutical products.
60. Enunciate about preservative system used in pharmaceutical products.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI
II M.Sc.Microbiology Semester-III

Core-II Genetic Engineering
Question bank

Sub code: 21PMIC32

SECTION – A

(1 Mark)

Choose the correct answer:

UNIT- I

1. Plasmid was first coined by _____
a) **Lederberg** b) Haeckel c) Morgan d) Francois
2. _____ is an extra chromosomal, double stranded circular DNA molecule.
a) Cosmid b) Phagemid c) **Plasmid** d) Bacterial vector
3. The first engineered plasmid vector is _____.
a) pBR322 b) pUC Vector c) **pSC101** d) pUC19
4. Genomic library construction is concerned with _____.
a) Enzymes b) Nucleosides c) **Gene isolation** d) Protein
5. Cutting certain gene out of molecules of DNA requires _____.
a) Degrading nuclease b) **Restriction endonuclease** c) Eukaryotic enzyme d) Viral enzyme.
6. *Agrobacterium tumefaciens* is a _____.
a) Plant species b) Fertilizer c) Growth hormone d) **Soil Microbe**
7. _____ acts as a nutrient for bacteria.
a) Sarin b) Bacteriocin c) **Opines** d) Colicin
8. The father of genetic engineering is _____.
a) Albert b) Herbert Boyer c) **Paul Berg** d) Henry Ford.
9. Maximum size of foreign DNA that can be inserted into a replacement vector is _____.
a) 25-30 kb b) 18-20 kb c) **20-25 kb** d) 40-50 kb
10. The hybrid plasmid containing a lambda phage cos sequence is _____.
a) **Cosmid** b) YAC c) Phagemids d) Plasmids

UNIT- II

11. The protein that links DNA sequences is _____
a) Restriction enzyme **b) Ligase** c) Transcriptase d) Polymerase
12. _____ enzymes are used to cut large DNA.
a) Reverse transcriptase b) DNA polymerase c) DNA ligase **d) Restriction enzymes.**
13. Which of the following is not a restriction endonuclease?
a) Eco R1 **b) DNA ligase** c) Hind III d) Bam H1
14. _____ catalyze the hydrolyses of phosphate esters.
a) Kinases **b) Phosphatases** c) Ligases d) Kinases
15. _____ is an enzyme that degrades DNA from the termini of a molecule.
a) Endonuclease b) Lipase c) **Exonuclease** d) Taq polymerase
16. The DNA segment to be cloned is called _____.
a) DNA fragment **b) DNA insert** c) Gene segment d) Chimeric gene
17. An enzyme used for generating cDNA is _____
a) Reverse transcriptase b) Restriction endonuclease c) **DNA polymerase** d) RNA polymerase
18. The kinase was discovered by _____
a) Tony Hunter b) Roeder c) Francis d) Linn
19. An enzyme that automates the specific DNA sequences in amplification is _____
a) Exonuclease b) Endonuclease c) Ribonuclease **d) Taq Polymerase**
20. _____ is an enzyme expressed in immature pre B and pre T lymphoid cells is _____
a) Terminal transferase b) Endonuclease c) Ribonuclease d) Transcriptase

UNIT-III

21. The western blotting technique was named by _____
a) Edward **b) Burnette** c) James d) Watson
22. _____ is the screening of library with a labeled radioactive probe.
a) Hybridization b) Transcription c) Screening d) Translation
23. The removal of lipid in cell wall in RFLP is carried out by _____
a) Methanol b) EDTA c) Lysozyme **d) SDS**
24. There are _____ types of physical maps in molecular mapping.
a) 2 **b) 3** c) 4 d) 8

25. The temperature maintained for annealing in PCR is _____ degree celcius.
a) 94 b) 72 c) **54** d) 102
26. The heat stable enzyme of PCR is _____ (K1)
a) **Taq polymerase** b) Kinase c) Nuclease d) Phosphatase
27. _____ is considered as dominant marker.
a) SSCP b) RFLP c) **RAPD** d) VNTR
28. _____ is a single-stranded sequence of DNA or RNA used to find complementary sequence in a sample genome.
a) Gene b) clone c) Marker d) **Probe**
29. Aminobenzyloxymethyl filter paper is commonly used for transfer in _____.
a) **Northern blotting** b) Southern blotting c) Eastern blotting d) Western blotting
30. Northern blotting is used to separate desired _____ from the sample.
a) tRNA b) **mRNA** c) rRNA d) RNA

UNIT-IV

31. Genetic engineering manipulates gene products at the level of _____.
a) Protein b) Amino acid c) **DNA** d) RNA.
32. The first drug produced using recombinant DNA technology is used to treat _____.
a) Haemophilia b) Heart attack c) **Diabetes** d) Anaemia
33. _____ has been used to treat growth disorders in humans.
a) HGS b) HRT c) HGT d) **HGH**
34. In hybridoma technology, hybrid cells are selected in _____ medium.
a) MS b) **HAT** c) X-gal d) Whites
35. The first scientific approved vaccine was _____.
a) Oral polio b) **Small pox** c) MMR d) Tetanus
36. _____ is not required for the biodegradation process.
a) Microorganism b) Environment conditions c) **Adhesives** d) Substrate
37. _____ is not an example of natural biodegradable polymer.
a) Collagen b) Lignin c) Natural rubber d) **Polyvinylalcohol**
38. _____ do not affect the activity of penicillin.
a) **Bile** b) HCl c) NaOH d) Cysteine

39. The amino acids generally synthesized from _____
a) ketoglutaric acid **b) Fatty acids** c) Volatile acids d) Mineral salts
40. _____ is an essential amino acid not synthesized by the body.
a) Arginine **b) Histidine** c) Proline d) Glutamine

UNIT-V

41. First cloned mammal was _____.
a) Dolly b) Monkey c) Ape d) Cats
42. The first transgenic crop developed in India was _____.
a) Bt brinjal b) Bt cotton c) Bt corn d) Bt maize
43. The Ti plasmid was present in _____.
a) *Bacillus* b) *Pseudomonas* c) *Clostridium* **d) Agrobacterium**
44. A somatic cell of human being contains ----- pairs of chromosomes.
a) 46 **b) 23** c) 13 d) 64
45. This is not a product of recombinant DNA technology.
a) Golden rice **b) Tracy** c) Bt cotton d) Dolly
46. "Superbug" was engineered for _____.
a) Antibiotic production b) Enzyme production **c) Hydrocarbon degradation** d) Probiotic production.
47. First genetically modified mice is generated in _____.
a) 1968 b) 1964 **c) 1974** d) 1978.
48. Organisms that have been genetically engineered to carry one or more foreign genes are known as _____.
a) Transgenic organisms b) Homogenous organisms c) Ligated organisms d) Plasmids.
49. _____ developed the genetically engineered superbug.
a) Andrew b) Johann **c) Chakrabarty** d) David
50. Gene splicing is also termed as _____.
a) Transfer DNA b) Moving DNA c) Rescue DNA **d) Recombinant DNA**

SECTION – B

(2 Marks)

Answer the following in about 50 words:

UNIT- I

1. Define cloning.
2. Define vector.
3. Define gene splicing.
4. Define phagemids.
5. Define conjugation.
6. List any two animal viral vectors.
7. Differentiate cosmids and plasmids.
8. Discuss cDNA cloning.
9. Name the cosmids types.
10. Write the salient features of cosmids.

UNIT- II

11. What are restriction endonucleases?
12. List down any four enzymes involved in genetic engineering.
13. Give two uses of nuclease.
14. What is restriction enzyme?
15. Write a note on the nomenclature of enzymes in genetic engineering.
16. List any two uses of DNA ligase.
17. Give the role of ALP in genetic engineering.
18. Express Taq DNA polymerase
19. Define ligase.
20. Discuss reverse transcriptase.

UNIT- III

21. Define SSCP.
22. Discuss VNTR.
23. What is cDNA?
24. Give the applications of southern blotting.

25. Define blotting.
26. List the advantages of PCR.
27. What is PCR?
28. Define autoradiography.
29. Define hybridization.
30. Define genome.

UNIT- IV

31. Define biodegradation.
32. Define natural polymers.
33. Define MCA.
34. List down any four commercial products by recombinant microorganisms.
35. Define recombinant microorganisms.
36. Define antibiotics.
37. Define polymers.
38. Define manipulation.
39. Define biopolymers.
40. List any four recombinant microorganisms.

UNIT- V

41. Define transgenic plants.
42. Elaborate goldenrice.
43. What is transgenesis?
44. Discuss transgenic animals.
45. Define superbug.
46. List down any four ethical aspects of biotechnology.
47. What is aFlavrSavr Tomato?
48. Expand GMO.
49. How transgenic animals are formed?
50. What is herbicide tolerant?

SECTION – C

(5 Marks)

Answer the following in about 200 words:

UNIT- I

1. Write the properties and application of pBR322.
2. Elaborate cosmids.
3. Write the properties of plasmids.
4. Expand on vectors.
5. Elaborate Ti plasmids.
6. Elaborate SV₄₀ viral vector.
7. Write down the strategies of cloning.
8. Write a note on biology of vectors.
9. What do you mean by cDNA cloning?
10. Explain cloning of genomic DNA.

UNIT- II

11. List down the enzymes used in genetic engineering.
12. Elaborate on DNA ligase.
13. Give the role of alkaline phosphatase.
14. Give the role of DNA ligase
15. Write a note on kinase.
16. Write a note on nuclease.
17. Give the types of restriction enzymes.
18. Mention the nomenclature of enzymes in genetic engineering.
19. List the applications of enzymes in genetic engineering.
20. Comment on reverse transcriptase.

UNIT- III

21. Elaborate denaturation in PCR.
22. Explain modification of PCR.
23. Describe autoradiography.
24. Comment on Northern blotting.
25. Explain cDNA library.
26. Elaborate on Western blotting.
27. Write a note on VNTR.
28. Elaborate RFLP.

29. Explain SSCP.

30. Write a note on RAPD.

UNIT-IV

31. Explain the applications of vaccines.

32. Briefly explain the role of rDNA technology in hormone production.

33. Explain in detail about the vitamins.

34. Explain commercial production of insulin.

35. Write a note on mono clonal antibodies.

36. Discuss Biopolymers.

37. Explain the process in insulin production.

38. Explain Manipulation techniques.

39. Briefly explain about the human growth hormone.

40. Compile the pollution control by biodegradation.

UNIT-V

41. Write a brief note on transgenic plants.

42. Briefly explain Bt cotton.

43. Write note on golden rice.

44. Explain FlavrSavr tomato.

45. Write a detail note on transgenic mouse.

46. Explain Transgenic fish.

47. Describe in detail about tearless onion.

48. Explain transgenic animal-Dolly.

49. Briefly explain GEM- super bug.

50. Discuss the ethical aspects of genetic testing.

SECTION- D

(10Marks)

Answer the following in about 400 words:

UNIT-I

1. Write a detail account on the cosmids and its types.
2. Explain in detail about the plasmid and its role in cloning.

3. Write a brief note on the plant virus vectors.
4. Explain in detail about the animal viral vectors.
5. Write in detail on cloning of genomic DNA.
6. Describe phagemids in detail.
7. Elaborate screening of recombinants.
8. Describe in detail cDNA cloning.
9. Give a detail account on colony hybridization.
10. Explain the role of yeast in cloning.

UNIT-II

11. Write in detail on the enzymes in r DNA technology.
12. Describe in detail about the restriction endonucleases.
13. Write a brief note on DNA modifiers.
14. Construct the r DNA by cloning process.
15. List the application of enzymes in r DNA.
16. Elaborate the types of nucleases.
17. Write a brief account on Taq polymerase.
18. What does reverse transcription occur? Explain.
19. Briefly explain DPN1 enzyme.
20. Explain thermal transferase in detail.

UNIT-III

21. How to determine RNA by Northern blotting techniques.
22. Briefly explain RFLP.
23. Write a detail note on RAPD.
24. Examine AFLP.
25. Write the steps to construct a DNA library.
26. Explain molecular mapping in detail.
27. Differentiate genetic and physical maps.
28. Write a brief note on amplification of DNA.
29. Write in detail about the VNTR.
30. Explain about the transformation of DNA.

UNIT-IV

31. Write a detail note on antibiotics.
32. Briefly explain MCA.
33. Give a brief account on production of amino acids.
34. Write a detail note on the vitamins production by r DNA.
35. Explain growth hormone by rDNA technology.
36. Briefly explain biodegradative pathway.
37. Write a detail note on gene alteration methods.

38. Elaborate biopolymers.
39. Write a detail note on gene manipulation.
40. Explain briefly about the recombinant vaccines.

UNIT-V

41. Write an account on colourful cauliflower in detail.
42. Describe genetically modified crops.
43. Explain in detail about tearless onion.
44. Explain Dolly-transgenic animal.
45. Explain transgenic fish.
46. Write a detail note on superbug.
47. Explain FlavrSavr tomato.
48. Describe in detail about transgenic mouse.
49. Write a detail account on transgenic pigs.
50. List the ethical aspects of biotechnology.

St. Mary's College (Autonomous) Thoothukudi-628001
II M.Sc. Microbiology Semester III
Core III – Food And Dairy Microbiology Sub. Code: 21PMIC33
Question Bank

SECTION – A
UNIT-I

(1 mark)

Choose the correct answer:

1. Fat is hydrolysed by the enzyme-----
a) Amylase b) Cellulase c) **Lipase** d) Protease
2. Molds are-----
a) **Aerobic** b) Anaerobic c) Microaerophilic d) Strict anaerobes
3. The compounds that resist changes in P^H of food is-----
a) Solute b) Solvent c) **Buffers** d) Acid
4. The a_w for pure water is-----
a) **1.00** b) 0.1 c) 0.01 d) 1.01
5. The organism causes spoilage in alcoholic beverages is-----
a) *Aeromonas* b) *Alteromonas* c) *Arthrobacter* d) ***Acetobacter***
6. Molds grow at ----- pH.
a) 2.5-4.0 b) 6.6-7.5 c) **1.5-11.0** d) 1.5-8.5
7. _____ is employed in many food industries such as bread, wine and alcohol.
a) *Candida* b) ***Saccharomyces*** c) *Aspergillus* d) *Penicillium*
8. Compounds inhibitory to other organisms are called _____.
a) **Inhibitors** b) activators c) microstatic d) microcidal
9. The chemical compounds that inhibits the growth of molds are _____.
a) fungicidal b) algicidal c) bactericidal d) **mycostatic.**
10. _____ bacteria has the ability to ferment sugar to lactic acid.
a) proteolytic b) lipolytic c) **lactic acid** d) coliform.

UNIT II

11. Salt fish are spoiled by----- bacteria
a) Thermophilic b) **Halophilic** c) Psychrophilic d) Barophilic
12. ----- is responsible for sweet-curdling of milk
a) *Staphylococcus* b) ***Bacillus*** c) *Streptococcus* d) *Escherichia*
13. The brown colour changes in stored fruits is due to the oxidation of-----
compounds.

- a) Sulphur b) Amino c) **Phenolic** d) Benzoic
14. The yellow colour change in spoilage of fish is due to the oxidation of -----
 a) **Carotenoids & Lipids** b) Carotenoids & Protein c) Carotenoids d) Protein&Lipid
15. ----- is used to wash vegetables and whole fruits.
 a) Benzene b) **Borax** c) Boric acid d) Benzoate
16. The pink or reddish liquid that comes from meat on thawing is-----
 a) Clotting b) Wilting c) **Drip** d) Leakage
17. The souring or putrefaction of meat is-----
 a) **Bone taint** b) Cork taint c) Flesh taint d) Taint
18. The yellow discolouration of meat is caused by-----
 a) *Streptococcus* b) ***Micrococcus*** c) *Leuconostoc* d) *Achromobacter*
19. The ropiness in milk is caused by-----
 a) *Serratia* b) *Salmonella* c) *Enterobacter* d) ***Alcaligenes***
20. Poultry held at 10 C is spoiled by -----
 a) ***Pseudomonas*** b) *Bacillus* c) *Clostridium* d) *Escherichia coli*

UNIT-III

21. A type of food preservation technique that involves sealing food in sterilized, airtight containers-----
 a) **canning** b) irradiating c) freezing d) drying
22. Kefir originated from the _____ mountain. (K2)
 a) Himalayan b) **Caucasian** c) Casicausian d) Casbastan
23. _____ is produced from a liquid starter culture. (K1)
 a) Kefir b) **Kumis** c) Both a and b d) acidophilus milk
24. _____ drink are popular in the USA.(K1)
 a) Kefir b) Kumis c) Both a and b d) **acidophilus milk**
25. Anaerobic condition means-----.
 a) Presence of oxygen b) **Absence of oxygen** c) microaerophilic d) Absence of carbondioxide.
26. The method for the complete removal of organism is-----
 a) Centrifugation b) Sedimentation c) **Filtration** d) Clarification
27. The maintenance of anaerobic condition in packaged food is by filling-----
 a) O₂ b) SO₂ c) **CO₂** d) CH₄

28. The anaerobic decomposition of protein is called as-----
a) Putrefaction b) Ropiness c) Rancidity d) Souring
29. ----- is used to suppress anaerobes in cheese production.
 a) Natamycin **b) Nisin** c) Nitrogen d) Phosphorus
30. The freezing of microbes in food leads to-----
 a) Cold shock **b) Cryo injury** c) Heat shock d) Electric shock

UNIT IV

31. Cow pox is an infectious disease caused by _____
a) CPXV b) CpXv c) cPxV d) CPxv
32. Which of the following can be identified by milk ring test?
 a) Salmonellosis **b) Brucellosis** c) Bovine tuberculosis d) Aspergillosis
33. Tests for proper pasteurization are based on the activity of which enzyme?
 a) Lactase b) Diastase **c) Phosphatase** d) Catalase
34. The purpose of heat treatment on milk is _____
a) Kill pathogenic microorganism b) Heat milk c) Evaporation d) Taste enhancement
35. Listeriosis is generally caused by _____
 a) *Hepatitis A virus* **b) *L. monocytogenes*** c) *Norovirus* d) *E.coli*.
36. Food borne _____ results when a person consumes food containing pathogens.
 a) Infection b) Intoxication c) Both a and b d) None of the above.
37. Anthrax is caused by spore-forming bacteria known as _____
 a) ***Bacillus subtilis*** b) *Bacillus diminuta* c) *Bacillus subtilis* d) *Bacillus tubtilus*
38. Human transmission of Brucellae occurs by _____
 a) direct contact with animal tissues b) ingestion of infected milk c) ingestion of contaminated meat. **d) all of these.**
39. Regarding tetanus quick sticks (TQS)?
 a) They take 1 hour to read
 b) If the test is positive, the patient has contracted tetanus.
c) They are 100% specific.
 d) They are 80% sensitive for titres of 0.01IU/ml.
40. Foot and mouth disease is a highly contagious _____ disease.
a) Viral b) bacterial c) fungal d) protozoal

UNIT V

41. _____ is also known as Alamar Blue assay.

a) **Resazurin assay** b) MBRT assay c) Milk ring test assay d) Dye reduction test assay.

42. BIS was established in the year _____.

a) 1988 b) 1982 c) 1984 **d) 1986**

43. Expansion for FPO is _____.

a) Fruit pulp order **b) Fruit product order** c) Food product order d) Fruit product organization.

44. The head quarters of BIS is in _____.

(a) Hyderabad (b) Chennai (c) **Delhi** (d) Mumbai

45. BIS works as _____ enquiry points for India.

a) **WTO-TBT** b) WHO-TBT c) WHO-ABT d) WTO-ABT

46. CCP _____

a) **Critical control point**

b) Critical celcius point

c) Critical control power

d) Conduct critical point

47. HACCP was developed in _____.

a) 1955 **b) 1950** c) 1960 d) 1986

48. Methylene blue reduction test _____

a) Fat content of milk

b) Sugar content of milk

c) Protein content of milk

d) Bacterial activity of milk

49) Reduction test is conducted to know the efficiency of _____

a) Toned milk b) double toned milk c) Sterilized milk **d) Pasteurized milk**

50) _____ determines the number of microbes present in the food sample.

a) **Standard plate count** b) Standard plate crowd c) Standard plate counting d) Standard plating count

SECTION-B

(2 Marks)

Answer in about 50 words each:

UNIT I

1) List intrinsic factors

2) List Extrinsic factors

- 3) Distinguish between Top yeast and Bottom yeast
- 4) What is food microbiology?
- 5) Define redox potential
- 6) Give the general characteristics of yeast
- 7) Define relative humidity.
- 8) Any two molds important in food microbiology
- 9) Any two yeast important in food microbiology
- 10) Any two bacteria important in food microbiology

UNIT II

- 11) Define contamination.
- 12) What is spoilage?
- 13) List the spoilage organisms for cereals and cereal products.
- 14) Any two spoilage microbes for fruits.
- 15) List the spoilage organisms for eggs
- 16) Enlist spoilage organisms for meat.
- 17) List contaminating microbes for fish.
- 18) Define canning.
- 19) List any two spoilage for canned foods
- 20) Any two spoilage microbes for vegetables.

UNIT III

- 21) Define preservation.
- 22) List methods for food preservation.
- 23) Define kefir
- 24) Define Koumiss
- 25) What is radiation?
- 26) What is acidophilus milk?
- 27) What is fermentation?
- 28) List fermented dairy products.
- 29) List fermented food products.
- 30) List any four chemical preservatives.

UNIT IV

- 31) List source of microbes in milk
- 32) What is mastitis?
- 33) List milk borne bacterial disease.

- 34) What is milk borne bacterial disease?
- 35) List milk borne viral disease.
- 36) What is milk borne viral disease?
- 37) What is Brucellosis?
- 38) Define milk borne disease.
- 39) Control measures for Rinderpest disease.
- 40) Define foot and mouth disease.

UNIT V

- 41) Expand HACCP.
- 42) Expand BIS
- 43) Expand MBRT
- 44) List BIS laboratory service.
- 45) What is GMP?
- 46) What is milk grading?
- 47) List the criteria for MBRT.
- 48) What is Resazurin test?
- 49) Define hazard.
- 50) What is reduction test?

Section - C

(5 Marks)

Answer in about 200 words each choosing either (a) or (b):

UNIT I

- 1) Write a brief account on general characteristics of Molds.
- 2) Explain about the microorganisms important in food microbiology.
- 3) Why food is considered as the substrate for microbes?
- 4) Comment on general characteristics of Yeast.
- 5) Briefly explain general characteristics of Bacteria.
- 6) Explain in detail about extrinsic factors that influence the growth of microbes in food.
- 7) Comment on intrinsic factors influencing microbial growth in food.
- 8) Explain microorganisms important in food.
- 9) Give the importance of molds in food.
- 10) Explain the importance of yeast in food industry.

UNIT II

- 11) Explain about contamination and spoilage of eggs in detail
- 12) Write about spoilage of meat in detail.

- 13) Comment on the spoilage of meat
- 14) Briefly explain fish contamination.
- 15) Explain about the spoilage of microbes in cereals and cereal products.
- 16) How fruits and vegetables gets contaminated?
- 17) Explain canning in detail.
- 18) Explain canned food contamination and spoilage.
- 19) Briefly explain eggs and poultry contamination in detail.
- 20) Comment on the microbes involved in meat contamination.

UNIT III

- 21) Explain about smoking in detail.
- 22) Write about acidophilus milk.
- 23) Explain the principles of food preservation.
- 24) Explain Koumiss in detail.
- 25) What is Kefir? Explain it.
- 26) Comment on pasteurization of milk.
- 27) Differentiate refrigeration and freezing.
- 28) Explain dehydration
- 29) What is radiation? Explain it in detail.
- 30) Explain in detail about any two chemical preservative.

UNIT IV

- 31) What is anthrax? Explain.
- 32) Discuss about Rinderpest.
- 33) Classify microbes on the basis of biochemical types.
- 34) On the basis of pathology classify dairy microbes.
- 35) Explain mastitis in detail.
- 36) Comment on Brucellosis
- 37) Describe foot and mouth disease.
- 38) Explain cow pox and Rinder pest disease.
- 39) Write in detail about Anthrax.
- 40) Explain the control measures for diphtheria.

UNIT V

- 41) Explain MBRT in detail.
- 42) Write in detail about Good manufacturing practice.

- 43) Explain HACCP concept in detail.
- 44) Describe BIS in detail.
- 45) Explain bacteriological examination in milk.
- 46) Explain microbial standards and milk grading.
- 47) How Resazurin test is done?
- 48) Estimate and examine specific microbes.
- 49) Comment on BIS laboratory service.
- 50) Explain microbiological examinations of food.

Section-D

(10 Marks)

Answer in about 400 words

UNIT I

- 1) Explain "Food as a substrate for microorganisms".
- 2) Describe the general characteristics of Mold and yeast
- 3) Comment on general characteristics of molds and bacteria.
- 4) Explain in detail about the general characteristics of yeast and bacteria.
- 5) Explain the important microbes involved in food microbiology.
- 6) List and explain the extrinsic factors influencing the microbial growth in food.
- 7) Describe the extrinsic factors influencing the microbial growth in food.
- 8) What are the factors that affect the microbial growth in food.
- 9) List and explain the intrinsic factors influencing the microbial growth in food.
- 10) Describe the intrinsic factors influencing the microbial growth in food.

UNIT II

- 11) Explain about contamination and spoilage of fruits and vegetables.
- 12) Describe about the spoilage by microbes in cereals and cereal products.
- 13) Define contamination and explain contamination of eggs and poultry.
- 14) Define spoilage and describe spoilage in canned foods.
- 15) Explain spoilage in dried fruits and vegetables.
- 16) List and explain the microbes involved in fish contamination.
- 17) Comment on meat contamination and spoilage by microbes.
- 18) Explain the spoilage involved in fish.
- 19) How contamination takes place in cereals and cereal products?
- 20) Explain the spoilage of eggs and poultry.

UNIT III

- 21) Define and explain principles of food preservation.

- 22) Define preservation. Explain food preservation by physical methods.
- 23) Define chemical preservatives and explain organic acids.
- 24) Discuss about radiation and smoking.
- 25) What is fermentation? Explain bread preparation in detail.
- 26) Comment on Tempeh in detail.
- 27) Explain any one fermented dairy product in detail.
- 28) What is acidophilus milk ? Explain.
- 29) Describe Koumiss in detail.
- 30) Write a note on Kefir and its importance.

UNIT IV

- 31) Define and classify milk borne disease and give a note on any two bacterial diseases.
- 32) Explain the source of microbes in milk.
- 33) Classify microbes on the basis of biochemical, characteristics, and pathology.
- 34) Explain mastitis with its control measures
- 35) Comment on rinder pest infections and its control measures.
- 36) Write a note on anthrax and tetanus.
- 37) Describe diphtheria in detail.
- 38) What is foot and mouth disease? Explain in detail.
- 39) Explain cow pox in detail.
- 40) How to control Viral diarrhea in cattle?

UNIT V

- 41) Discuss about HACCP in detail.
- 42) Comment on microbiological examination of foods.
- 43) How bacteriological examination of milk is done?
- 44) Explain good manufacturing practice in detail.
- 45) Elaborate on BIS and its importance.
- 46) Critically explain milk grading.
- 47) What is phosphatase test? Explain resazurin method.
- 48) Explain MBRT and its importance.
- 49) How to estimate and examine specific microorganisms in food?
- 50) How to practice GMP? Explain.

Question Bank

Section – A

(1 Mark)

Choose the correct answer:

Unit I

1. Chloroplast involved in the process is called _____
a) **Photosynthesis** b) Movement c) Metabolism d) Respiration
2. Chloroplast has a structure called _____
a) Thylakoid b) **Chlorophyll** c) Stroma d) Granum
3. The thylakoid in chloroplasts are arranged as _____
a) **Stacked discs** b) interconnected disc c) interconnected sacs d) none of the above
4. RNase enzyme is inactivated by
a) Ethanol b) **Guanidinium thiocyanate** c) Diethyl pyrocarbonate (DEPC)
d) Chloroform
5. Chromatography is a physical method that is used to separate and analyze _____
a) Simple mixtures b) **Complex mixtures** c) Viscous mixtures d) Metals
6. PCR techniques which is used to _____
a) **DNA amplification** b) DNA identification c) DNA isolation d) DNA separation
7. _____ sound waves are used for agitating the particles in the solution.
a) Centrifugation b) Transverse Waves c) Longitudinal Waves d) **Sonication**
8. How many steps involved in cell fractionation?
a) 10 b) 4 c) **2** d) 9
9. Which of the following centrifugation is used to separate certain organelles from whole cell?
a) Rate-zonal centrifugation b) Normal centrifugation
c) **Differential centrifugation** d) Isopycnic centrifugation
10. Derivatization techniques in HPLC are intended to enhance
a) Molecular weight b) Reversibility c) **Detectability** d) Reproducibility

Unit II

11. Who developed electrophoresis process?
a) Ferdinand **b) Arne W.K. Teselius** c) Alan Walsh d) All the above
12. Agarose is a polymer extracted from _____
a) **Red seaweed** b) Black seaweed c) Green seaweed d) Brown seaweed
13. The factors which do not affect the electrophoretic mobility
a) Sample b) Electric field c) Buffer **d) gel**
14. In electrophoresis the ionic strength used is usually between
a) 0.5 to 1.0 M **b) 0.05 to 0.1 M** c) 0.05 to 0.1 M d) 0.05 to 1.0 M
15. _____ & _____ are two support matrices used in electrophoresis
a) Buffer and solvents b) Gel and apparatus c) Gel and electric field
d) Agarose and polyacrilamide
16. SDS is _____
a) Sodium deodyl sulphate **b) Sodium dodecyl sulphate** c) Sodium decodyl sulphate d) None of these
17. Agarose gels are normally in the range of _____
a) 0.5 % to 1.0 % b) 0.2 % to 0.5 % c) 0.05 % to 1.0 % **d) 0.2 % to 3 %**
18. _____ technique provides highest resolution for the protein analysis.
a) 4 D gel electrophoresis b) 3D gel electrophoresis **c) 2D gel electrophoresis**
d) 5D gel electrophoresis
19. _____ is an anionic detergent.
a) Acylamide b) TEMED **c) SDS** d) Ammonium per sulphate
20. _____ is a commonly used technique for the determination of single elements in compounds.
a) UV Spectrometry **b) Atomic absorption spectroscopy** c) Mass spectroscopy
d) All of the above

Unit III

21. _____ is a process of systemic inquiry that entails collection of data.
a) **Research** b) thesis c) dissertation d) presentation
22. _____ is a supposition or proposed explanation made on the basis of

limited evidence as a starting for further investigation.

a) literature **b) Hypothesis** c) journal d) manuscript

23. _____ help you to understand a research topic.

a) reference b) abstract c) methodology d) review of literature

24. _____ is a process of collecting and analyzing data for publication purpose.

a) manuscript b) data c) literature **d) research**

25. Inductive reasoning was first proposed by_____.

a) Rogar Bacon b) Peritz **c) Francis Bacon** d) John Locke

26. _____ is defined as section or division of a book.

a) journal **b) chapter** c) publication d) thesis

27. The scientific method is an _____ method of acquiring knowledge.

a) observable b) logical c) standard **d) empirical**

28. _____ is a supposition or proposed explanation made on the basis of limited evidence.

a) theory **b) hypothesis** c) scientific method d) none

29. _____ is associated with thinking cognition and intellect of an individual.

a) reduction b) deduction **c) logical reasoning** d) induction

30. _____ words are in a non-fiction book Chapter.

a) 40,000 - 60,000 words **b) 50,000 - 70,000 words** c) 20,000 - 40,000 words
d) 30,000 - 70,000 words

Unit IV

31. _____ is the smallest object or individual that can be investigated as the source of basic information.

a) parameter **b)unit** c)constant d) variable

32. _____ is a quantity which does not vary from one member of a group to another or within a particular set of define conditions.

a) variable **b) constant** c) unit d) parameter

33. _____ is simply a conclusion about a population.
 a) unit b) data **c) inference** d) constant
34. _____ is the science of collection, analysis and interpretation of facts and numbers connected with biology.
a) biostatistics b) bioinformatics c) bioinstrumentation d) coding
35. The _____ data is one which is collected by the investigator himself for the first time.
 a) secondary **b) primary** c) internal d) external
36. _____ is the study of relationship between two or more variables.
a) correlation analysis b) regression analysis c) utility d) presentation
37. _____ is the measures of the average relationship between two or more variables in terms of the original units of the data.
 a) correlation analysis **b) regression** c) utility d) presentation
38. A _____ is a geometrical image of a data.
a) graph b) diagram c) word d) data
39. _____ is a measure of central tendency.
 a) graph b) mode c) median **d) mean**
40. In _____, the two variables tend to move in opposite directions.
 a) positive correlation **b) negative correlation** c) correlation coefficient
 d) correlation analysis

Unit V

41. Intellectual Property Rights(IPR) protect the use of information and ideas that are of
 a) Ethical value b) Moral value c) Social value **d) Commercial value**
42. The term 'Intellectual Property Rights' covers
 a) Copyrights b) Know-how c) Trade dress **d) All of the above**
43. The following cannot be exploited by assigning or by licensing the rights to others.
 a) Patents b) Designs **c) Trademark** d) All of the above
44. The Letter patent means it is an _____.
a) Instrument b) device c) product d) machine

45. The meaning of the patentee is _____ in Latin term
 a) close patent b) open patent c) inventor **d) to open**
46. Register of patent is maintain by _____
a) controller b) attorney c) patent agent d) plaintiff
47. The patentee's exclusive _____ over the invention is an intellectual Property right granted to him.
 a) Licence right b) mortgage right c) Assignment right **d) proprietary right.**
48. The patent law gives an exclusive right to the patent to gain _____ out of his invention.
 a) Commercial benefits b) reputation c) Personal benefits **d) all the above**
49. The invention must be non-obvious to the person possessed of an _____ in the art.
a) Average skill b) talented person c) Excellent skill d) extra ordinary person
50. An invention relates to the manufacture of machines, articles or substance, the applicant must apply for _____ patent
 a) process **b) product** c) letter patent d) property

Section - B

(2 marks)

Answer the following in 50 words each:

Unit I

1. Draw the structure of chloroplast and mark the parts.
2. Define chloroplast.
3. Define fractionation.
4. Define PCR.
5. Define centrifuge.
6. Write any five centrifuge types.
7. What is the difference between centrifuge and Centrifugation?
8. What is chromatography?
9. What are the types of chromatography?
10. Define Sonication.

Unit II

11. Define Electrophoresis.
12. Write the principle of electrophoresis.
13. What is Agarose gel?
14. Define Spectrophotometer.
15. What is protein electrophoresis?
16. Define SDS – PAGE.
17. Write the requirement of electrophoresis.
18. What is MALDI?
19. Draw the instrumentation of spectroscopy.
20. Define atomic absorption spectroscopy.

Unit III

21. What is research?
22. What are major types of Research?
23. What is scientific methodology?
24. Define literature review.
25. How will you prepare manuscript?
26. What is proof Reading?
27. What is chapter?
28. Define Research report writing.
29. What is peer review?
30. What is thesis?

Unit IV

31. Define data.
32. Define variable.
33. Define mean.
34. What is mode?
35. Write about median.
36. Define population.
37. Define sample.
38. What is positive correlation?

39. What is negative correlation?
40. Define regression and write its types.

Unit V

41. What is a patent?
42. What are the criteria of patentability?
43. Write short note on copyright.
44. Write short note on trademark.
45. How to select a good trademark?
46. What is the purpose of geographical research?
47. What are the types of research design in geography?
48. What principle is applicable to trademark?
49. Why is copyright necessary in research?
50. Who can claim copyright?

Section – C

(5 marks)

Answer the following in about 200 words:

Unit I

1. Explain briefly about Sonication principle, methods and uses.
2. Explain the steps involved in PCR.
3. How does chromatography work?
4. Write short notes on centrifuge.
5. Write the procedure for isolation of DNA.
6. Write the procedure for isolation of RNA.
7. Write notes on chloroplast.
8. Briefly explain about paper chromatography.
9. Write the procedure for isolation of mitochondria.
10. Write the application of chromatography.

Unit II

11. Write about electrophoresis with a neat labelled diagram.
12. What are the factors affecting electrophoretic mobility?
13. Write the preparation of Agarose gel with a neat diagram.
14. Explain Protein electrophoresis.

15. Write about Nucleic acid electrophoresis.
16. Explain Spectroscopy.
17. Write a short note on ultraviolet & visible spectroscopy.
18. Write the principle & methodology of MALDI?
19. List out the application of MALDI.
20. Describe about the atomic absorption spectroscopy.

Unit III

21. Write short note on Research.
22. Explain about the Research method in biological science.
23. Describe about literature survey.
24. How to write a Research paper?
25. Give a short note on Research report writing.
26. What are the types of preparation of manuscript?
27. What is proof reading and its types?
28. Write about journals format.
29. How to publication research article?
30. Explain short note on planning and preparation of thesis.

Unit IV

31. Explain the types of data.
32. Give a brief account on median.
33. Give a brief account on mode.
34. Write about regression and its types.
35. Write about correlation and its types.
36. Write the calculation of Karl Pearson & coefficient of correlation.
37. Give a brief account on secondary data collection.
38. Write about graphs of frequency distribution.
39. Give a brief account on sampling.
40. Write about line graph.

Unit V

41. Explain about different types of Intellectual property.
42. Explain why agencies are responsible for Intellectual Property registration with

any two examples.

43. Derive an application for registration of different types of marks in PTO and an Indian IPR organization.
44. Describe how monopoly nature of owner is controlled by Patent Trademark Organization.
45. Explain administration of Patent System.
46. Compare patent rights and IPR.
47. Explain the inventions that are patentable and not patentable in India.
48. What are the main provisions of Indian Patent Amendment Act-2005?
49. What is a Geographical Indication (GI) and what is its function?
50. What are the differences between Product Patents and Process Patents?

Section – D

(10 marks)

Answer the following in 400 words:

Unit I

1. Write short notes on isolation of chloroplast.
2. Briefly explain about isolation of DNA & RNA.
3. Explain about homogenization.
4. Give an outline of separation of cellular constituents of mitochondria.
5. Explain Centrifugation and their uses.
6. Explain about HPLC.
7. Detail note about PCR.
8. Explain Gas liquid chromatography.
9. Explain about paper chromatography.
10. Explain thin layer chromatography.

Unit II

11. Write about Spectroscopy & explain its types.
12. Explain the principle, methodology & application of MALDI mass spectroscopy.
13. Give a detail account on Electrophoresis process.
14. Write about protein & Nucleic acid electrophoresis.

15. Give a detail account on AAS.
16. Explain UV- Visible spectroscopy.
17. Explain about flame photometry.
18. Write in detail about the mechanism and application of UV.
19. Discuss about estimation on cellular constituents.
20. Write about the factors affecting electrophoretic mobility.

Unit III

21. Explain about literature survey.
22. Details about Research method in biological science.
23. Explain about preparation of manuscript.
24. Explain about scientific methodology and its types.
25. Explain proof Reading.
26. Give detail notes about i) Summary ii) Bibliography.
27. Explain about research process.
28. Explain in detail about the method of proof correction.
29. Explain how to write scientific paper.
30. Explain about research fellowships.

Unit IV

31. Give a detailed account on methods of data collection.
32. Give a detailed account on biostatistics.
33. Evaluate the graphical presentation of data.
34. Give a detailed account on mean.
35. Write about ANOVA one way and two way classification.
36. Comment on regression.
37. Write in detail about methods of data presentation.
38. Discuss in detail about correlation.
39. Give an outline of applications of biostatistics.
40. Explain about the measures of central tendency.

Unit V

41. What is Intellectual Property Rights (IPR)? What are the different types of IPR?
42. What is Trademark? Explain the different types of trademarks with examples.

43. Discuss in detail about Copyright.
44. Differentiate between Copyright infringement and Trademark infringement.
45. Describe the structure and content of patent document in detail.
46. Discuss about the industrial design.
47. Explain in detail about geographical indication.
48. Explain the works protected under copyright act.
49. Discuss about the patents.
50. Give an outline of protection of new varieties of plants.

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

II M.Sc., Microbiology - SEMESTER – IV

Core I – Environmental Microbiology - 21PMIC41

Question Bank

SECTION – A

(1 mark)

Choose the correct answer:

UNIT -I

- _____ is the relationship in which each organism in interaction gets benefits from the association.(K1)
a) **Mutualism** b) Amensalism c) Parasitism d) Predation
- Example of biotic factor is _____(K1)
a) sunlight b) air c) **plants** d)temperature
- Ecological niche was first proposed by _____(K1)
a) Joseph Lister b) Robert Koch c) Alexander d) **JosephGrinnel**
- Penicillium* does not swallow the growth of bacterium *Staphylococcus*. This sort of relationship is called _____(K1)
a)commensalism b) **amensalism** c) parasitism d) predation
- Source of energy in an ecosystem is _____(K1)
a) **sunlight** b) ATP c)NAD d) ADP
- _____ is an example of commensalism.(K1)
a) Lichens b) *Myxococcus xanthus* c)***Staphylococcus aureus*** d)*Aspergillus*
- When both partners are affected negatively the nature of interaction is _____(K1)
a) commensalism b) amensalism c) **mutualism** d) parasitism
- The effect of inter specific completion on niches is to make them _____(K1)
a) larger b) **smaller** c) more triangular d) change location
- Mycorrhizha represents _____(K1)
a) symbiotic association between fungus and liverworts
b) symbiotic association between fungus and an algae

c) symbiotic association between fungus and root of plants

d) **symbiotic association between fungus and roots of higher plants**

10. _____ is an example of negative interaction.(K1)

a) Mutualism b) Amensalism c) **Parasitism** d) Predation

UNIT -II

11. _____ plays a major role in marine nitrogen cycle.(K1)

a) *Bacillus* b) *Alternaria* c) ***Cyanobacteria*** d) *Clostridium*

12. Name the organism capable of solubilizing calcium phosphate.(K1)

a) *Pseudomonas* b) *Micrococcus* c) *Penicillium* d) **All of these**

13. _____ is the eleventh most abundant element in earth's crust.(K1)

a) Carbon b) **Phosphorus** c) Nitrogen d) Sulphur

14. When ice or snow changes directly into water vapour is called _____(K1)

a) condensation b) evaporation c) **sublimation** d) precipitation

15. Water cycle is also called as _____(K1)

a) gaseous cycle b) **hydrological cycle** c) sedimentary cycle d) atmospheric cycle

16. Industrial fixation is accomplished by _____(K1)

a) **Haber process** b) Helmond's process c) Friedel-Crafts reaction d) None

17. The atmosphere containing _____ % of oxygen.(K1)

a) 12 % b) 17% c) **21%** d) 22%

18. _____ is the process which returns oxygen to the atmosphere.(K1)

a) Respiration b) **Photosynthesis** c) Absorption d) Oxygenation

19. _____ is essential for the formation of chlorophyll.(K1)

a) **Iron** b) Zinc c) Copper d) Lead

20. The total boron content in Indian soil has been found to vary from _____(K1)

a) 10 to 100 ppm b) **7 to 630 ppm** c) 7 to 530 ppm d) 17 to 63 ppm

UNIT -III

21. Aerobiology was coined by _____(K1)

a) Blackman b) Joseph Grinnel c) **F.C.Meier** d) Alexander

22. _____ and _____ properties change with altitude.(K1)
 a) Air & temperature b) Pressure & air c) **Air pressure & air temperature** d) None
23. _____ has constant temperature.(K1)
 a) **Tropopause** b) Ionopause c) Mesopause d) Exopause
24. _____ is present between inosphere & exosphere.(K1)
 a) **Ionopause** b) Mesopause c) Exopause d) Metopause
25. Who introduced the term allergy?(K1)
 a) Anderson b) Blackman c) **Anton Von Birguet** d) Grinnel
26. What is the hottest layer of the atmosphere?(K1)
 a) Troposphere b) Stratosphere c) Mesosphere d) **Thermosphere**
27. The commonest genera of fungi in indoor air is _____(K1)
 a) *Alternaria* b) *Phytophthora* c) ***Penicillium*** d) *Aspergillus*
28. In which layer of the atmosphere is ozone found?(K1)
 a) Troposphere b) **Stratosphere** c) Mesosphere d) Exosphere
29. Filtration method, the particle is removed from the air by _____(K1)
 a) **suction** b) absorption c) adsorption d) reduction
30. The causative agent of whooping cough is _____(K1)
 a) *Mycobacterium tuberculosis* b) ***Bordetella pertussis***
 c) *Corynebacterium diphtheriae* d) *Bacillus*

UNIT –IV

31. Alum is used for which of the following purification process?(K1)
 a) **Sedimentation** b) Filtration c) Disinfection d) Ozonation
32. The coliform group of bacteria includes all the _____ bacilli.(K1)
 a) aerobic b) anaerobic c) non-sporulating d) **aerobic, gram-negative, non-sporulating**
33. Among the following which acts as a representative of fecal streptococci group?(K1)
 a) ***Streptococcus faecalis*** b) *Streptococcus bovis*
 c) *Streptococcus equines* d) *Streptococcus faecium*

34. In which treatment involve oxidation of organic constituents of the wastewater?(K1)
- a) Primary treatment b) **Secondary treatment**
 c) Advanced treatment d) Final treatment
35. The upper region of the trickling filter is favorable for the growth of _____(K1)
- a) fungi b) protozoa c) **algae** d) bacteria
36. Activated sludge usually employs an aeration period of _____(K1)
- a) 1 hour b) 24 hours c) 10-15 hours d) **4-8 hours**
37. Trickling filter is used in which of the following wastewater treatment processes?(K1)
- a) Primary treatment b) **Secondary treatment**
 c) Advanced treatment d) Final treatment
38. Belt filter presses are used in which of the following process?(K1)
- a) Thickening b) Stabilization c) **Dewatering** d) Disposal
39. Which of the following gases are produced in large amounts during sludge digestion?(K1)
- a) **Methane** b) Carbon-dioxide c) Hydrogen d) Nitrogen
40. Who introduced gravity petridish?(K1)
- a) **Frankland and Hait** b) Durham c) Gregory d) Anderson

UNIT –V

41. In-situ based bioremediation involves introducing _____ to aerobic microbes.(K1)
- a) **oxygen and nutrients** b) CO₂ & methane c) O₂ & CO₂ d) CO₂ & nutrients
42. The use of living microorganism to degrade environmental pollutants is called__(K1)
- a) microremediation b) **bioremediation** c) nanoremediation d) bioaugmentation
43. A non -directed physico chemical interaction between heavy metal ions and microbial surface is called_____(K1)
- a) **biosorption** b) biomining c) bioconversion d) biotransformation
44. Xenobiotics are those chemical which are _____(K1)
- a) **anthropogenic** b) synthetic c) naturally d) in organic
45. Hydrolysis of plastics is done by _____(K1)
- a) *Streptococcus sp.*, b) *Azotobacter* c) *Pseudomonas sp.*, d) *Penicillium sp.*,
46. _____ technique includes mixing contaminated water and soil, fertilizers and carbon dioxide in a bioreactor to stimulate biodegradation.(K1)

15. Name the primary reservoirs of oxygen. (K1)
16. Define oxygen cycle (K1)
17. Define nitrogen cycle(K1)
18. Name the steps in nitrogen cycle.(K1)
19. Write note on sulphur cycle.(K1)
20. Write note on phosphorus cycle. (K1)

UNIT-III

21. Define aerobiology. (K1)
22. Describe troposphere.(K1)
23. Define stratosphere.(K1)
24. Describe mesosphere.(K1)
25. Define ionosphere.(K1)
26. Define exosphere.(K1)
27. Explain bioaerosol.(K2)
28. Write note on indoor microbiology (K1)
29. Explain aeroallergy (K2)
30. Discuss phylloplane pathogens (K2)

UNIT-IV

31. Describe water pollution (K1)
32. Interpret how is BOD measured (K2)
33. List out the steps for effluent treatment process.(K1)
34. Discuss primary treatment process (K2)
35. Draw a neat sketch on waste water treatment.(K1)
36. Write the objectives of tertiary treatment process (K1)
37. Explain BOD (K2)
38. Draw a neat sketch on anaerobic sludge digester (K1)
39. Name the micro flora in water (K1)

40. Discuss oxidation pond (K2)

UNIT-V

41. Define bioaugmentation(K1)

42. List out the types of bioremediation.(K1)

43. Define bioventing (K1)

44. Discuss lagoon treatment (K2)

45. Define biosorption(K1)

46. Define biodegradation(K1)

47. Summarize xenobiotics (K2)

48. List out the hazardous of heavy metals (K1)

49. Describe microbial plastics (K2)

50. Define bioremediation (K2)

SECTION –C

Answer the following in 200 words each

(5marks)

UNIT-I

1. Differentiate biotic and abiotic factors in an ecosystem (K4)
2. Illustrate various ecosystem food chains(K2)
3. Discuss the concept of food web(K2)
4. Examine the basic concepts of energy flow(K4)
5. Explain the concept of community(K2)
6. Explain microbial communities and their significance(K2)
7. Simplify the patterns of ecological succession (K4)
8. Differentiate between parasitism and predation (K4)
9. Compile the Fluctuation (K3)
10. Experimental approach on Mutualistic association (K3)

UNIT-II

11. Discuss the factors affecting the micronutrients in biogeochemical cycle(K2)
12. Classify the steps of water cycle (K3)
13. Explain the various steps involved in hydrological cycle(K2)
14. Explain in brief note on oxygen cycle(K2)
15. Differentiate between nitrification and denitrification (K4)

16. Simplify the mechanism of nitrate reduction (K4)
17. Discuss the types of nitrogen fixation(K2)
18. Illustrate the Phosphorus cycle(K2)
19. Explain the mechanism of Sulphur cycle(K2)
20. Discuss the process of Carbon cycle(K2)

UNIT-III

21. Classify atmospheric layers (K3)
22. Analyze the assessment of air quality (K3)
23. Compile sedimentation (K3)
24. Discuss impaction (K2)
25. Explain impingement (K2)
26. Simplify filtration (K3)
27. Differentiate indoor and outdoor microbiology (K4)
28. Explain the causes of allergy (K2)
29. Analyze tests for the detection of allergy (K4)
30. Discuss airborne fungi causing diseases (K2)

UNIT-IV

31. Explain the pond ecosystem with suitable trophic level(K2)
32. Discuss the role of organic pollutants in water(K2)
33. Simplify the distribution of microbes in natural water (K4)
34. Discuss the various factors governing micro flora in water(K2)
35. Differentiate between C BOD and N BOD (K4)
36. Discuss the significance of N BOD in water pollution(K2)
37. Discuss the role of COD water pollution(K2)
38. Explain the importance of trickling filter water analysis(K2)
39. Compileoxidation pond (K3)
40. Illustrate the principles of disinfection(K2)

UNIT-V

41. Discuss the concept of bioremediation (K2)
42. Explain in detail account of bioremediation(K2)
43. Illustrate the principle of bioremediation(K2)
44. Discuss the various factors involved in bioremediation process(K2)
45. SimplifyIntrinsic in situ bioremediation (K4)
46. SimplifyEngineered in situ bioremediation (K4)
47. Discuss the mechanism of Lagoon treatment(K2)
48. CompileSlurry phase treatment (K3)
49. Explain in detail account on Pesticides biodegradation(K2)
50. Express the mechanism involved in Xenobiotics degradation (K2)

SECTION –D

Answer the following in 500 words each

(10 marks)

UNIT-I

1. Distinguish commensalism and mutualism (K4)
2. Outline the microbial symbiosis of commensalism with example (K4)
3. Outline the microbial symbiosis of mutualism with example. (K4)
4. Distinguish the concept of community and limiting factor (K4)
5. Distinguish fluctuation and succession (K4)
6. Prove parasitism with example (K5)
7. Formulate predation with example (K6)
8. Prove food chain (K5)
9. Produce food web (K6)
10. Formulate energy flow (K6)

UNIT-II

11. Assemble the various processes in water cycle with neat diagram. (K6)
12. Evaluate the types Oxygen cycle. (K5)
13. Analyze the importance of nitrogen cycle in crop field. (K4)
14. Breakdown the steps involved in nitrogen cycle. (K4)
15. Compose the role of Rhizobium in nitrogen fixation (K6)
16. Rewrite the steps involved in Carbon cycle (K6)
17. Outline the steps in Phosphorus cycle (K4)
18. Assemble the various steps involved in Sulphur cycle (K6)
19. Judge the role of micronutrients in Biogeochemical cycle (K5)
20. Outline the steps in Sedimentary cycles (K4)

UNIT-III

21. Analyze the assessment of air quality (K4)
22. Examine the transmission of airborne bacteria (K4)
23. Examine the transmission of airborne fungi (K4)
24. Analyze transmission of airborne virus (K4)
25. Generate indoor and outdoor microbiology (K6)
26. Evaluate the causes of allergy (K5)
27. Tests for the detection of allergy (K5)
28. Outline the layers of atmosphere (K4)
29. Rewrite the airborne microbes (K6)
30. Diagram of atmospheric layers (K4)

UNIT-IV

31. Prove pond ecosystem (K5)
32. Compose the role of organic pollutants in water (K6)
33. Examine the distribution of microbes in natural water (K4)
34. Produce the factors governing micro flora in water (K6)
35. Formulate the concept of C BOD, N BOD and COD (K6)
36. Simplify the effluent treatment process (K4)

37. Produce the primary treatment process (K6)
38. Outline the Secondary treatment (K4)
39. Outline tertiary treatment process (K4)
40. Prove waste water treatment by anaerobic process (K5)

UNIT-V

41. Rewrite the factors affecting bioremediation (K6)
42. Outline the types of bioremediations (K4)
43. Compose in- situ bioremediation (K6)
44. Develop ex-situ bioremediation (K6)
45. Prove the biodegradation of metals with example (K5)
46. Formulate the biodegradation of pesticides (K6)
47. Simplify the biotransformation of xenobiotics (K4)
48. Differentiate biodegradation and bioremediation (K4)
49. Outline the biodegradation of chlorinated and nitrated aromatic compounds (K4)
50. Generate the biodegradation of phenolic and polycyclic aromatic compounds (K4)

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI-628001

II M.Sc. Microbiology

SEMESTER – IV

Core II – Soil and Agricultural Microbiology

(For those who joined in July 2021 and after)

Sub. Code – 21PMIC42

QUESTION BANK

SECTION – A

(1 mark)

Choose the correct answer:

UNIT- I

- 1) The dominant group of microorganisms found in the soil is _____ (K1)
a) fungi b) algae c) **bacteria** d) actinomycetes
- 2) The second most dominant group of microorganisms found in the soil is _____ (K1)
a) fungi b) algae c) bacteria d) **actinomycetes**
- 3) Bacteria that tolerate temperature less than 20 degree celsius is called _____ (K1)
a) Thermophlies b) Mesophlies c) **Psychrophiles** d) Basophlies
- 4) Actinomycetes are tolerant to _____ (K1)
a) **Acidity** b) Alkalinity c) Neutrality d) pH
- 5) Algae grow at an optimum pH range of _____ (K1)
a) 1-4 b) 5-6 c) **7-10** d) 10-14
- 6) Fungal count is high in _____ horizon (K1)
a) A b) O c) C d) **B**
- 7) Fungi dominate _____ soils (K1)
a) neutral b) **acid** c) alkaline d) buffered
- 8) _____ are nematodes which feed on more than one type of food material (K1)
a) Bacterivores b) **Omnivores** c) Fungivores d) Herbivores
- 9) The _____ population is always uniform and constant in soil (K1)
a) **autochthonous** b) zymogenous c) fungal d) bacterial
- 10) The number of algae in soil ranges from _____ per gram of soil (K1)

a) 10 – 100 **b) 100 – 10000** c) 100 – 1000 d) 1000 - 100000

11) _____ is a primary mineral (K1)

a) vermiculite **b) feldspars** c) clay d) smectite

12) _____ are/is formed from the alteration and decomposition of primary minerals (K1)

a) pyroxenes **b) secondary minerals** c) parent rock d) mica

13) _____ is when carbonic acid reacts with minerals and changes them to new minerals (K1)

a) Oxidation b) Hydration c) Hydrolysis **d) Carbonation**

14) Hygroscopic water is in the form of _____ (K1)

a) vapour b) water c) gas d) solid

15) Macro pore space has a diameter of more than _____ micrometer (K1)

a) 60 b) 50 c) 40 d) 30

16) Micro pore space has a diameter of less than _____ micrometer (K1)

a) 60 b) 50 c) 40 **d) 30**

17) Soil colour is influenced by the _____ (K1)

a) inorganic matter **b) organic matter** c) humus d) litter

18) Each individual unit of soil structure is called _____ (K1)

a) ped b) colloid c) shovel d) auger

19) CEC is _____ (K1)

a) Cation Expel Capacity b) Cation Export Capacity

c) Cation Exchange Capacity d) Cation Equal Capacity

20) _____ is a mixture of dark, colloidal organic compound relatively resistant to decomposition (K1)

a) Soil colloid **b) Soil Humus** c) Soil litter d) Soil organic matter

21) Microflora improve soil structure by improving the _____ (K1)

a) soil aeration **b) soil texture** c) soil water d) CEC

22) Soil microflora improves _____ in soil (K1)

a) gaseous exchange b) colour c) temperature d) water

23) _____ is used to determine deficiency of Phosphorus and potassium (K1)

a) *Penicillium notatum* b) *Candida albicans*

c) *Rhizopus stolonifer* **d) *Aspergillus niger***

- 24) Media used for testing the presence of available Phosphorus is _____ (K1)
a) Ashby's media b) VBGRB media c) **Pikovskaya's media** d) Stuart's media

UNIT-II

- 1) The most abundant sole source of carbon on earth is _____ (K1)
a) chitin b) dextran c) **cellulose** d) starch
- 2) Earth crust have _____% of Carbon (K1)
a) 0.05 b) 0.15 c) **0.03** d) 0.09
- 3) CO₂ is predominantly present in _____ (K1)
a) **air** b) soil c) water d) rock
- 4) The major process that brings Carbon from environment is _____ (K1)
a) Respiration b) **Photosynthesis** c) Decomposition d) Burning fossil fuel
- 4) Phosphorus cycle does not have _____ phase (K1)
a) semi-solid b) **gaseous** c) aqueous d) solid
- 5) Phosphorus is the _____ abundant element in the Earth's crust (K1)
a) **11th** b) 12th c) 14th d) 13th
- 6) Sulphur cycle is an/a _____ cycle (K1)
a) oxidation b) reduction c) non oxidation reduction d) **oxidation reduction**
- 7) _____ is a condition in which iron in soil is reduced and has a grayish green colour (K1)
a) **Gleying** b) Graying c) Browning d) Greening
- 8) The gene responsible for root nodule formation is called _____ (K1)
a) nif b) **nod** c) lux d) hyd
- 9) The enzyme responsible for nitrogen fixation _____ (K1)
a) **Nitrogenase** b) Luciferase c) Luminase d) Hydrogenase
- 10) _____ is a component of nucleic acids (K1)
a) Sulphur b) **phosphates** c) amino acid d) protein
- 11) *Rhizobium japonicum* forms root nodule in _____ (K1)
a) **soy bean** b) Peas c) ground nut d) beans
- 12) Ammonia is oxidized to nitrite ion by _____ (K1)
a) *Nitrobacter* b) **Nitrosomonas** c) *Rhizobium* d) *Azotobacter*
- 13) The amount of nitrogen present in earth's atmosphere is _____ (K1)

a) **79%** b) 2% c) 50% d) 45%

14) The process of conversion of molecular nitrogen to ammonia is _____ (K1)

a) **ammonification** b) nitrification c) denitrification d) mineralization

15) The blood red colour of nodular tissue in leguminous plants is due to the presence of _____ (K1)

a) ferric oxide b) protein c) haemoglobin d) **leghaemoglobin**

16) Larger subunit of Nitrogenase enzyme is called _____ (K1)

a) ferrous protein b) molybdenum
c) **molybdenum ferrous protein** d) ferrous molybdenum protein

17) Leghaemoglobin serves as an/a _____ carrier (K1)

a) CO₂ b) hydrogen c) **oxygen** d) electron

18) Atmosphere contains _____% of Nitrogen (K1)

a) 70 b) 65 c) 75 d) **79**

UNIT-III

1) _____ is the volume of soil that surrounds a seed (K1)

a) Phyllosphere b) Carposphere c) **Spermosphere** d) Phytosphere

2) The term Mycorrhiza was first used by _____ (K1)

a) **A.B. Frank** b) Nicolle c) Alexander d) S.T. Hiltner

3) _____ is a VAM fungi (K1)

a) *Amanita* b) *Aspergillus* c) ***Acaulospora*** d) *Albugo*

4) The area on the surface of the root is called _____ (K1)

a) rhizosphere b) **rhizoplane** c) rhizoregion d) rhizorea

5) _____ is the region surrounding the whole plant (K1)

a) spermosphere b) **phytosphere** c) Phyllosphere d) rhizosphere

6) The term 'Phyllosphere' is coined by _____ (K1)

a) **Ruinen** b) Nicolle c) Alexander d) S.T. Hiltner

7) The leaf surface is termed as _____ (K1)

a) phyllosphere b) **phylloplane** c) phylloregion d) phylloroid

8) Azolla-Anabaena symbiosis is an example of _____ interaction (K1)

a) animal-microbe b) rumen-microbe c) **plant-microbe** d) human-microbe

- 9) _____ is a complex of 3 enzymes such as C1 enzyme, Beta-1,4 glucanase and Beta-1,4glucosidase (K1)
 a) Lignase b) Xylanase **c) Cellulase** d) Pectinase
- 10) _____ is a lignin degrading Actinomycetes (K1)
 a) ***Streptomyces griseus*** b) *Frankia alni* c) *Actinomyces viscosus* d) *Actinobacillus neuii*
- 11) Cellulose is a linear polymer of _____ (K1)
 a) α - D Glucose b) α - D Sucrose **c) β -D Glucose** d) β -D Glucose
- 12) Hemicellulose consist of _____ sugar units (K1)
 a) **50 - 3000** b) 500 – 3000 c) 5 – 30 d) 50 -30
- 13) Mannans are a group of _____ polysaccharides (K1)
 a) Alpha (1,4 linked) **b) Beta (1,4 linked)** c) Alpha (1,2 linked) d) Beta (1,2 linked)
- 14) Laccases are a group of _____ degrading enzymes (K1)
 a) **lignin** b) cellulose c) hemicelluloses d) mannan
- 15) _____ is a group of complex aromatic polymer (K1)
 a) **lignin** b) cellulose c) hemicelluloses d) mannan

UNIT-IV

- 1) *Pyricularia* is a genus of fungi which was named by _____ (K1)
 a) **Saccardo** b) Dimitri Iwanowsky c) Patel d) Alfred
- 2) Conidia of *Pyricularia* is _____ shaped (K1)
 a) spherical **b) pear** c) ovoid d) rod
- 3) *Cercospora melongenae* causes leaf spot on _____ (K1)
 a) onion b) tomato c) eggplant d) potato
- 4) Tikka leaf spot of ground nut is caused by _____ (K1)
 a) ***Cercospora*** b) *Exobasidium* c) *Pyricularia* d) *Fusarium*
- 5) _____ is a chemical control for *Cercospora melongenae* (K1)
 a) **Bordeaux mixture** b) DDT c) Boric acid d) Malathion
- 6) The word 'Xantho' means _____ (K1)
 a) Orange b) Black **c) Yellow** d) Red
- 7) The word 'monas' means _____ (K1)
 a) yellow **b) entity** c) coccus d) Orange
- 8) *Xanthomonas* is a causative organism of _____ (K1)

- a) citrus canker **b) blight of rice** c) bean mosaic d) tomato wilt
- 9) The crystalline form of TMV was first purified by _____ (K1)
 a) **W. M. Stanley** b) A.B. Frank c) Robert d) Schwann
- 10) Tobacco mosaic virus was discovered by _____ (K1)
 a) Stanley **b) Ivanovski** c) Frank d) Robert
- 11) The bunchy top disease in banana is transmitted by a vector is _____ (K1)
 a) *Pentalonia* b) *Bemisia* c) *Myzus* **d) Aphids**
- 12) Banana bunchy top virus has _____ as it's genetic material (K1)
 a) dsRNA b) ssRNA c) dsDNA **d) ssDNA**
- 13) _____ is used to treat citrus canker (K1)
 a) **Copper spray** b) Antibiotics c) Anti-viral agent d) Iodine spray
- 14) _____ causes crown-gall disease in plants (K1)
 a) *Xanthomonas citri* b) TMV **c) *Agrobacterium tumefaciens*** d) *Cercospora melongenae*
- 15) Contact of a pathogen with a suitable host plant and initiation of the disease first time in the season of a crop is called _____ (K1)
 a) **primary infection** b) secondary infection c) tertiary infection d) fatal infection
- 16) The pathogen spreading itself independently by natural agencies is called _____ (K1)
 a) **Indirect transmission** b) Direct transmission
 c) Internal transmission d) External transmission
- 17) Yellowing of leaves due to lack of chlorophyll is called _____ (K1)
 a) **chlorosis** b) blight c) necrosis d) mottling
- 18) Blight of rice can be controlled by spraying _____ (K1)
 a) Thiram b) Zineb **c) Agrimycin** d) Penicillin

UNIT-V

- 1) *Rhizobium* has _____ granules in its cell (K1)
 a) Starch **b) Beta - hydroxy granules** c) Cellulose d) Alpha – hydroxyl granules
- 2) Cyanobacteria can be grown in _____ media (K1)
 a) MS **b) BG11** c) B5 d) B21
- 3) Cyanobacteria fixes atmospheric nitrogen using it's _____ (K1)
 a) cell wall b) DNA **c) heterocyst** d) enzyme

- 4) *Bacillus thuringiensis* produces an/a _____ (K1)
 a) growth factor b) antibiotic **c) toxin** d) vitamin
- 5) *Azolla* is a/an _____ (K1)
 a) Fungus b) Actinomycetes c) Algae **d) Fern**
- 6) *Azolla* and *Anabaena* has _____ association (K1)
a) symbiotic b) non symbiotic c) parasitic d) synregistic
- 7) The technique of seed dressing with bacteria is _____ (K1)
a) bacterization b) algalization c) curing d) inoculation
- 8) The pleomorphic forms of bacteria present inside the root nodules is _____ (K1)
 a) capsule b) slime **c) bacterioids** d) bacterivars
- 9) The medium used for the mass production of *Azotobacter* inoculant is _____ (K1)
 a) Pikovaskaya b) okans c) YEMA **d) Jensen**
- 10) The technique of seed dressing with algae is _____ (K1)
 a) bacterization **b) algalization** c) curing d) inoculation
- 11) The control of disease by using a biological agent is _____ (K1)
a) Biopesticides b) Biofertilizers c) Bioleaching d) Biodegradation
- 12) The commercial trade name of *B. thuringiensis* is _____ (K1)
a) DIPEL b) TAIVIRIDAE c) NPV d) CMV
- 13) _____ is a virus most frequently considered as controlling insect (K1)
a) NPV b) TMV c) CMV d) HIV
- 14) *Nosema pyrausta* infects _____ (K1)
a) *Ostrinia nubilalis* b) *Oecanthus fultoni* c) *Dissostiera Carolina* d) *Gr yllus texensis*
- 15) _____ causes white muscardine disease (K1)
a) *Beauveria bassiana* b) *Mattesia weiseri* c) *Nosema pyrausta* d) *Trypanosoma brucei*

SECTION – B

(2 Marks)

Answer in following in about 50 words:

UNIT I

- 1) List down some green algae present in soil (K1)
- 2) Name the different horizons of soil (K1)
- 3) Define soil fertility (K1)
- 4) Define loam (K1)

- 5) Define soil pH (K1)
- 6) Define Cation Exchange Capacity (K1)
- 7) Name the father of soil microbiology (K1)
- 8) Write about soil water (K1)
- 9) Write about soil temperature (K1)
- 10) Write about soil texture (K1)
- 11) List down some factors which affect microbial population in soil (K1)
- 12) Define soil (K1)
- 13) Define soil aggregate (K1)
- 14) Write nematode (K1)
- 15) Write soil fertility (K1)
- 16) Define gravitational water (K1)
- 17) Define Heterotrophs (K1)
- 18) Define soil humus (K1)

UNIT II

- 1) Define Biogeochemical cycle (K1)
- 2) Differentiate symbiotic and non-symbiotic nitrogen fixation (K2)
- 3) Define Carbon cycle (K1)
- 4) Define Nitrogen cycle (K1)
- 5) Write about symbiosis (K1)
- 6) Define diazotrophy (K1)
- 7) Explain about diazotrophs (K2)
- 8) Explain about symbiotic nitrogen fixation (K1)
- 9) Explain about asymbiotic nitrogen fixation (K1)
- 10) Define nitrogenase (K1)
- 11) Define hydrogenase (K1)
- 12) Write about nitrogen fixation (K1)
- 13) Write about Phosphorus cycle (K1)
- 14) Define root nodule (K1)
- 15) Explain leghaemoglobin (K2)
- 16) Write about Iron cycle (K1)

17) Define BNF (K1)

UNIT III

1) Define Spermosphere (K1)

2) Define Phyllosphere (K1)

3) Define Phytosphere (K1)

4) Define Rhizosphere (K1)

5) Define rhizoplane (K1)

6) Define phylloplane (K1)

7) List down the types of Mycorrhiza (K1)

8) Write about VAM (K1)

9) Write about Ectomycorrhiza (K1)

10) Write about Entomycorrhiza (K1)

11) List down some root exudates (K1)

12) Write about symbiosis (K1)

13) Define *Azolla* (K1)

14) List down the role of lignin in a plant (K1)

15) Define leaf litter (K1)

16) List down some cellulose degrading microbes (K1)

17) List down some hemicellulose degrading microbes (K1)

18) List down some lignin degrading microbes (K1)

19) Define soil humus Define soil humus (K1)

UNIT IV

1) Define canker (K1)

2) List out the symptoms of Tobacco mosaic (K1)

3) Define blight (K1)

4) Define kresek (K1)

5) List out the symptoms of red rot of sugarcane (K1)

6) Define TMV (K1)

7) List out the control measure for citrus canker (K1)

8) Name some virus that infects plants (K1)

9) List out the control measure of bunchy top of banana (K1)

- 10) Name some symptoms of tobacco mosaic (K1)
- 11) Name some bacteria that infect plants (K1)
- 12) Name some fungi that infect plants (K1)
- 13) Write some symptoms of plant diseases (K1)
- 14) Write about direct transmission (K1)
- 15) Write about indirect transmission (K1)

UNIT V

- 1) Define biopesticide (K1)
- 2) Write the uses of *Rhizobium* as a biofertilizer (K1)
- 3) Define biofertilizers (K1)
- 4) Define Blue Green algae (K1)
- 5) Write about *Azotobacter* (K1)
- 6) Write about *Azospirillum* (K1)
- 7) Define phosphobacteria (K1)
- 8) Write the uses of *Azotobacter* as a biofertilizer (K1)
- 9) Write the uses of *Azospirillum* as a biofertilizer (K1)
- 10) Write the uses of phosphobacteria as a biofertilizer (K1)
- 11) Explain about viral biopesticides (K2)
- 12) Write about *Metarrhizium* (K1)
- 13) Differentiate NPV, CPV and GV
- 14) Explain about bacterial biopesticides (K2)
- 15) Explain about fungal biopesticides (K2)
- 16) Explain about protozoan biopesticides (K2)

SECTION –C

(5 marks)

Answer the following in about 200 words:

UNIT-I

- 1) Explain the chemical properties of soil (K2)
- 2) Discuss about the factors affecting the microbial flora of soil (K2)
- 3) Summarize the concepts of Agricultural Microbiology (K2)
- 4) Interpret the role of microbes in soil fertility (K2)
- 5) Analyze the process of soil genesis (K4)

- 6) Analyze the chemical properties of soil (K4)
- 7) Analyze the physical properties of soil (K4)
- 8) Compile the methods of soil fertility evaluation (K3)
- 9) Compile the methods of soil fertility improvement (K3)
- 10) Construct an essay on soil microorganism (K3)

UNIT-II

- 1) Explain about Carbon cycle (K2)
- 2) Summarize the genetic engineering of BNF (K2)
- 3) Explain about Iron cycle (K2)
- 4) Give a detailed outline on Sulphur cycle (K4)
- 5) Summarize root nodule formation by *Rhizobium* (K2)
- 6) Explain about Nitrogen cycle (K2)
- 7) Explain about Phosphorus cycle (K2)
- 8) Explain about Sulphur cycle (K2)
- 9) Give a detailed outline on nitrogenase (K4)
- 10) Give a detailed outline on nif gene (K4)
- 11) Summarise the role of nodulin in nodule development (K2)
- 12) Give a detailed outline on nitrogen fixation by *Rhizobium* (K4)
- 13) Give a detailed outline on nitrogen fixation by *Frankia* (K4)
- 14) Give a detailed outline on nitrogen fixation by *Azotobacter* (K4)
- 15) Give a detailed outline on nitrogen fixation by *Azospirillum* (K4)

UNIT-III

- 1) Explain the Anabaena Azolla association (K2)
- 2) Summarize humus formation (K2)
- 3) Compile the decomposition of lignin (K3)
- 4) Analyze the decomposition of cellulose (K4)
- 5) Explain the microbial association in spermosphere (K2)
- 6) Explain the microbial association in phytosphere (K2)
- 7) Interpret the microbial association in rhizosphere (K2)
- 8) Describe about microbe – phyllosphere interaction.
- 9) Compile the decomposition of cellulose (K3)
- 10) Compile the decomposition of hemicellulose (K3)

UNIT-IV

- 1) Interpret the resistance of plants to pathogens (K2)
- 2) Illustrate about bunchy top virus (K2)
- 3) Illustrate about *Xanthomonas* (K2)
- 4) Illustrate about *Pyricularia* (K2)
- 5) Illustrate about *Cercospora* (K2)
- 6) Illustrate about *Agrobacterium* (K2)
- 7) Illustrate about *Agrobacterium* (K2)
- 8) Illustrate about TMV (K2)
- 9) Discuss the symptoms of plant diseases (K2)
- 10) Discuss the transmission of plant diseases (K2)
- 11) Discuss the signaling events in pathogenesis (K2)
- 12) Discuss the plant resistance to pathogens (K2)
- 13) Interpret the molecular basis of plants disease chemical control (K2)
- 14) Interpret the molecular basis of plants disease biological control (K2)

UNIT-V

- 1) Compile about NPV bio pesticide (K3)
- 2) Illustrate on *Azotobacter* bio fertilizer (K2)
- 3) Illustrate on *Azospirillum* bio fertilizer (K2)
- 4) Illustrate on Phosphobacteria bio fertilizer (K2)
- 5) Illustrate on BGA bio fertilizer (K2)
- 6) Illustrate on Azolla bio fertilizer (K2)
- 7) Illustrate on Mycorrhizae bio fertilizer (K2)
- 8) Explain about CPV bio pesticide (K2)
- 9) Explain about GV bio pesticide (K2)
- 10) Explain about *Bacillus thuringiensis* bio pesticide (K2)
- 11) Explain about *Bacillus papillae* bio pesticide (K2)
- 12) Explain about *Pseudomonas* bio pesticide (K2)
- 13) Explain about *Beauveria* bio pesticide (K2)
- 14) Explain about *Metarrhizium* bio pesticide (K2)
- 15) Explain about *Verticillium* bio pesticide (K2)

- 16) Explain about *Mattesia* bio pesticide (K2)
- 17) Explain about *Nosema* bio pesticide (K2)
- 18) Explain about Explain about *Nosema* bio pesticide (K2)

SECTION-D

(10 marks)

Answer the following in about 400 words:

UNIT-I

- 1) Analyze about the microbial flora of soil (K4)
- 2) Give a detailed outline on soil microorganisms (K4)
- 3) Analyze the physical properties of soil (K4)
- 4) Analyze the methods of soil fertility evaluation and improvement (K4)
- 5) Analyze the chemical properties of soil (K4)
- 6) Give a detailed outline on soil genesis (K4)
- 7) Evaluate the role of microbes in soil fertility (K5)
- 8) Analyze soil properties (K4)
- 9) Evaluate the methods of soil fertility improvement (K5)
- 10) Evaluate the methods of soil fertility evaluation (K5)

UNIT-II

- 1) Give a detailed outline on Phosphorus cycle (K4)
- 2) Analyze the molecular mechanism of nitrogen fixation (K4)
- 3) Analyze the importance of nif gene and Nitrogenase enzyme in nitrogen fixation (K4)
- 4) Give a detailed outline on Sulphur cycle (K4)
- 5) Give a detailed outline on Iron cycle (K4)
- 6) Give a detailed outline on Nitrogen cycle (K4)
- 7) Give a detailed outline on Carbon cycle (K4)
- 8) Analyze about symbiotic nitrogen fixation (K4)
- 9) Analyze the non-symbiotic nitrogen fixation (K4)
- 10) Analyze the role of nodulin in nodule development and symbiosis (K4)

UNIT-III

- 1) Evaluate the Anabaena-Azolla association as an example of Phyllosphere interaction (K5)
- 2) Examine formation of humus and steps involved in it (K4)
- 3) Evaluate the decomposition of lignin (K5)
- 4) Analyze the decomposition of cellulose (K4)

- 5) Evaluate the microbial association in spermosphere (K5)
- 6) Examine the microbial association in phytosphere (K4)
- 7) Examine the microbial association in rhizosphere (K4)
- 8) Examine about microbe – phyllosphere interaction (K4)
- 9) Compile the steps involved in decomposition of cellulose (K3)
- 10) Compile the steps involved in decomposition of hemicellulose (K3)
- 11) Examine the decomposition of organic matter (K4)

UNIT-IV

- 1) Examine the resistance of plants to pathogens (K4)
- 2) Evaluate about plant disease caused by bunchy top virus (K5)
- 3) Evaluate about plant disease caused by *Xanthomonas* (K5)
- 4) Evaluate about plant disease caused by *Pyricularia* (K5)
- 5) Evaluate about plant disease caused by *Cercospora* (K5)
- 6) Evaluate about plant disease caused by *Agrobacterium* (K5)
- 7) Evaluate about plant disease caused by *Agrobacterium* (K5)
- 8) Evaluate about plant disease caused by TMV (K5)
- 9) Analyze the symptoms of plant diseases and transmission of plant diseases (K4)
- 10) Analyze the signaling events in pathogenesis and plant resistance to pathogens (K4)

UNIT-V

- 1) Evaluate bacterial bio fertilizer (K5)
- 2) Evaluate algal bio fertilizer (K5)
- 3) Evaluate fungal bio fertilizer (K5)
- 4) Examine about viral bio pesticide (K4)
- 5) Examine about bacterial bio pesticide (K4)
- 6) Examine about protozoan bio pesticide (K4)
- 7) Compose as essay on Bio fertilizer (K6)
- 8) Compose as essay on Bio pesticides (K6)
- 9) Construct an essay on production of bacterial bio fertilizer (K6)
- 10) Construct an essay on production of fungal bio fertilizer (K6)
- 11) Construct an essay on production of algal bio fertilizer (K6)

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

II M.Sc., Microbiology

SEMESTER – IV

Core III – Applied Microbiology

Question Bank

Unit _ I

1. _____ uses anaerobic digestion.

- a) **Incineration** b) Combustion
- c) Fermentation
- d) Oxygenation

2. What is biogas composed of?

- a) O₂ and CO₂
- b) CO₂ and NO₂
- c) CH₄ and O₂
- d) **CH₄ and CO₂**

3. What is the percentage of methane in the biogas?

- a) 10-20 %
- b) 20-40 %
- c) 45-65 %
- d) **55-75 %**

4. How many steps are present in anaerobic digestion?

- a) 1
- b) 2
- c) **3**
- d) 4

5. What is the temperature that needs to be maintained during the process?

- a) 90°F
- b) 95°F
- c) **100°F**
- d) 105°F

6. The pathogens in digestate are _____

- a) Highly active
- b) Inactive

c) **Partly inactive**

d) Neutral

7. What is the range of retention time during anaerobic digestion?

a) 10-20 days

b) 20-30 days

c) 40-80 days

d) **40-100 days**

8. How much is the cow yield from anaerobic digestion that can be obtained?

a) 0.1 m³/Kg dung

b) 0.2 m³/Kg dung

c) 0.3 m³/Kg dung

d) **0.4 m³/Kg dung**

9. In anaerobic digestion system which of the following statement holds good?

a) Acids are necessary to be added to make the pH neutral

b) **Alkalines are necessary to be added to make the pH neutral**

c) A flocculant is to be added to bring about flocculation

d) A coagulant is necessary to be added in order to bring about coagulation

10. What is the optimum temperature at which anaerobic digestion is carried out?

a) **25-35 degree Celsius**

b) 55 degree Celsius

c) 45 degree Celsius

d) 40-50 degree Celsius

11 For what range of COD level anaerobic digestion is carried out?

a) 400-800

b) 900-1200

c) **1500-2000**

d) 300-400

12. What is the percentage of Carbon dioxide produced during anaerobic digestion?

a) 70-80%

b) 80-90%

c) **30-50%**

d) 50-60%

13. What is the rate limiting step in anaerobic digestion?

a) **Methanogenesis**

b) Hydrolysis

c) Acidification

d) Biogas production

14. What is the hydraulic retention time for a completely mixed anaerobic digestion process?

- a) **15-30 days**
- b) 40-50 days
- c) 50-60 days
- d) 60-80 days

Unit- II

1. Earthworm's faecal deposits known as _____

- a) Worm wash
- b) vermiwash
- c) **worm castings**
- d) Worm cocoon

2. The first body segment is called as _____

- a) **Peristomium**
- b) preclitellar
- c) mouth
- d) clitellum

3. _____ is absent in first and last clitellum

- a) Septae
- b) **Setae**
- c) mouth
- d) preclitellar

4. Immature _____ produced by the testes

- a) **Spermatozoa**
- b) sperm
- c) ova
- d) ovary

5. Spermiducal funnel leads into a _____

- a) Spermatozoa
- b) sperm
- c) ova
- d) **Vasa deferens**

6. _____ secretion, serves as a medium for transfer of sperms

- a) Spermatozoa
- b) sperm
- c) **Prostate**
- d) Vasa deferens

7. _____ secretion, is supposed to help in keeping the two worms close together during copulation

- a) Spermatozoa
- b) **Accessory glands**
- c) Prostate
- d) Vasa deferens

8. _____ store the sperms received from male earthworm during copulation

- a) Spermatozoa
- b) Accessory glands
- c) Prostate
- d) **Spermathecae**

9. _____ species is commonly known as redworm

- a) **Eisenia fetida**
- b) *Lumbricus terrestris*
- c) *Pontoscolex crethrurus*
- d) Anecic species

10. The mature worms called _____

- a) clitellate
- b) **post – clitellate**
- c) pre- clitellate
- d) clitellum

Unit –III

1. CaCO_3 is mixed with spawn in the _____ ratio.
a) **20g / 1Kg** b) 30g / 1Kg c) 40g / 1Kg d) 10g / 1Kg
2. The scientific name of milky mushroom is _____
a) Agaricus bisporus **b) Calocybe indica** c) Pleurotus sajor-caju d) Volvariella volvcea
3. The scientific name of paddy straw mushroom is _____
a) Agaricus bisporus b) Calocybe indica c) Pleurotus sajor-caju **d) Volvariella volvcea**
4. The scientific name of button mushroom is _____
a) Agaricus bisporus b) Calocybe indica c) Pleurotus sajor-caju d) Volvariella volvcea
5. The scientific name of oyster mushroom is _____
a) Agaricus bisporus b) Calocybe indica **c) Pleurotus sajor-caju** d) Volvariella volvcea
6. To maintain the pH of spawn _____ is added to it.
a) CaCO_3 b) CaOH c) CaPO_4 d) CaCl
7. The first step in mushroom cultivation is _____ technique
a) Tissue growth **b) Tissue culture** c) spawn d) harvest
8. In third generation spawn the _____ of mushroom will be reduced
a) yield b) growth c) colour **d) virulence**
9. Spawn is prepared by _____ grains for oyster mushroom
a) rice **b) Sorgham** c) moringa d) wheat
10. For tissue culture technique _____ media is used
a) PDA b) MSA c) TCBS d) MRA
11. _____ acts as a seed for mushroom cultivation
a) tissue **b) spawn** c) bed d) spore
12. To maintain the pH of spawn _____ is added to it.
a) CaCO_3 b) CaOH c) CaPO_4 d) CaCl
13. In canning process, after blanching the mushrooms are placed in cans containing _____
a) NaCl and citric acid b) NaOH and citric acid c) NaCo and citrate d) Citrate
14. The cans are placed in an autoclave and sterilized for one hour at _____ C
a) 120 b) 150 c) 180 d) 200

1. The fruiting body of *Aspergillus* is called _____
 a) **Cleistothecium** b) Apothecium c) Hypanthodium d) Perithecium
2. All fungi are _____
 a) parasites b) saprophytes c) autotrophs d) **Heterotrophs**
3. Fungi can be stained by _____
 a) **Lactophenol cotton blue** b) methylene blue c) crystal violet d) saffranine
4. Fungi usually store the reserve food material in the form of _____
 a) starch b) **Glycogen** c) fat d) protein
5. Mushrooms have been recognized by the _____ as food constituting to the protein nutrition
 a) FAD b) FSSAI c) ISI d) **FAO**
6. _____ activity is rare in mushrooms
 a) Vit C b) Vit B1 c) Vit B2 d) **vit D**
7. For tissue culture technique _____ media is used
 a) **PDA** b) MSA c) TCBS d) MRA
8. _____ acts as a seed for mushroom cultivation
 a) tissue b) **spawn** c) bed d) spore
9. _____ carbohydrate is present in mushrooms.
 a) **chitin** b) starch c) galactose d) lactose
10. _____ amino acid lacking in mushrooms.
 a) lysine b) **methionine** c) tyrosine d) alanine

Unit-IV

1. SCP stands for _____
 a) **Single Cell Protein**
 b) Stress Cultivated Plant
 c) Somatic Cultivated Plantlet
 d) Soma Clonal Plants

2. How much per cent of the human population is suffering from hunger and malnutrition?

- a) 75 per cent
- b) 5 per cent
- c) 25 per cent**
- d) 50 per cent

3. Which of the following algae can be grown on wastewater?

- a) *Spirogyra*
- b) *Volvox*
- c) *Spirulina***
- d) *Chlamydomonas*

4. On which of the following material, *Spirulina* cannot grow?

- a) Straw
- b) Molasses
- c) Animal manure
- d) Lava**

5. Which of the following bacterial species is known for its high rate of biomass production?

- a) *Methylophilus methylotrophus***
- b) *Xanthomonas*
- c) *Clostridium*
- d) *Rhizomonas*

6. Which of the following is the most common source of SCP?

- a) Multicellular yeast
- b) Single-celled yeast**
- c) Unicellular algae
- d) Unicellular bacteria

7. Which of the following is not an organic matter on which microorganisms are raised for SCP?

- a) Sawdust
- b) Paddy straw
- c) Acids**
- d) Whey

8. Which of the following is not an advantage of SCP?

- a) Used as a protein-rich diet
- b) Reduce environmental pollution
- c) Increase in supply of protein
- d) Increases water pollution**

9. Which of the following nitrogen fixers is found in rice fields associated with *Azolla*?

- (a) *Tolypothrix*
- (b) *Frankia*
- (c) *Anabaena***
- (d) *Spirulina*

10. Which of the following is a pair of biofertilizers?

- (a) *Salmonella* and *E. coli*
- (b) *Rhizobium* and grasses
- (c) *Nostoc* and legume
- (d) *Azolla* and BGA**

11. Which of the following fern is a biofertilizer?

- (a) *Salvinia*
- (b) *Azolla***
- (c) *Pteridium*
- (d) *Marsilea*

12. Pick the correct statement

- (a) legumes do not fix nitrogen
- (b) legumes fix nitrogen independent of bacteria
- (c) legumes fix nitrogen through bacteria in their roots**
- (d) legumes fix nitrogen through bacteria in their leaves

13. Organic farming is the technique of raising crops through the usage of

- (a) resistant varieties
- (b) manures
- (c) biofertilizers
- (d) all of the above**

14. A biofertilizer involving a pteridophyte host is

- (a) *Azotobacter*
- (b) *Clostridium*
- (c) *Anabaena***
- (d) *Rhizobium*

Unit V

1. Bioaugmentation is a process that involves:

- A) Using plants for bioremediation

- B) Bioventing
- C) Sludge removal
- D) Adding microbes to a cleanup site**

2. Which bioremediation approach involves mixing contaminated soil with water, carbon dioxide, and fertilizers in a bioreactor to stimulate biodegradation?

- A) In situ hybridization
- B) Slurry-phase bioremediation**
- C) Biopile treatment
- D) In situ bioremediation

3. Which bioremediation approach involves using plants to degrade pollutants?

- A) Biopile
- B) Phytoremediation**
- C) Composting
- D) Land farming

4. During which stage of wastewater treatment is the primary effluent aerated to allow for biodegradation by aerobic microbes?

- A) Sedimentation
- B) Secondary treatment**
- C) Sludge digestion
- D) Disinfection

5. Which cleanup approach involves removing groundwater or soil from its natural setting to allow for bioremediation?

- A) In situ bioremediation
- B) Ex situ bioremediation**
- C) Bioaugmentation
- D) Phytoremediation

6... Microbially catalyzed redox reaction leads to metal _____

- a) Mobilization**
- b) Immobilization
- c) Reduction
- d) Oxidation

7. Which of the following is the most common bacteria used for bioleaching?

- a) Spirillum
- b) Coccus
- c) Bacillus**
- d) Streptococcus

8. Which one of the following is not included in the mechanism of bioleaching?

- a) Acidolysis

- b) Complexolysis
- c) Redoxolysis
- d) Hydrolysis**

9. What kind of bacteria benefits the most from direct leaching?

- a) Autotrophs**
- b) Heterotrophs
- c) Chemotrophs
- d) Chemolithotrophs

10. Which genera helps in bioaccumulation?

- a) Bacillus
- b) Aspergillus**
- c) Agaricus
- d) Mycenae

11. What kind of pH is most suitable for bioleaching in majority of the metals?

- a) At very low pH
- b) At very high pH
- c) At low pH**
- d) At high pH

12. Which of the following microbial leaching techniques depend on the working volume of less than ten cubic meter (<10m³)?

- a) Laboratory Scale
- b) Pilot-Plant Scale**
- c) Industrial Scale
- d) Commercial Scale

13. FCC stands for _____

- a) Fluid Cracking Catalyst
- b) Fluid Catalytic Cracking**
- c) Fluid Chemical Cracking
- d) Fluid Chemical Catalyst

Section – B

Unit I

2 Marks

1. Define Biofuel
2. Define AD
3. Write about Methanogens

4. What is meant by biogas?
5. What is meant by methanogenesis?
6. What are organic materials?
- 7.bWhat is the result of the AD process?
- 8.bDefine biosolids
- 9.Define scum
10. State the stages of AD
11. Write a short note on Hydrolysis stage of AD
- 12.Write a short note on acidogenesis stage of AD
- 13.Write a short note on acetogenesis stage of AD
- 14.Write a short note on methanogenesis stage of AD
- 15.Write about the function of acid forming bacteria in AD
- 16.Write about the function of methanogenic bacteria in AD

5 Marks

- 1.Write about stages of AD
- 2.Explain about CMR
- 3.Describe Mixed Plug flow reactors
- 4.Write in detail about Covered Lagoon
- 5.Explain about Up-flow anaerobic sludge blanket
- 6.Write about Fixed film anaerobic digester
- 7.Give a detailed account on Sequential Batch reactor
- 8.Discuss about advantages and disadvantages of anaerobic digestion
- 9.Discuss about factors affecting anaerobic digestion
- 10.Explain about applications of anaerobic digestion
- 11.Give a list of wastes used in methanogenesis

10 Marks

- 1.Explain detailed stages of AD
- 2.Explain about CMR
- 3.Describe Mixed Plug flow reactors
- 4.Write in detail about Covered Lagoon
- 5.Explain about Up-flow anaerobic sludge blanket
- 6.Write about Fixed film anaerobic digester
- 7.Give a detailed account on Sequential Batch reactor
- 8.Discuss about advantages and disadvantages of anaerobic digestion
- 9.Discuss about factors affecting anaerobic digestion
- 10.Explain about applications of anaerobic digestion

Unit II

2 Marks

- 1.Write about Anecic species
- 2.Write about Endogeic species
- 3.Write about Epigeic species
- 4.Write a short note on locomotion of earthworm
- 5.Write about habitat of earthworm
- 6.Define vermiculture
7. Define vermicompost
8. What is meant by cocoon?
9. list out the nutrients present in vermicompost
10. Define **Peristomium**
11. Define **Spermatozoa**

12. Define **Setae**

13. Define **Vasa deferens**

14. Define **Prostate**

15. Define **Accessory glands**

16. Define **Spermathecae**

5 Marks

1. Describe about male reproductive system of earthworm
2. Describe about female reproductive system of earthworm
3. Explain about wastes used in vermicompost
4. Describe about Endogeic and Anecic species
5. Discuss about advantages and disadvantages of vermicompost
6. Write short note on Tank vermicompost method
7. Discuss about earthworm's food
8. Write short note on heap vermicompost method
9. Explain about static pile windrows method
10. Explain about top-fed windrows method
11. How will you harvest the vermicompost
12. Explain about the characterization of vermicompost
13. Discuss about the precautions taken for storage of vermicompost
14. How will you analyse a plant growth parameters by application of vermicompost

10 Marks

1. Explain about the life cycle of earthworm

2. Describe about the importance of earthworm
3. Explain the factors influencing of vermicompost
4. Discuss in detail about stages of vermicompost
5. Explain about applications of vermicompost
6. Explain about the large scale vermicompost production by roof shed method
7. Describe about vermicompost production by Bin method
8. Discuss about the advantages of vermicompost
9. Explain about the nutrient availability in vermicompost
10. Explain the role of vermicompost in plant growth

Unit III

2 Marks

1. Write any two uses of mushroom
2. Write a short note on Oyster mushroom
3. Write a short note on Milky mushroom
4. Write a short note on Paddy Straw mushroom
5. Write a short note on Button mushroom
6. What is meant by tissue culture technique?
7. What is the use of CaCO_3 in spawn preparation?
8. How will you harvest the mushroom from the bed?
9. How will you store the mushrooms ?
10. What are all substrates you can use for mushroom bed?
11. What are all substrates you can use for mushroom spawn?
12. What are the precautions should be taken during the media preparation?
13. What are the precautions should be taken during the bed preparation?
14. What are the precautions should be taken tissue culture technique?
15. What are the precautions should be taken during the spawn preparation?

5 Marks

1. Write in detail about the steps involved in milky mushroom cultivation

2. Write in detail about the steps involved in oyster mushroom cultivation
3. Write in detail about the steps involved in button mushroom cultivation
4. Write in detail about the steps involved in paddy straw mushroom cultivation
5. Explain about tissue culture technique
6. Describe about spawn preparation
7. Describe about mushroom bed preparation

10 Marks

Write in detail about the steps involved in Paddy straw mushroom cultivation

- 3 Write in detail about the steps involved in oyster mushroom cultivation
5. Write in detail about the steps involved in milky mushroom cultivation
6. Write in detail about the steps involved in button mushroom cultivation

Write in detail about the steps involved in mushroom cultivation

Explain tissue culture technique and spawn preparation

4. Describe about mushroom bed preparation with different types of substrates.

Describe about the precaution methods for media, spawn and mushroom bed preparation

Write about post harvest technology of mushroom

Unit IV

2 Marks

Define biofertilizer

Write a short note on biology of *Spirullina*

Write a short note on biology of *Azolla*

Name the steps involved in *Spirullina* cultivation

Name the steps involved in *Azolla* cultivation

Expand SCP

Write the uses of SCP

5 Marks

Explain about the biology of *Spirullina*

Explain about the biology of *Azolla*

Write in detail about cultivation of *Spirullina*

Write in detail about cultivation of *Azolla*

Describe about the post harvest technology of *Spirullina*

Describe about the post harvest technology of *Azolla*

Explain about SCP formulation

10 Marks

Explain about the biology of *Spirullina*

Explain about the biology of *Azolla*

Write in detail about cultivation of *Spirullina*

Write in detail about cultivation of *Azolla*

Describe about the post harvest technology of *Spirullina*

Describe about the post harvest technology of *Azolla*

Explain about SCP formulation

Unit V

2 Marks

Define biodegradation

Define Xenobiotics

Define bioremediation

Define Biodeterioration

Define bioleaching

Define bioaccumulation

5 Marks

Describe about the role of microbes in degradation

Explain about the biodegradation of hydrocarbons

Explain about the biodegradation of pesticides

Explain about the biodegradation of plastics

Write in detail about Biodeterioration of wood

Write in detail about Biodeterioration of paper pulp

Write about bioremediation of toxic waste sites

Explain about factors affecting the bioremediation process

Explain about bioaccumulation of heavy metals

Write in detail about bioleaching of iron

Write in detail about bioleaching of gold

Write in detail about bioleaching of uranium

10 Marks

Describe about the role of microbes in degradation

Explain about the biodegradation of hydrocarbons

Explain about the biodegradation of pesticides

Explain about the biodegradation of plastics

Write in detail about Biodeterioration of wood

Write in detail about Biodeterioration of paper pulp

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Write in detail about bioleaching of gold

Write in detail about bioleaching of uranium

St. Mary's College (Autonomous)

Re-accredited with 'A+' Grade by NAAC

Thoothukudi



PG Department of Chemistry

Semester I

QUESTION BANK

2021 - 2023

Unit I Inorganic Photochemistry**Section - A**

- Transitions from S_1 to S_0 state is known as _____
a) Phosphorescence b) Internal Conversion c) Intersystem Crossing **d) Fluorescence**
- Transitions from T_1 to S_0 state is known as _____
a) Intersystem Crossing b) Internal Conversion **c) Phosphorescence** d) Fluorescence
- Which of the following is radiation less transitions _____?
a) Internal Conversion b) Intersystem Crossing **c) Both** d) None
- Transitions from singlet to singlet state or triplet to triplet state is known as _____
a) Internal Conversion b) Phosphorescence c) Intersystem Crossing d) Fluorescence
- Transitions from singlet to triplet state or triplet to singlet state is known as _____
a) Internal Conversion b) Phosphorescence **c) Intersystem Crossing** d) Fluorescence
- Which among the following emit radiation during transition _____?
a) Phosphorescence b) Fluorescence **c) Both** d) None
- Which of the following is phosphorescence quenched sensitizer?
a) Acridinium **b) Biacetyl** c) Both d) None
- Which of the following is p-type semiconductor?
a) WS_2 b) TiO_2 c) CdSe **d) GaP**

Section - B

- What is lamberts law? Define beer law.
- Write about beer lamberts law.
- What is fluorescence?
- What is phosphorescence?
- What is photo aquation reaction?
- What is photo anation reaction?
- What is photo redox reaction?
- What is photo substitution reaction?

Section - C

- Write about photochemistry of organometallic compounds.
- Explain the photochemistry of Co III complexes.
- Explain the photo anation reaction.
- Write about photo redox reactions.
- Discuss briefly Adamson's rule.
- Explain about Kinetics of bimolecular deactivation reaction.
- Describe briefly about d-d and Charge transfer reaction.

Section - D

- Explain the photochemistry of ruthenium polypyridyls.
- Explain the photochemistry of Chromium complexes

- Discuss briefly about the application of semiconductor in photochemistry.
- Discuss the photo substitution reaction.
- Discuss in detail about Energy transfer process

Unit II Periodic properties and Ionic bonding

Section - A

- If the electronegativity difference of two atoms is small, the bond formed is
 - Ionic
 - Covalent**
 - Coordinate
 - Covalent coordinate
- Electronegativity of the element N, O, F and C increases in the order
 - $F > O > N > C$
 - $C < N < F < O$
 - $C < N < O < F$**
 - $F > N > C > O$
- Electronic configuration of Al^{3+} is
 - 2, 8, 3
 - 2,8,8
 - 2,8**
 - 2,8,8,3
- Bond length increases in the order
 - Triple bond < double bond < single bond**
 - Triple bond > double bond > single bond
 - Single bond < Triple bond < double bond
 - All bonds are equal in length.
- Which of the following has lowest bond angle?
 - H_2O
 - H_2S
 - H_2Se
 - H_2Te**
- Covalency is favoured by
 - Large positive ion
 - Small negative ion
 - Both(a) and (b)
 - Large charges on Ions.**
- Ionic radii decreases in the direction
 - $AgF < AgCl < AgBr < AgI$
 - $AgCl < AgBr < AgI < AgF$
 - $AgF > AgCl > AgBr > AgI$**
 - $< AgBr < AgI < AgF < AgCl$
- Which of the following does not obey the octet rule?
 - H_2
 - He_2
 - B
 - All the above**
- The overlap of two p-orbital perpendiculars to the internuclear axis gives
 - Sigma bond
 - pi-bond**
 - dative bond
 - ionic bond
- The relative strength of covalent bond is in the order,
 - $S-S > S-P > P-P$
 - $P-P > S-S > S-P$
 - $S-S < S-P < P-P$**
 - $S-P > P-P > S-S$

Section B

- How does the Electronic configuration of an atom related to its position in periodic table?
- The atomic numbers of three elements A, B and C are 12,18 and 20 respectively, state and give reason which two elements will show similar properties.
- Define: Ionic bond, Covalent bond and coordinate bond with example.
- Write down the electronic configuration of Li, Na^+ , Fe^{3+} , Zn^{2+} .
- What is Born-Landé equation, explain the terms in it and for which calculation this equation is used.
- What is bond order?
- What is bond energy?
- What is meant by electronegativity?

Section C

1. Explain Lattice energy with Born Lande equation.
2. Define: Size effect of Ionic radii and what are the factors affecting Ionic radii.
3. Explain Polarizability and Polarizing power with Fajan's Rule.
4. Discuss about Octet rule with Lewis dot diagram.
5. What is H-bonding? What are the different types of hydrogen bonding and explain them?
6. What is meant by ionic radius? How does it vary in a group and in a period?
7. Define the terms ionization energy and electron affinity. How does it vary in a group as well as in a period?

Section D

1. What is periodicity and explain how all the properties changes in group and periods.
2. Explain in detail about Reduction potential and their Uses.
3. Explain Born Haber cycle with its characteristics.
4. List out the periodic properties of elements.

Unit III

Molecular Structure and Bonding

Section - A

(20 x 1 = 20)

1. The shape of water molecule is
 - a) **Bent**
 - b) Trigonal bipyramidal
 - c) Linear
 - d) Square planar
2. In σ – molecular orbital, the number of nodal plane is
 - a) 1
 - b) 2
 - c) 3
 - d) **none**
3. If the electronegativity difference of two atoms is small, the bond formed is
 - a) Ionic
 - b) **Covalent**
 - c) Coordinate
 - d) Covalent coordinate
4. The correct order of repulsions
 - a) LP – LP < LP – BP < BP – BP
 - b) BP – LP < LP – LP < BP – BP
 - c) LP – LP < BP – BP < LP – BP
 - d) **LP – LP > LP – BP > BP – BP**
5. In ammonia molecule, H – N – H bond angle is
 - a) 104.5°
 - b) **107°**
 - c) 107.5°
 - d) 109.5°
6. The hybridization of the oxygen atom in water is
 - a) sp
 - b) sp²
 - c) **sp³**
 - d) dsp²
7. The combination of two or more atomic orbitals is called
 - a) **Molecular orbital**
 - b) Bonding orbitals
 - c) Antibonding orbitals
 - d) None of the above
8. Molecules having two or more configurations which are chemically equivalent stereochemically non – rigid are called
 - a) **Fluxional molecules**
 - b) Isomers
 - c) Tautomers
 - d) Enantiomers
9. According to Bent's rule, more electronegative substituents prefer hybrid orbitals having
 - a) More 's' character
 - b) **Less 's' character**
 - c) More 'p' character
 - d) More 'p' character
10. The correlation diagram of orbital energy and molecular geometry is called
 - a) MO diagram
 - b) Character table
 - c) Venn diagram
 - d) **Walsh diagram**
11. The bond order of the molecule CO is
 - a) 1
 - b) 2
 - c) **3**
 - d) 2.5
12. The molecular geometry for ammonia is

- a) Saw horse b) Trigonal planar **c) pyramidal** d) Tetrahedral
13. The relative strength of the hybrid orbitals are in the order
 a) $sp > sp^2 > sp^3$ **b) $sp^3 > sp^2 > sp$** c) $sp^2 > sp > sp^3$ d) $sp < sp^2 < sp^3$
14. The geometry corresponding to sp^3d hybridization is
 a) trigonal b) tetrahedral c) octahedral **d) trigonal bipyramid**
15. CO molecule is isoelectronic with
 a) NO b) O₂ **c) N₂** d) F₂
16. The paramagnetic character of oxygen molecule is explained by
a) MO theory b) VB theory c) Lewis theory d) VSEPR theory
17. When two atoms approach to form a bond between them, the potential energy
a) decreases b) increases c) remains the same d) none
18. The noble gas with highest ionization energy is
a) He b) Ne c) Ar d) Xe
19. EA₁ (first electron affinity) and EA₂ are
 a) both exothermic **b) exothermic and endothermic**
 c) endothermic and exothermic d) both endothermic
20. The bond formed when two electron clouds overlap along their axis is
 a) pi bond **b) sigma bond** c) co-ordinate bond d) none
21. London force is
 a) strong forces b) weak forces **c) very weak forces** d) very strong forces
22. Electronegativity of the element N, O, F and C increases in the order
 a) $F > O > N > C$ b) $C > N > F > O$ **c) $C > N > O > F$** d) $F > N > C > O$
23. In the alkalimetal group ionic radii
 a) decreases **b) increases** c) increases and decreases d) none
24. ----- is not a periodic property
 a) electron affinity **b) paramagnetism** c) electronegativity d) ionisation energy
25. The alkalimetal with lowest ionization energy is
 a) Li b) Na **c) Cs** d) K

Section - B

(7 x 2 = 14)

1. Define apicophilicity.
2. State Bent's rule.
3. Define Walsh diagram.
4. What is molecular orbital?
5. What is meant by hybridization?
6. Define resonance.
7. Explain sp^3 hybridization with example.
8. Define about geometrical isomerism.
9. What is hydrogen bonding? Explain with examples.
10. Identify hybridization involved in following molecules. i) H₂O ii) NH₃ iii) BF₃
11. Interpret the shape of the following molecules: i) PCl₅, ii) BeCl₂, iii) SF₆

Section - C

(5 x 6 = 30)

1. Explain the postulates of VSEPR theory.

Section – B

Answer the questions:- (2 marks)

1. What are Lewis acids?
2. Write a limitations of Lewis concept.
3. Give a reason CsF reacts with LiI even through both are ionic.
4. What is Lewis concept of acids and bases?
5. Write HSIP principle.
6. What do you meant differentiating solvents?
7. What are acids and bases based on Arrhenius concept?
8. Why is NF_3 a much weaker base than NH_3 ?
9. Explain PH_4I is stable while PH_4F not?

Section – C

Answer all the questions choosing either (a) or (b):-

1. Explain clearly why hard acids coordinate with hard bases and soft acids coordinate with soft bases.
2. How are acids and bases defined in terms of i) Arrhenius concept ii) Bronsted Lowry concept?
3. Comment on the statement, “All Arrhenius acids are also Bronsted acids but all Arrhenius bases are not Bronsted Bases”.
4. Give samples to show that water can behave both as an acid and a base under suitable conditions.
5. Discuss Arrhenius theory of acids and bases.
6. What are the factors affecting the strength of acids and bases?
7. Describe the properties and reactions of superacids.

Section – D

Answer the questions:- (12marks)

1. Discuss the effect of solvent on relative strengths of acids and bases.
2. Illustrate the effect of substituent on relative strengths of acids and bases.
3. What do you understand by conjugate acid-base pairs? Show that a strong acid has a weak conjugate base and a weak acid has a strong conjugate base.
4. Discuss the contribution of pi bonding of pi bonding in soft-soft interactions.
5. Explain in detail about Lewis theory of acids and bases.
6. Describe the properties and reactions of liquid ammonia.
7. Describe the properties and reactions of liquid HF.
8. Describe the properties and reactions of liquid SO_2 .

Unit V Lanthanides and Actinides

Section - A

1. The most common oxidation state of lanthanide is
a) +4 **b) +3** c) +2 d) +5
2. Paramagnetism is a property of
a) Completely filled electronic subshells **b) Unpaired electrons**

22. Tripositive lanthanide ions are coloured due to unpaired
a) **f-electrons** b) d-electrons c) p-electrons d) all
23. Similarity in size of Zr and Hf is due to
a) isoelectronic nature b) similar electronic configuration
c) **lanthanide contraction** d) actinide contraction

Section - B

Answer any seven in about 50 words each:

1. What are f-block elements?
2. Actinide have greater tendency for complex formation than lanthanides. Explain.
3. What is meant by lanthanide contraction?
4. Discuss the position of lanthanides in the periodic table.
5. What are actinides?
6. Although +3 oxidation states is the characteristic oxidation state of lanthanides but cerium shows +4 oxidation state also. Why?
7. Ionisation enthalpies of Ce, Pr and Nd are higher than Th, Pa and U. Why?
8. Actinides show larger number of oxidation states than lanthanides. Why?
9. Define actinide contraction.
10. Give the uses of lanthanide compounds as shift reagent.

Section - C

Answer in about 200 words each:

1. Discuss the magnetic properties of lanthanides and actinides.
2. Write note on uses of lanthanide compounds as shift reagents.
3. Illustrate the emission spectra of actinide and lanthanide.
4. Write any two consequences of lanthanide contraction.
5. Why does lanthanum exhibit only +3 oxidation state whereas certain other elements of f-block elements show +2 and +4 oxidation state also?
6. How will you separate the lanthanide elements?
7. Illustrate absorption spectra of lanthanide.
8. Give a note on organometallic compounds of actinides.
9. Explain the magnetic properties of lanthanides
10. Write a short note on coordination complexes of f-block elements.

Section - D

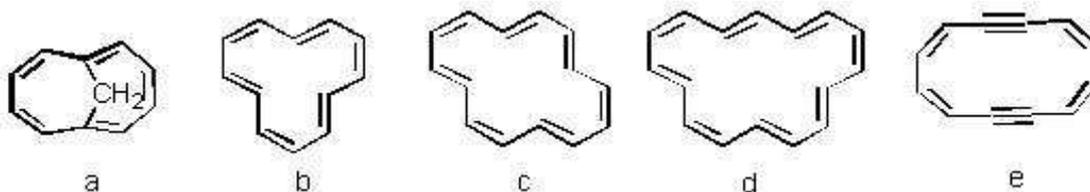
Answer any three in about 500 words each:

1. Discuss the following
 - i) Comparison between lanthanides and actinides.
 - ii) Co-ordination complexes of lanthanides.
2. How is lanthanide compounds used as shift reagents?
3. Explain lanthanides contraction. What are the consequences?
4. Write a note on oxidation states and colour of lanthanides and actinides.
5. What are the important minerals of lanthanides? How are lanthanides extracted from monazite sand and separated into individual lanthanides?

Unit I Aromaticity and Ring system

Section – A

- Cyclopropenyl cation is
 - Aromatic**
 - Non Aromatic
 - Antiaromatic
 - None
- Which one of the following is antiaromatic
 - Pyrrole
 - 1,3- Cyclobutadiene**
 - Azulene
 - [14] Azulene
- Which statement regarding Hückel's rule is FALSE?
 - There must $(4n+2)$ π electrons
 - The molecule must be planar
 - The molecule must be cyclic
 - The molecule has hybrid p orbitals**
- Which of the following structures are aromatic according to Hückel's rule?

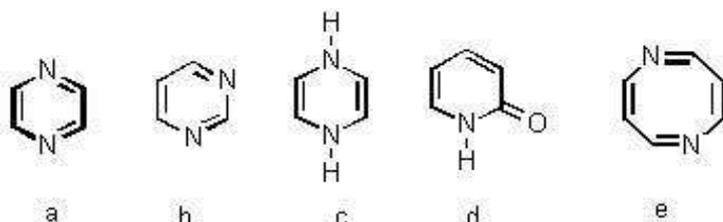


- a and c
- a, c and d
- b and d**
- b, d and e

- Cyclooctatetraene is
 - Planar
 - Tub shaped**
 - Pyramidal
 - In chair form
- Which of the following is aromatic



- Which of the following compounds are aromatic?

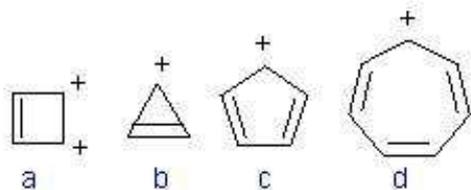


- a, b, c and d
- a, c and d
- a, b, d and e**
- a, b and d

- Which of the following molecules is aromatic according to Huckel's rule?



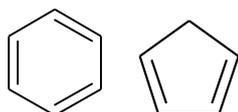
- Which of the following cations is aromatic?



- a) b,d b) d c) **a,b,d** d) b,c,d
10. What is the hybridization of the ring atoms in atomic compound?
 a) Sp **b) sp²** c) d²sp d) sp³
11. Which of the following compound is not aromatic?
 a) Benzene b) Phenanthrene **c) Cyclooctatetraene** d) Napthalene
12. How many pi electrons are there in an antiaromatic compound?
 a) 4n+4 **b) 4n** c) 2n+2 d) 4n+2
13. Most of the sydnones contain how many ring membered?
 a) **5 membered ring** b) 3 membered ring c) 4 membered ring d) 6 membered ring
14. Example for 7 membered ring
 a) Annulenes **b) Tropones** c) Fullerene d) Sydnone
15. In which are the lone pair electron on the nitrogen atom of pyrrole?
 a) sp **b) sp²** c) d²sp d) sp³
16. Fullerene structure is also called as
 a) **Soccer ball** b) Hand ball c) Cricket ball d) Ring ball
17. The non-benzenoid aromatic compound is
 a) phenanthrene b) anthracene **c) ferrocene** d) naphthalene
18. Which among the following compounds is aromatic?
 a) cyclobutadiene **b) potassium cyclopentadienide**
 c) cyclo octatriene d) cyclopentadienylcation

Section – B

- Define Huckel's rule.
- Will cyclooctatetraene show aromatic character? Give the reason.
- Discuss the difference between aromatic, non aromatic and antiaromatic compounds give examples.
- Under Huckel's rule write the compound will be aromatic, anti aromatic and non aromatic.



- How many faces are in the fullerene?
- Brief account on tropones.
- What is sydnones?
- Write about alternate and non alternate hydrocarbons?
- What are paratopic compounds?
- Explain molecular orbital theory approach of analyzing aromaticity.
- Comment on the aromaticity of sydnones.

Section - C

1. Illustrate the aromatic and antiaromatic ions.
2. Write about alternate and non alternate hydrocarbon.
3. Write about paratopic compounds.
4. Explain Huckel's rule and mention its one application.
5. Discuss about fullerenes.
6. Describe aromatic and antiaromatic ions.
7. Explain the aromaticity of azulene.
8. Write a brief note on Annulenes.
9. Give an account on the cyclopentadienyl ion is aromatic or antiaromatic.
10. Brief note on tropones.
11. Explain the stereochemistry of Adamantane and Diamantane.

Section - D

1. Illustrate aromatic, antiaromatic and non aromatic compound with an example.
2. Explain the molecular description of aromaticity and antiaromaticity.
3. Give a note on Azulene and Tropones.
4. Explain the synthesis method of Adamantane, Diamantane and Cubane.
5. Discuss about aromatic and non aromatic ions.
6. Write note on annulenes and azulene.
7. Give an account on paratopic compounds.
8. Discuss the stereochemistry of Adamantane, Diamantane and Cubane.

Unit II Aliphatic Nucleophilic and Electrophilic Reactions

Section - A

1. Which of the following reactions does not have any intermediate?
a) S_N^1 b) S_N^2 c) E1 d) E1CB
2. Solvolysis process involves in
a) S_N1 b) S_N1 c) E1CB d) S_E1
3. S_N1 mechanism follows
a) **First order reaction** b) Second order reaction c) Third order reaction d) None
4. Which of the following is ambient nucleophile
a) OH^- b) CN^- c) Cl^- d) CH_3^-
5. Which of the following statements regarding the S_N2 mechanism is wrong?
a) S_N2 reactions are bimolecular b) S_N2 reactions are usually second order
c) S_N2 mechanism occurs in one step d) **S_N2 reactions usually occur in two steps**
6. Which of the following statements regarding the S_N1 mechanism is wrong?
a) S_N1 reactions are unimolecular b) S_N1 reactions are first order
c) **S_N1 mechanism involves a single step** d) S_N1 reactions usually occur in two steps
7. Which is the most reactive compound by the S_N2 mechanism?
a) **$CH_3CH_2CH_2CH_2Br$** b) $(CH_3)_2CHCH_2Br$

- a) S_N1 b) S_N2 c) S_{Ni} d) $E1$
17. In a S_N2 reaction the (+) isomer gives-----
 a) (-) isomer b) (+) isomer c) both d) none
18. Relative reactivities of halides involved in S_N1 reaction are in the order (1) primary halide, (2) secondary halide, (3) tertiary halide, (4) allyl halides.
 a) $1 > 2 > 3 > 4$ b) $1 = 2 = 3 = 4$ c) $1 < 2 < 3 < 4$ **d) $3 > 1 > 2 > 4$**
19. Carbonium ion is formed in ----- mechanism
 a) S_N1 b) S_N2 c) both d) none

Section – B

1. What is Nucleophilic substitution reaction?
2. Account for relative order of reactivity of halide ions is $I^- > Br^- > Cl^- > F^-$
3. Define neighbouring group participation.
4. Draw the energy level diagram for S_N1 reaction.
5. How the attacking nucleophile play a major role in S_N1 and S_N2 reaction? Explain.
6. What is meant by ambient nucleophiles?
7. Write the definition for S_N2 reaction.
8. Give an account of solvents with high polarity enhances the rate of S_N1 but retards S_N2 .
9. Draw the energy diagram for S_N2 reaction.
10. What is Electrophilic substitution reaction?
11. Write a note on S_E2 reaction?

Section - C

1. Explain in detail the S_N1 mechanism and the factors which favour S_N1 mechanism in preference to S_N2 mechanism.
2. Write a note on base catalyzed hydrolysis of ester.
3. Explain in detail the bimolecular mechanism of nucleophilic substitution. Write briefly on the reaction intermediate of the above reaction how does it differ from S_N1 reaction?
4. Discuss the effect of substrate structure and leaving group in S_N1 reaction?
5. How nitrogen and sulfur groups are involved in neighbouring group participation? Explain with examples.
6. Give a note on ambient nucleophiles with examples.
7. What are the factors influence the electrophilic substitution?
8. Explain acid catalyzed hydrolysis of ester.

Section - D

1. What are the factors influence S_N1 and S_N2 reaction mechanism.
2. Describe the mechanism of S_N1 and S_N2 reactions.
3. Discuss the reactivity of allylic and vinylic carbons in substitution reactions.
4. What is neighbouring group participation? Which groups are involved in neighbouring group participation? Explain with examples.
5. Write briefly on S_E1 and S_E2 reaction.
6. List out the factors affect the S_E1 and S_E2 reaction.

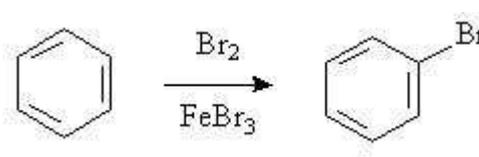
Unit III

Reactive Intermediates and rearrangements

Section – A

(20 x 1 = 20)

- The conversion of carboxylic acid to amine based on ----- rearrangement
 - Wolff rearrangement
 - Steven's rearrangement
 - Schmidt rearrangement**
 - Favorskii rearrangement
- The C-H bond angle in triplet Carbene is
 - 103°
 - 136°**
 - 144°
 - 127°
- Dihalocyclopropane on treatment with carbene which produces
 - Spiro**
 - Alkene
 - Alkyne
 - Aryne
- Arndt-Eistert synthesis involves the conversion of-----
 - Acid to Amine
 - Acid to Ketone
 - Acid to higher homologue**
 - Acid to aldehyde
- What is the difference between a carbene and a carboanion?
 - a carbene is a positively charged anion while a carbanion is a neutral organic molecule
 - a carbene is an organic molecule containing a carbon atom with six valence electrons while a carbanion is a type of climbing equipment
 - a carbene is an organic molecule used to power green cars while a carbanion is any organic molecule that will not split from its grouping
 - although both have a lone pair of electrons a carbene is neutral while a carbanion has a minus charge**
- What is the definition of an electrophile?
 - A reagent that forms a bond to its reaction partner by accepting both bonding electrons from that reaction partner**
 - A biological molecule that transmits data
 - An organic molecule that donates an electron pair
 - Any organic molecule that has a charge
- Which of the following will react with an alkene to give a product in a single step?
 - NBS, H₂O, DMSO
 - carbene**
 - H₃O
 - Cl₂
- The intermediate in the following reaction is a



The reaction shows a benzene ring on the left. An arrow points to the right with Br₂ above it and FeBr₃ below it. On the right is a benzene ring with a bromine atom (Br) attached to one of the carbons.

 - radical
 - carbanion
 - carbocation**
 - nitrene
- What is the formal charge on the carbon atom in Carbene
 - +1
 - 1
 - Zero**
 - 2
- Arndt Einstert reaction produced intermediate
 - carbene**
 - carbanion
 - carbocation
 - nitrene

Section – B

(7 x 2 = 14)

Answer any seven in about 50 words each:

- How will you prepare Triptycene and α -naphthol from Arnye?

2. Write any two generation of Carbene.
3. Carbene in their singlet state react stereospecifically. Why?
4. Brief note on Carbene structure.
5. What is Arndt-Einstert synthesis?
6. Write the stability order of carbanion.
7. How will you generate benzyne from phthaloyl peroxide?
8. What is trapping?
9. Write the preparation of caprolactum from cyclohexanone.
10. In which mechanism ketene is converted to amide?
11. Differentiate carbanion and carbocation.

Section C

(5 x 6 = 30)

Answer in about 200 words each:

1. What product is obtained by the reaction of primary amide with strong base? Give the mechanism involved.
2. How will you assign the structure of Carboxylate derivatives using Favorskii rearrangement?
3. Write a short note on benzyne intermediate.
4. Write reactions of carbenes.
5. Explain the mechanism of Wolff rearrangement.
6. How will you generate nitrenes?
7. Explain the Hofmann rearrangement.
8. Give a note on Schmidt rearrangement.
9. Write the reactions of carbenes.
10. Explain Stevens rearrangement.
11. Demonstrate the stability of carbocation.
12. How will you generate carbocation? Write the reactions of carbocation.

Section D

(3 x 12 = 36)

Answer any three in about 500 words each:

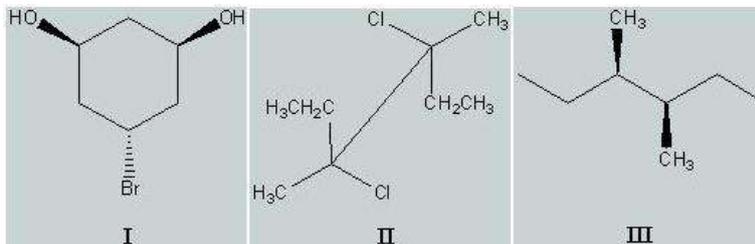
1. What is carbene? How they are generated? Write any one rearrangement based on this intermediate.
2. Give an account of the generation, structure, stability and reactivity of nitrenes
3. Bring out the similarity between the following pair of Stevens and Sommelet-Hauser rearrangement reactions.
4. Discuss the mechanistic features and synthetic applications of Favorskii rearrangement and Wolf rearrangement.
5. Explain the mechanism and application of Hoffmann rearrangement.
6. Write the reaction of benzyne and cine substitution.
7. How will you generate carbanion? What are the reactions which undergoes it?
8. Sketch the mechanism of Wagner Meerwein rearrangement. Discuss its applications.
9. What is Beckmann rearrangement? Discuss its mechanism with applications.

Unit IV

Stereochemistry

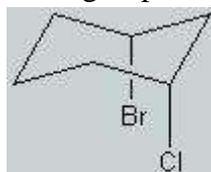
Section – A

1. Which of the following three molecules is achiral?

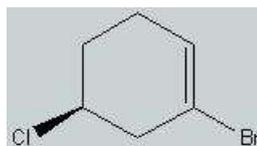


- a) I only b) II only c) **I and II** d) I, II and III

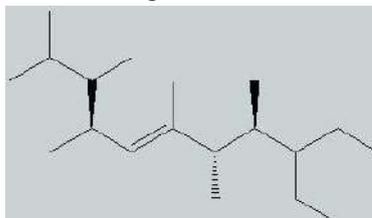
2. What is the relationship between the two groups in the molecules?



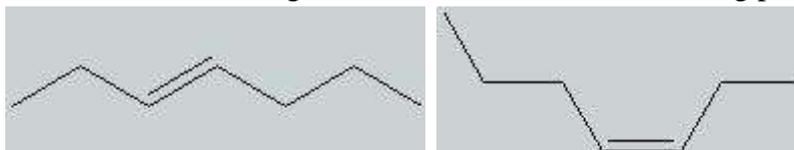
- a) They are equatorial to one another b) They are axial to one another
 c) **They are cis to one another** d) They are trans to one another
3. What is the special orientation of the double bond in the molecule below?



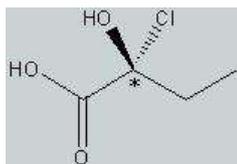
- a) Cis b) Trans c) **E** d) Z
4. How many chiral atoms does the following molecule have?



- a) Three b) **Four** c) Five d) Six
5. Isomers having same bonding connectivity is called as
- a) Constitutional isomer b) Isomer c) **Stereoisomers** d) Homomers
6. Molecules which are superimposable with their mirror image called as
- a) Chiral b) **Achiral** c) Stereoisomerism d) None
7. Which of the following terms best describes the following pair of molecules?

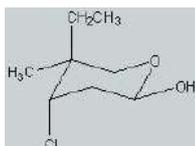


- a) Isomers b) Constitutional isomers c) Configurational isomers d) **Geometric isomers**
8. Which group on the atom marked with an asterisk(*) has the highest priority in the molecule below?

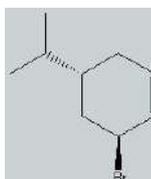


- a) Alcohol **b) Chlorine** c) Ethyl group d) Carboxylic acid
9. What is the spatial orientation of the stereocenter marked with an asterisk(*) in the molecule below?

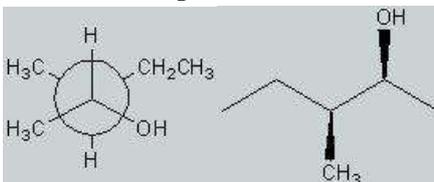
- a) R **b) S** c) E d) Z
10. In the molecule below how many stereocenters have an S orientation?



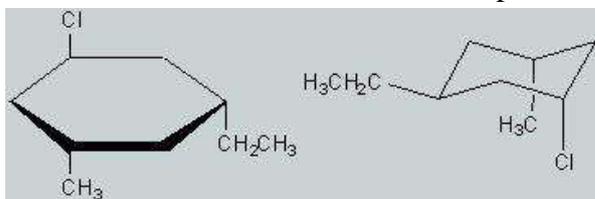
- a) 0 b) 1 **c) 2** d) 3
11. What is the complete name of the molecule below, if the base name of the molecule is 3-bromo-5-isopropylcyclohexene?



- a) (3,R)- bromo- (5,R)- isopropyl-Z-cyclohexene
 b) (3,S)-bromo-(5,S)-isopropyl-Z-cyclohexene
 c) (3,S)-bromo-(5,R)- isopropyl-E- cyclohexene
d) (3,S)- bromo-(5,R)-isopropyl-Z-cyclohexene
12. What is the stereochemical relationship between the following two molecules?

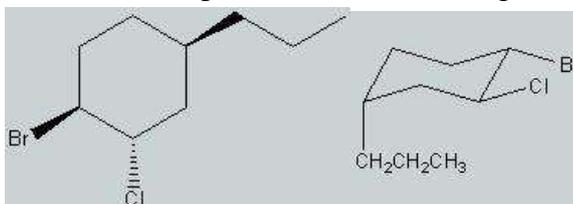


- a) Identical b) Enantiomers **c) Diastereomers** d) None
13. What is the stereochemical relationship between the following two molecules?



- a) Identical b) Enantiomers **c) Diastereomers** d) None

14. What is the stereochemical relationship between the following two molecules?



- a) **Identical** b) Enantiomers c) Diastereomers d) None
15. A pair of stereoisomers which are not mirror images of each other are called
- a) Enantiomers **b) Diastereomers** c) Metamers d) Racemate

Section – B

Answer any seven in about 50 words each:

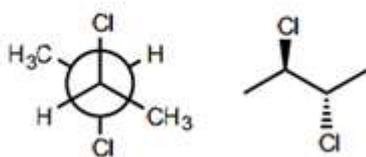
1. Why for the tartaric acid diastereomers the terms erythro and threo are not used.
2. What is the sufficient condition for a compound to be asymmetric?
3. Write note on erythro and threo isomer
4. Differentiate between enantiomers and diastereomers
5. What is meant by racemisation?
6. Define conformational isomer.
7. Enumerate the difference between the configuration and conformation.
8. What do you mean by the term resolution?
9. What do the notations of E and Z signify?
10. What is optical activity?

Section C

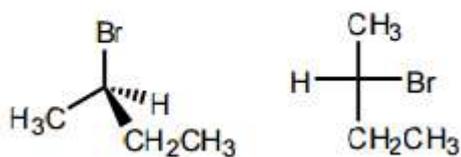
Answer in about 200 words each:

1. Discuss the term helicity
2. Brief note on Diastereotopic ligands and faces.
3. Give a general definition of chirality and support it with examples.
4. Explain what do you understand by Rectus and Sinister system of designating chiral centres? State and Illustrate the sequence rule.
5. Brief outline for the resolution of racemic mixture.
6. Which of the following terms best describes the pair of compounds shown: enantiomers, diastereomers, or the same compound?

a)



b)



7. Write a short note on helicity.
8. Illustrate atropisomerism of biphenyl.
9. What meant chirality? Explain with examples.
10. What are the methods involves in resolution?

Section D

Answer any three in about 500 words each:

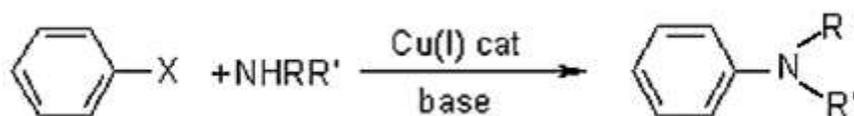
1. Explain the following mechanism of racemisation
 - i) Carbanions
 - ii) Carbonium ion
 - iii) Free radical.
2. What are the methods to be followed in assigning R, S configuration for allenes and biphenyls?
3. Discuss prostereoisomerism.

4. What are the essential conditions for a compound to be chiral? The presence of a stereocenter is not always essential for a compound to exhibit chirality. Explain.
5. Discuss the atropisomerism of allene and spiranes.
6. Explain topocity of ligands.
7. Write a note on diastereotopic ligands and faces.

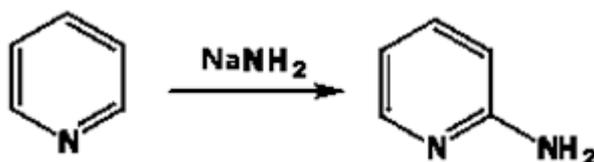
Unit V Name Reactions

Section – A

1. Bouveault-Blanc reduction reaction involves :
 - a) Reduction of an acyl halide with H_2/Pd
 - b) Reduction of an ester with Na/C_2H_5OH**
 - c) Reduction of a carbonyl compound with Na/Hg and HCl
 - d) Reduction of an anhydride with $LiAlH_4$
2. The oxidation of toluene to benzaldehyde by chromyl chloride is called as which of the following?
 - a) Cannizzaro reaction
 - b) Wurtz reaction
 - c) Etard reaction**
 - d) Rosenmund reaction
3. Benzaldehyde can be prepared by oxidation of toluene by which of the following reagent?
 - a) Acidic $KMnO_4$
 - b) $K_2Cr_2O_7$
 - c) CrO_2Cl_2**
 - d) basic $KMnO_4$
4. What is the known name of the reaction given below?



- a) Gabriel phthalimide synthesis
 - b) Buchwald-Hartwig Reaction**
 - c) Chan-Lam coupling
 - d) Ullmann reaction**
5. What is the name of the following reaction?



- a) Chichibabin Reaction**
 - b) Bonnemenn Cyclisation
 - c) Nef Reaction
 - d) Duff Reaction
6. Reaction of _____ with nitriles in strongly acidic medium gives amides in Ritter reaction.
 - a) olefins
 - b) sec. alcohols
 - c) tert. alcohols
 - d) all three**
 7. Formylation of Phenols with hexamine reaction is
 - a) Duff reaction**
 - b) Etard reaction
 - c) Henry reaction
 - d) Nef reaction
 8. The conversion of nitro compounds into carbonyls is known as -----
 - a) Duff reaction
 - b) Etard reaction
 - c) Henry reaction
 - d) Nef reaction**
 9. Which of the following reactions is called Rosenmund reaction?
 - a) Aldehydes are reduced to alcohols
 - b) Acids are converted to acid chlorides.
 - c) Alcohols are reduced to hydrocarbons
 - d) Acid chlorides are reduced to aldehydes**
 10. Simmons-Smith reagent is
 - a) $NaOH/ZnCl_2$
 - b) $Zn(Cu)+CH_2I_2$**
 - c) $H_2, Pd/BaCO_3$
 - d) CH_3CN/H_2O

Section B

1. Enumerate the reaction of acid chloride to aldehyde conversion.
2. Interpret the applications of Etard reaction.
3. Illustrate the mechanism of Henry reaction.
4. Write any two applications of Nef reaction.
5. Write the mechanism of Ullmann reaction.

Section - C

1. Appraise the effect of substrate structure in Nucleophilic Substitution reaction.
2. Sketch the mechanism of Intermolecular Nucleophilic substitution reaction.
3. Propose the mechanism of Bouveault- Blanc reduction.
4. Predict the mechanistic pathway of Duff reaction.
5. Identify the applications of Ullmann Reaction
6. Write the mechanistic pathway of Chichibabin reaction.

Section D

1. Investigate the mechanistic pathway of Simmons- Smith reaction with applications.
2. Discriminate the mechanism of Etard reaction, Chichibabin reaction.
3. Generalized the mechanism and applications of Ritter reaction and Ullmann reaction.
4. Enumerate the mechanistic pathway and its application of Henry reaction and Nef reaction.
5. Reactions, Mechanism and Applications of Bouveault-Blanc reduction, Chichibabin reaction, Duff reaction, Etard reaction, Henry reaction, Nef reaction, Ritter reaction, Rosenmund reduction, Simmons-Smith reaction and Ullmann reaction.

Unit I Quantum Mechanics - I

Section –A

(20 x 1 = 20)

- According to Heisenberg's uncertainty principle, $\Delta x \Delta p \geq$
 - $h / 2\pi$
 - h
 - h / π
 - $h / 4\pi$**
- De Broglie equation is
 - $\lambda = h / \pi$
 - $\lambda = h / 2\pi$
 - $\lambda = h / p$**
 - $\lambda = h / 2p$
- Matter possesses _____ nature.
 - particle
 - wave
 - both particle and wave**
 - transverse
- Addition operator is
 - Commutative**
 - Non-commutative
 - Linear
 - None
- The degree of degeneracy for a rigid rotor in an energy level with quantum number J is
 - J
 - 2J
 - 2J + 1**
 - 2J – 1
- Laplacian operator is expressed as
 - λ
 - Ψ
 - ∇
 - ∇^2**
- The value of wave function is
 - Single
 - Finite
 - Continuous
 - All the above**
- At extreme values of the coordinate, the value of wave function
 - Unity
 - Must vanish**
 - Infinity
 - Positive values
- The probability of finding a system in a volume element is given as
 - Ψ
 - $\Psi\Psi$
 - $\Psi\Psi^*$
 - $\int \Psi\Psi^* d\tau$**
- The function on which the operation is carried out is called
 - Operator
 - Operand**
 - Wave function
 - Probability
- Multiplication operator is
 - Commutative
 - Non-commutative
 - May (or) may not be commutative**
 - Non-linear
- The total energy operator is called _____ operator.
 - Hamiltonian**
 - Hermitian
 - Laplacian
 - Kronecker delta
- The zero point energy of a particle in 1-D box is
 - Zero
 - Unity
 - $h^2 / 8ml^2$**
 - 2l / m
- The Hamiltonian operator is for
 - Energy**
 - Momentum
 - Time
 - Eigen value
- The energy difference between any two levels in SHO is
 - 1/2hv
 - hv**
 - 3/2 hv
 - 5/2 hv
- For a particle in an 1D box, its potential energy is _____ everywhere inside the box.
 - 1
 - zero**
 - 2
 - negative
- Hamiltonian is an operator for
 - Energy**
 - Momentum
 - Time
 - Eigen value
- Schrodinger wave equation is the time-dependent _____ order differential equation.
 - First**
 - Second
 - Third
 - Zero
- If $\frac{d}{dx} (e^{-ax}) = -a (e^{-ax})$, then the eigen value is
 - e^{-ax}
 - a**
 - ax
 - $-a (e^{-ax})$

3. The degeneracy of the rotational energy levels is given by
 a) $\ell + 1$ **b) $2\ell + 1$** c) $2\ell + 1$ d) $\ell^2 + 1$
4. The selection rule for rotational transition is
 a) $\Delta l = + 1$ b) $\Delta l = - 1$ **c) $\Delta l = \pm 1$** d) $\Delta l = \pm 2$
5. The sum of the probability at different volume element is
 a) 0 **b) 1** c) 2 d) 4
6. The general formula for degeneracy of energy level of hydrogen atom is
 a) $2n + 1$ b) $n + 1$ **c) n^2** d) $n^2 + 1$
7. Hooke's law is
a) $\mathbf{f} = -\mathbf{kx}$ b) $E = mc^2$ c) $E = h\nu$ d) $F = ma$
8. The selection rule for allowed vibrational transition is
 a) $\Delta v = + 1$ b) $\Delta v = - 1$ **c) $\Delta v = \pm 1$** d) $\Delta v = \pm 2$
9. The number of radial nodes in a given state is
 a) n b) $n + 1$ c) $2n + 1$ **d) $n - \ell - 1$**
10. The delocalisation energy for benzene molecule is
a) 2β b) $2\alpha + 2\beta$ c) $2\alpha + 4\beta$ d) $\alpha + \beta$
11. Delocalisation energy is a measure of _____ of the molecule.
a) Bond order b) Stability c) Electron density d) Valency

Section –B

1. State Slater's rule.
2. "Approximation methods are needed to solve SWE of many electron systems" – Explain why?
3. Explain the significance of Slater determinant regarding the total wave function for a poly electronic system.
4. What are the steps involved in the application of variation method?
5. Calculate the Huckel molecular orbital energies of ethylene.
6. What is meant by linear combination of atomic orbitals?

Section –C

1. Discuss variation theorem and apply it for H – atom.
2. Explain the application of first order perturbation theory to Helium atom.
3. Outline the salient features of the Huckel theory.
4. State and explain Pauli's exclusion principle.
5. Discuss the principle of HMO calculation.
6. Apply perturbation method for the calculation of GS energy of He - atom.
7. Give the principle and steps involved in variation theory.
8. Calculate the total π electron energy and delocalization energy in benzene.
9. State and explain Born-Oppenheimer approximation.

Section –D

1. Explain H_2 molecule by applying MO theory.
2. Give the basic principles of VB theory and apply it to H_2 molecule.
3. Solve the Schrödinger wave equation for the ground state energy of Helium atom using the first order time independent perturbation theory.

- Solve the Schrödinger wave equation for the ground state energy of He atom using the variation method.
- Calculate the total π electron energy and delocalization energy in ethylene.
- Explain Huckel molecular orbital theory for butadiene.

Unit III Polymer Chemistry

Section –A

- Suspension polymerization is otherwise called as _____ polymerization.
 - Bulk
 - Solution
 - Pearl**
 - Emulsion
- A catalyst used in cationic polymerization is
 - Lewis acid**
 - Lewis base
 - Zeigler – Natta catalyst
 - Peroxides
- The most probable molecular weight of a polymer is _____ average molecular weight.
 - Number
 - Weight**
 - z-average
 - Viscosity
- Lewis acids are used as catalysts in
 - Free radical polymerization
 - Cationic polymerization**
 - Anionic polymerization
 - Coordination polymerization
- The catalysts used in coordination polymerization are
 - Lewis acids
 - Lewis base
 - Zeigler – Natta catalyst**
 - Peroxides
- In anionic polymerization, bifunctional monomers give
 - Low molecular weight polymer
 - Linear polymer**
 - Branched polymer
 - Cross-linked polymer
- The number-average molecular weight is given by the expression
 - $M_n = \frac{\sum n_i M_i}{\sum n_i}$
 - $M_n = \frac{\sum n_i M_i^2}{\sum n_i M_i}$
 - $M_n = \frac{\sum n_i M_i^{1+a}}{\sum n_i M_i}$
 - $M_n = \left[\frac{\sum n_i M_i^{1+a}}{\sum n_i M_i} \right]^{1/a}$
- The weight average molecular weight is given by the formula
 - $M_w = \frac{\sum n_i M_i}{\sum n_i}$
 - $M_w = \frac{\sum n_i M_i^2}{\sum n_i M_i}$
 - $M_w = \frac{\sum n_i M_i^{1+a}}{\sum n_i M_i}$
 - $M_w = \left[\frac{\sum n_i M_i^{1+a}}{\sum n_i M_i} \right]^{1/a}$
- The relative position of molecular weight averages of polymers are
 - $M_n < M_w < M_v$
 - $M_w < M_v < M_n$
 - $M_v < M_n < M_w$
 - $M_n < M_v < M_w$**
- Glass transition temperature is _____ in highly crystalline polymers.
 - High**
 - Low
 - Moderate
 - Zero
- The method by which the number-average molecular weight of a polymer is measured
 - Light scattering method
 - Osmotic pressure method**
 - Viscosity method
 - Sedimentation method
- Light scattering method is used to determine _____ average molecular weight.
 - Number
 - Weight**
 - z-average
 - Viscosity
- Viscosity method is used to determine _____ average molecular weight.
 - Number
 - Weight
 - z-average
 - Both a & b**

Section –B

- Give the important properties of polymers.
- Define number average molecular weight of polymers.
- Define weight average molecular weight of polymers.

4. What are living polymers?
5. Define glass transition temperature.
6. Write a note on conducting polymers.
7. What is doping of conducting polymers?

Section –C

1. Give a brief account of homogeneous polymerization.
2. Explain the different forms of molecular weight.
3. Explain the kinetics of anionic polymerization.
4. What is glass transition temperature? Write the factors which affect T_g .
5. Explain the factors affecting the conductivity of conducting polymers.

Section –D

1. Explain the mechanism and kinetics of free radical polymerisation.
2. Explain the kinetics of cationic polymerization.
3. Explain how the molecular weight of a polymer is determined by osmotic pressure method.
4. How is molecular weight of a polymer determined by light scattering method?
5. How is molecular weight of a polymer determined by viscosity method?
6. Explain: Solitons, Polarons and Bipolarons.

Unit IV Photochemistry

Section A

1. Which of the following are the principal laws of photochemistry?
 - a) Grothus-Draper- and Stark-Einstein law
 - b) Raoult's law
 - c) Raoult's and Henry's law
 - d) Lambert's and Beer's law
2. In photochemical reactions, absorption of _____ radiations takes place.
 - a) Ultraviolet and visible
 - b) Radio
 - c) Only visible
 - d) Visible and x-rays
3. Which of the following are the reactions in which molecules absorbing light do not themselves react but induce other molecules to react?
 - a) Free radicals
 - b) Chain reactions
 - c) Reversible reactions
 - d) Photosensitized reactions
4. Identify the incorrect statement for photochemical reactions?
 - a) First step in photochemistry is excited state (photoexcitation)
 - b) Only ultraviolet radiations can induce photochemical reactions
 - c) When a molecule or atom in the ground state (S_0) absorbs light, one electron is excited to a higher orbital level
 - d) Upon absorption of radiation of specific wavelength, there occurs transition from $S_0 \rightarrow S_1$
5. Identify the instrument that was conventionally used to monitor quantum yield of reactions?
 - a) Scanning electron microscope
 - b) Polarimeter
 - c) Atomic force microscope
 - d) Chemical actinometer
6. Which of the following is an example of photochemical reaction?
 - a) Photosynthesis
 - b) Decomposition of ammonia
 - c) Formation of NaOH
 - d) Decomposition of HCl
7. In _____ reactions, molecules absorbing light do not themselves react but induce other molecules to react.

- a) **Photosensitized** b) Dark c) Thermal d) Irreversible
8. The reactions which are caused by heat and in the absence of light is called _____.
- a) Photochemical reactions **b) Dark reactions**
 c) Reversible reactions d) Reversible photochemical reactions
9. The transition S_2 to S_1 is.....
- a) Non-radiative** b) Radiative c) Luminescent d) Phosphorescent
10. The transition T_1 to S_0 is.....
- a) Phosphorescence** b) Non-radiative c) Internal conversion d) Deactivation

Section B

1. Define G-value.
2. What is quantum yield?
3. What is phosphorescence?
4. Write any two laws of photochemistry.
5. What is intersystem crossing? (What is internal conversion?)
6. What is triplet state?
7. Explain about the Chemiluminescence.

Section C

1. State laws of photochemistry.
2. Sketch Jablonski diagram and label the various photo physical process.
3. What is chemiluminescence? Explain its significance and applications.
4. Write notes on fluorescence.
5. What is photosensitization? Explain the significance of photosensitisation.
6. Explain about chemical actinometers.

Section D

1. Explain the various processes undergone by excited molecules with the help of Jablonski diagram.
2. Explain them with their life time and rate constant parameters.
3. Discuss the Jablonski diagram with respect to fluorescence and phosphorescence.
4. Write notes on physical properties of the electronically excited molecules.
5. Derive Stern-Volmer equation, what are its applications?

Unit V Rotational Spectroscopy

Section A

1. _____ molecules are molecules in which all the atoms are arranged in a straight line.
a) Linear b) diatomic c) triatomic d) polyatomic
2. An example of linear molecule is
a) HCl b) HCl_2 c) SO_4 d) SO_3
3. OCS is an example of _____ molecule.
a) Linear b) diatomic c) triatomic d) polyatomic
4. The moment of inertia of the linear molecule is
a) $I_B=I_C, I_A=0$ b) $I_B=I_C= I_A=0$ c) $I_B=I_A, I_C=0$ d) $I_B=I_C= I_A=1$
5. $I_B=I_C \neq I_A, I_A \neq 0$ is the condition for _____ molecules.

- a) **Symmetric top** b) Spherical top c) linear d) polyatomic
6. Methyl Fluoride is an example of _____ molecule.
a) **Symmetric top** b) Spherical top c) linear d) polyatomic
7. $I_B = I_C > I_A$ is the condition for _____ symmetric top.
a) Oblate b) **prolate** c) spherical d) antispherical
8. $I_B = I_C < I_A$ is the condition for _____ symmetric top.
a) **Oblate** b) prolate c) spherical d) antispherical
9. Boron trichloride is an example of _____ symmetric top
a) **Oblate** b) prolate c) spherical d) antispherical
10. If all the three moments of inertia are identical then the molecule is called a _____.
a) Symmetric top b) **spherical top** c) prolate d) oblate
11. CH_4 is a _____ molecule.
a) Rhombohedral b) orthorhombic c) **tetrahedral** d) diatomic
12. The spherical tops have moment of inertia
a) $I_B = I_C = I_A$ b) $I_B = I_C \neq I_A$ c) $I_B = I_A, I_C = 0$ d) $I_B \neq I_C = I_A$
13. The moment of inertia of asymmetric tops are
a) $I_B \neq I_C \neq I_A$ b) $I_B = I_C \neq I_A$ c) $I_B = I_A, I_C = 0$ d) $I_B \neq I_C = I_A$
14. Water and vinyl chloride are examples of _____ molecules.
a) Symmetric top b) Spherical top c) Diatomic d) **Asymmetric top**
15. μ is called the _____ of the system.
a) Moment of inertia b) Rotational constant c) Permeability d) **Reduced mass**
16. When the molecule rotates end over end rotation about a point c the centre of gravity is defined by _____
a) **Moment** b) inertia c) mass d) volume
17. B is called the _____ constant.
a) **Rotational** b) irrotational c) symmetric d) asymmetric
18. J is called the rotational _____.
a) Constant b) variable c) **quantum number** d) state
19. The selection rule for a rigid diatomic rotator is
a) $\Delta J = 0$ b) $\Delta J = 1$ c) $\Delta J = -1$ d) **$\Delta J = \pm 1$**

Section – B

1. Difference between wavelength and wavenumber.
2. Explain Doppler broadening.
3. What is collision broadening?
4. Define rotational quantum number.
5. Define reduced mass and give its expression.
6. What is degeneracy?
7. What are linear molecules? Give two examples.

Section – C

1. Describe the characteristics of electromagnetic radiation.
2. Explain briefly about the quantization of energy.
3. Explain briefly about the width of the spectral transitions.
4. Explain the effect of isotopic substitution in microwave spectroscopy.
5. Classify the molecules based on the moment of inertia.

6. Explain the intensity of spectral lines of spectroscopy.
7. Describe about the symmetrical polyatomic molecules in microwave spectroscopy.

Section – D

1. Explain in detail the spectrum of a Non rigid rotator.
2. Describe in detail about the rotational spectra of rigid diatomic molecules.
3. Explain the various regions of spectrum and their transition probability.
4. Explain the intensity of spectral lines for rotational spectroscopy
5. Enumerate in detail about the linear polyatomic molecules in microwave spectroscopy.

Unit I Molecular modelling and Drug designing**Section - A**

- The term bioinformatics coined by
a) J. D Watson b) Margaret Dayoff c) **Pauline Hogeweg** d) Frederic Sanger
- Margaret Dayoff developed the first protein sequence database called
a) SWISS PORT b) **Atlas of protein sequence and structure**
c) PDB d) Protein sequence databank
- Stepwise method for solving problems in Computer science is called
a) Flow chat b) sequential design c) procedure d) **algorithm**
- The first published completed gene sequence
a) M 13 phage b) T4 Phage c) **φX174** d) lambda phage
- The term used to refer something performed on computer simulation
a) Dry lab b) web lab c) invitro d) **insilico**
- Laboratory work using chemicals, drugs etc using water is referred as
a) Dry lab b) web lab c) **invitro** d) insilico
- Laboratory work using computers and computer generated models generally offline is referred as
a) **Dry lab** b) web lab c) invitro d) insilico
- Invitro in latin means
a) **Within the glass** b) within the lab c) outside the lab d) outside the glass
- NCBI was established
a) **1988** b)1989 c)1990 d)1991
- Application of bioinformatics include
a) Data storage and management b)drug designing
c) understand relation between organisms d) **all of the above**
- The computer methodology that tries to find the best matching between two molecules, a receptor and ligand is called
a) Molecular matching b) **molecular docking**
c)molecular fitting d) molecule affinity checking
- Proteomics is the study of
a) Set of proteins b)set of proteins in a specific region of the cell
c) **entire set of expressed proteins in cell** d) none
- A compound that has desirable properties to become a drug is called
a) **Lead** b) find c) fit drug d) fit compound
- SLIDE abbreviated as
a) Screening for Local induced Combined Docking Effect
b) **Screening for Ligands by Induced fit Docking Efficiently**
c) Screening for Ligands Immediate Docking Efficiently
d) Screening for Local Immediate Docking Efficiently
- Rigid body docking means

- a) **Both receptor & Small molecule are rigid** b) Receptor only rigid not small molecules
 c) Receptor not rigid but small molecules rigid d) Both receptor & small molecules are not rigid

Section – B

1. What do you mean quantum mechanical simulations?
2. What is scoring function?
3. Define target.
4. What is docking?
5. Expands SMILES and CADD.
6. What is meant by hits?
7. Define De novo design.
8. Write the types of searching methods in docking.
9. What is force field scoring function?
10. What is lead optimization?

Section – C

1. Give account on *Ab Initio* methods, Semi Empirical methods.
2. Give an account on Bioassay and Lipinski's rule of five.
3. What are the software for docking?
4. Write brief history of drug discovery.
5. What are the factors affecting the docking score?
6. Discuss the simplified molecular input line entry specification.

Section – D

1. Write brief note on molecular dynamics.
2. Illustrate the process of Cheminformatics in drug discovery and its applications.
3. Describe the classification of scoring function.
4. Sketch the algorithm of docking using AUTODOCK.
5. Explain the application of Cheminformatics in drug discovery.

Unit II Supramolecular chemistry

Section - A

1. Which of the following is a host molecule?
 a) Cyclodextrin b) Crown ether c) Calixarene **d) All the above**
2. Clathrands are possible only in the -----state.
 a) Solid b) Crystalline c) Solution **d) Both (a) and (b)**
3. Carbonyl compounds shows -----interaction.
 a) Ion-Ion b) Ion-dipole c) **Dipole-Dipole** d) Hydrogen bonding
4. Which of the following has the faster complexation rate?
a) Crown ethers b) Cryptands c) Catenanes d) Rotaxanes
5. When alkali metal ions are complexed with the cyclic ether 18-crown-6, the most stable complex is formed with
 a) Li^+ b) Na^+ c) **K^+** d) Rb^+
6. A molecule with Dumbbell shaped and is threaded through a macrocycle is known as
 a) Catenanes **b) Rotaxanes** c) Supramolecule d) Crown ethers
7. Which of the following is 3-D analogue of Crown ether?
a) Cryptands b) Catenanes c) Rotaxanes d) Calixarane

8. In the term [2.2.2] Cryptand, the numbers indicate the number of -----
 a) Carbon atoms **b) Ether oxygen atoms** c) Cyclic rings d) Nitrogen atoms
9. Cryptands bind the guest ions using -----
 a) Oxygen only b) Nitrogen only **c) Oxygen and Nitrogen** d) Carbon atoms
10. The side arm in crown ethers are referred as
 a) Cryptands b) Side chain **c) Podants** d) Spherands

Section -B

1. Define Supramolecule with example.
2. What are photo responsive crown ethers?
3. What are lariat crown ethers?
4. Explain macrocyclic effect in crown ethers.
5. What are the factors affect the stability of complexes?
6. Explain about Self-replicating Molecular systems?

Section - C

1. What are the classifications of Supramolecules based on cavities and forces?
2. Explain the synthesis of crown ethers.
3. Describe about the Catenenes and Rotaxanes.
4. How will you synthesis Cryptands.
5. Explain the Metal complex of Cryptands.
6. Explain about Self-replicating Molecular systems.
7. Explain about Molecular self-assembly based on hydrogen bonds.

Section - D

1. Explain any five interactions between Supramolecules.
2. Explain molecular self-assembly based on self-replicating systems, hydrogen bond and metal co-ordination.
3. Explain the synthesis of crown ethers.
4. Explain the Metal complex of crown ethers.

Unit III Green chemistry

Section - A

1. Which of the following reaction is carried out using organoborane derivative-----
 a) Stille reaction **b) Suzuki reaction** c) Sonagashira reaction d) Heck reaction
2. Which of the following reaction is carried out using organostannanes compound-----
a) Stille reaction b) Suzuki reaction c) Sonagashira reaction d) Heck reaction
3. Which of the following reaction is 100% atom economical -----
 a) Addition reaction b) Rearrangement reaction c) Elimination reaction **d) Both a& b**
4. Which of the following green solvents in solid form is known as dry ice,
 a) Water **b) Supercritical CO₂** c) Ionic Liquids d) Both a& b
5. Which of the followings is a green solvent-----
 a) Chloroform b) Benzene **c) Ionic Liquids** d) Methyl chloride

6. Which of the followings is not a green solvent-----
 a) Water b) Supercritical CO₂ c) Ionic Liquids **d) Chloroform**
7. The bond angle for water molecule is -----
 a) **104.5°** b) 90° c) 120° d) 107.3°
8. ----- has high surface tension of all liquids
 a) Ethanol **b) Water** c) Benzene d) Ionic liquids
9. ----- solvent is used for dry cleaning
 a) Ethanol **b) Supercritical CO₂** c) Water d) Ionic liquids
10. Ultrasound having frequencies between
 a) 40-400 KHz **b) 20-100 KHz** c) 40-400 MHz d) 20-100 MHz
11. A device used to convert electrical energy into sound energy is
 a) Transmitter b) Transformer **c) Transducer** d) Sonicator
12. When H₂O is sonicated, the products are
 a) H₂ and O b) H₂ and O₂ c) H and H **d) H₂ and H₂O₂**
13. Which of the following crystal used as transducer in Whistle reactor?
 a) Titanium b) Barium c) Silica **d) Quartz**
14. Additional mixing in whistle reactor is due to
 a) Tindal effect b) Hall effect **c) Venturi effect** d) Sound effect
15. In which of the following method, a Probe directly contact with the reaction mixture?
 a) Whistle reactor **b) Sonic horn** c) Ultrasonic cleaning bath d) Cup horn
16. Horn is used as -----
 a) Amplifier b) Velocity transformer **c) Both (a) and (b)** d) None
17. The most suitable material for probe in sonic horn -----
 a) Aluminium alloy **b) Titanium alloy** c) Tungstun d) Copper
18. Ultrasound can be passed through ----- substance.
 a) Solid b) Liquid c) Gas **d) All the above**

Section - B

1. Write about Stille reaction.
2. What is Krohnke reaction? Give an example.
3. Define Suzuki reaction. Give an example.
4. What is Hiyama reaction?
5. What are green solvents? Give examples
6. What is sonochemistry?
7. What are the types of sonochemical reactions?
8. Write down Bouveault reaction.

Section – C

1. Write briefly about Sonogashira coupling reaction.
2. Write and explain Suzuki and Hiyama reactions.
3. Explain the properties and the reactions which take place in presence of water.
4. Explain how Supercritical CO₂ is used for dry cleaning.
5. Describe the properties and phase diagram for Supercritical CO₂.
6. Discuss Strecker reaction.

7. Give a note on Esterification reaction.
8. Explain strecker synthesis of aminonitriles with ultrasound.
9. Outline the applications of ultrasound.
10. How is polluted water treated by sonochemical approach.

Section – D

1. Discuss briefly the twelve principles of green chemistry.
2. Explain in detail about the microwave assisted reactions.
3. Explain the properties and the reactions which take place in presence of supercritical CO₂.
4. Explain the instrumentation for whistle reactor and ultrasonic cleaning bath.
5. Explain the instrumentation for Cup horn and Direct immersion sonic horn.
6. Explain Hydrolysis and solvolysis in heterogeneous liquid-liquid reactions.
7. Explain in detail of Barbier reaction of carbonyl compounds.
8. Illustrate the Heterogeneous solid-liquid sonochemical reaction with Strecker synthesis.

Unit – IV **Pharmaceutical Chemistry**

1. Which of the following is an antioxidant?
a) Benzoic acid **b) Ascorbyl palmitate** c) Citric acid d) Gelatin
2. An example for sequestering agent?
a) Ascorbic acid b) Starch **c) EDTA** d) Propyl gallate
3. Caramel is used as-----
a) Colouring agent b) Flavoring agent c) Artificial sweetening agent d) None
4. Which of the following is used in antibacterial preparation of eye?
a) Monosodium glutamate **b) Phenyl ethyl alcohol** c) Eugenol d) Hydroxy anisole.
5. Which of the following is used in chewing gum?
a) Lemon oil b) Rose oil c) Nutmeg oil **d) Peppermint oil**
6. Which of the following is not an artificial sweetening agent?
a) Saccharin b) Sorbitol **c) Caramel** d) Aspartame
7. Which of the following is used both as diluent and disintegrants?
a) Starch b) Sucrose c) Gelatin d) Erythrosine
8. Vegetable capsules are made up of ----- polymer
a) Proteins b) Glycogen c) Gelatin **d) Hypromellose**
9. Which solid form of drug designed for insertion into rectum?
a) Pills b) Capsules **c) Suppository** d) None
10. Vaginal suppositories are also called -----
a) Colace **b) Pessaries** c) Dulcolax d) Fleet BabyLax
11. Which of the following is not a hydrocarbon base ?
a) Hard Paraffin b) Soft Paraffin c) Micro crystalline wax **d) Emulsifying wax**
12. An example for absorption bases in ointment?
a) Macrogols b) Micro crystalline wax **c) Bees wax** d) Emulsifying wax
13. Which of the following is not in oral dosage?
a) Antacids b) cotrimoxazole c) Metronidazole **d) Toxoids**
14. Which of the following is Topical suspension?

- a) Vaccines **b) Calamine** c) Toxoids d) Antacids
15. An example for gaseous dosage forms of drug-----
 a) Capsules b) Ointment c) Suspension **d) Aerosol**
17. Which of the following is airborne disease?
 a) Cholera b) Jaundice c) Epilepsy **d) Measles**
18. Typhoid disease is due to
 a) Air **b) Water** c) Virus d) Insects
19. Benzoic acid is used as
 a) Antioxidants b) Colouring agent **c) Preservative** d) Flavouring agent
20. Solid dosage forms of drug includes
 a) Tablets b) Capsules c) Powders **d) All the above**

Section B

- List out some Airborne diseases.
- List out some waterborne diseases.
- Name some disease which is caused by insects and animals?
- Explain briefly about Respiratory disease.
- What is Alzheimer's disease?
- Write down the symptoms and causes for Mumps?
- How will you treat chickenpox?
- What are sequestrants?
- How will you synthesis Vanillin from Eugenol?
- Write the preparation of methylsalicylate.
- Write a note on Peppermint.
- Write a note on Rose Oil.
- What is Aspartame? Sketch the structure.
- What are Excipients?
- Differentiate Hard and Soft Gelatin capsules.
- Explain about Suppository.
- What is Ointment and Ointment base?
- What is aerosol? Give some advantages.
- Name some chemical compounds used as flavouring agents.
- What are the symptoms and treatment of Cholera.

Section C

- Discuss about diseases due to Insects and animals with their treatment.
- Explain briefly about the diseases of Nervous system.
- How will you synthesise Tartrazine?
- Write the synthesis of Sunset yellow FCF?
- How will you synthesise Erythrosine?
- Write a brief note on the following diseases:
 i) Jaundice ii) Anthrax iii) Respiratory diseases
- Discuss briefly about antioxidants with examples.
- Write in detail about preservatives used in drugs.

15. Which of the following bacteria utilise iron compounds to drive energy for their metabolic processes.
- a) Ferrobacillus b) Sphaerotilus c) Gallinonella **d) all the above**
16. Which of the following one has capacity to exchange cations.
- a) Clay minerals b) Organic material c) humus **d) all the above**
17. -----shows very high cation exchange capacity.
- a) Clay b) Organic material **c) humus** d) None

Section – B

1. What is lithosphere?
2. Write a note on biosphere.
3. Give short note on green house effect?
4. Describe El Nino phenomenon.
5. Define photocatlytic effect.
6. Give the examples for acid catalyst.
7. Sketch oxygen cycle.
8. Write a photochemical reactions in atmosphere by organic compounds.
9. What is global warming?
10. What is freons?(CFC)
11. Write a note on polymer recycling.
12. . What is vermicomposting?

Section –C

1. Write briefly about environmental segments.
2. Draw and explain Nitrogen cycle.
3. Discuss briefly the oxygen cycle.
4. Write a note on hydrological cycle.
5. Give the detail about catalytic aquatic activity of micro organism.
6. How to manage the solid waste?
7. Explain briefly Green House Effect.(Global Warming)
8. Discuss briefly on Ozone hole.
9. Write a brief note on EL Nino phenomenon.
10. Write a note on acid-base and ion-exchange reactions in soils.
11. Explain briefly about waste classification and its disposal.

Section – D

1. Briefly explain about the following
 - a) Nitrogen pathway in NPK soil b) Ozone hole
2. Explain in detail about the natural cycles of the environment.
3. Write a note on chemical photochemical reactions in atmosphere by SO₂, N₂, O₂ and O₃.
4. Classify the waste and explain about its disposal management.
5. Explain in detail about the catalysts of aquatic chemical reactions using micro-organisms.

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Thoothukudi



PG Department of Chemistry

Semester II

QUESTION BANK

2021 - 2023

Unit I

Stability of Co-Ordination compounds

Section - A

- Thermodynamic stability of a complex depends on
 a) **Reaction energy** b) Activation energy c) Stabilization energy d) None
- The number of isomer possible for a square planar complex $[Mabcd]$ is
 a) 2 b) **3** c) 4 d) 5
- Which one of the following complexes can exhibit geometrical isomerism?
 a) **$[Pt(NH_3)_2Cl_2]$ (square planar)** b) $[Zn(NH_3)_2Cl_2]$ (tetrahedral)
 c) $[Cu(NH_3)_4]^{2+}$ (square planar) d) $[Co(NH_3)_5Cl]^{2+}$ (octahedral)
- A molecule that cannot be superimposed on its mirror image is said to exhibit which of the following?
 a) geometrical isomerism b) **optical isomerism**
 c) linkage isomerism d) reactive isomerism
- In which one of the following species does the transition metal ion have d^3 electronic configuration?
 a) **$[Cr(NH_3)_6]^{3+}$** b) $[Co(OH_2)_6]^{2+}$ c) $[CoF_6]^{3-}$ d) $[Fe(CN)_6]^{3-}$
- The type of isomerism shown by $[Co(en)_2(NCS)_2]Cl$ and $[Co(en)_2(NCS)Cl]NCS$ is
 a) **Coordination** b) Ionisation c) Linkage d) All of these
- Metal ions are classified based on the stability of the complexes in-----
 a) Spectrochemical series b) **Irving William series** c) K- series d) CFSE
- For most metals the order of stability follows the sequence-----
 a) **$F^- > Cl^- > Br^- > I^-$** b) $Cl^- > F^- > Br^- > I^-$ c) $I^- > Br^- > Cl^- > F^-$ d) $F^- < Cl^- < Br^- < I^-$
- Which of the following Oxine forms the least stable complex due to steric effect?
 a) 8-Hydroxy quinoline b) **2-Methyl derivative** c) 4-Methyl derivative d) Dien
- More basic Ligands will form ----- complexes.
 a) Chelate complexes b) lightest metal c) Less stable d) **More stable**
- The preorganization energy for a macrocyclic ligand gives ----- favour in the observed macrocyclic effect
 a) Entropic b) **Enthalpic** c) Both a) & b) d) None
- Cryptate effect is also known as -----
 a) Chelate effect b) Macrocyclic effect c) **Macrobicyclic effect** d) Steric effect

13. How many structures are possible for Coordination number 4?

- a) 3 b) 4 c) 1 d) 2

Section – B

Answer any seven in about 50 words each:

1. Which of the following can function as a bidentate ligand? Why?
 NH_3 , $\text{C}_2\text{O}_4^{2-}$, CO , OH^-
2. Illustrate linkage isomerism?
3. Draw the structure of the following complexes: a) trans- diaquadichloroplatinum (II) b) diamminetetra(isothiocyanato)chromate (III)
4. What are the geometries of the following two complexes? (i) $[\text{AlCl}_4]^-$ (ii) $[\text{Ag}(\text{NH}_3)_2]^+$
5. Draw the structure of $\text{M}[\text{abcd}]$.
6. What is nephelauxetic effect?
7. What is Chelation?
8. What is chelate effect?
9. What is macrocyclic effect?
10. What is polymerisation isomerism?
11. What is hydrate isomerism?
12. What is position isomerism?
13. $[\text{Co}(\text{en})_3]^{3+}$ is more stable than $[\text{Co}(\text{NH}_3)_6]^{3+}$. Justify.
14. Generally chelate complex is more stable than non-chelate complex. But $[\text{Ag}(\text{NH}_3)_2]^+$ is more stable than $[\text{Ag}(\text{en})]^+$.

Section – C

Answer in about 200 words each

1. Define stepwise stability constant and over all stability constants. How are they related?
2. Brief note on spectrochemical series.
3. Write a note on the optical isomerism.
4. Discuss the geometrical isomerism involved in the co-ordination complexes.
5. Write any two methods to determine the stability constants with example.
6. Explain Irving William series.
7. Determine the coordination number and oxidation number of the central metal atom in each of the following: (i) $[\text{CrBr}_2(\text{NH}_3)_4\text{Br}]$ (ii) $\text{K}_4[\text{Co}(\text{C}_2\text{O}_4)_3]$

Section D

Answer any three in about 500 words each:

1. Write a note on the structural isomerism involves in the co-ordination complexes.
2. Discuss the stereoisomerism of co-ordination complexes.
3. Explain how will you determine the stability constants of complexes.
4. Debate what are the factors governing stability of complexes? Explain it briefly.
5. Explain in detail based on thermodynamic and kinetic aspects of the Macrocyclic effect.

Unit II

Bonding in Co-ordination compounds

Section - A

- The ion which is expected to have Jahn Teller distortion in an octahedral field is
a) Co^{3+} (Strong field) **b) Co^{2+} (Low spin)** c) Ni^{2+} d) Mn^{2+} (Weak field)
- CFSE for a high spin system is zero. Its electronic distribution is
a) Zn^{2+} b) Cu^{2+} c) Fe^{2+} d) Cr^{2+}
- In which one of the following species does the transition metal ion have d^3 electronic configuration?
a) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ b) $[\text{Co}(\text{OH}_2)_6]^{2+}$ c) $[\text{CoF}_6]^{3-}$ d) $[\text{Fe}(\text{CN})_6]^{3-}$
- Which of the following is paramagnetic?
a) $[\text{Ni}(\text{CO})_4]^{2-}$ b) $[\text{Co}(\text{NH}_3)_6]^{3+}$ c) $[\text{Ni}(\text{CN})_4]^{2-}$ **d) $[\text{NiCl}_4]^{2-}$**
- In which of the following octahedral complexes of Co the magnitude of Δ_0 will be the highest?
a) $[\text{Co}(\text{CN})_6]^{3-}$ b) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ c) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ d) $[\text{Co}(\text{NH}_3)_6]^{3+}$
- Fe^{3+} forms a high-spin octahedral complex; then its magnetic moment is
a) 1.73 BM b) 2.83 BM c) 3.37 BM **d) 5.97 BM**
- In Crystal Field Theory, Strong field ligands such as CN^- :
a) usually produce high spin complexes and small crystal field splittings.
b) usually produce low spin complexes and small crystal field splittings.
c) usually produce low spin complexes and high crystal field splittings.
d) usually produce high spin complexes and high crystal field splittings.
- The CFSE for a low spin octahedral complex of a d^7 ion is
a) $-0.6 \Delta_0$ **b) $-1.8 \Delta_0$** c) $2.4 \Delta_0$ d) $1.2 \Delta_0$
- Calculate Δ_0 for $[\text{Ti}(\text{OH}_2)_6]^{3+}$, if the wavenumber corresponds to $20,300 \text{ cm}^{-1}$
a) 48 kcal/mol b) 57 kcal/mol **c) 58 kcal/mol** d) 68 kcal/mol
- According to VBT, magnetic measurements indicate that $[\text{Co}(\text{OH}_2)_6]^{2+}$ has 3 unpaired electrons. Therefore, the hybridization of the metal's orbitals in $[\text{Co}(\text{OH}_2)_6]^{2+}$ is:
a) sp^3 b) sp^2d c) dsp^2 **d) sp^3d^2**
- In which one of the following species does the transition metal ion have d^3 electronic configuration?
a) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ b) $[\text{Co}(\text{OH}_2)_6]^{2+}$ c) $[\text{CoF}_6]^{3-}$ d) $[\text{Fe}(\text{CN})_6]^{3-}$
- The coordination complex, $[\text{Cu}(\text{OH}_2)_6]^{2+}$ has one unpaired electron. Which of the following statements are true based on Valence Bond Theory?
i) The complex is octahedral ii) The complex is an outer orbital complex.
iii) The complex is d^2sp^3 hybridized iv) The complex is diamagnetic.

v) The coordination number is 6

a) i, iv

b) i, ii, iii

c) ii, iii, v

d) ii, iii

13. In Crystal Field Theory, when the valence d orbitals of the central metal ion are split in energy in

an octahedral ligand field, which orbitals are raised **least** in energy?

a) d_{xy} and $d_{x^2-y^2}$

b) d_{xy} , d_{xz} and d_{yz}

c) d_{xz} and d_{yz}

d) d_{xz} , d_{yz} and d_z^2

14. According to Crystal Field Theory, how many unpaired electrons are there in a strong field iron(II)

octahedral complex?

a) 0

b) 1

c) 2

d) 4

15. Consider the complex ion $[\text{Mn}(\text{OH}_2)_6]^{2+}$ with 5 unpaired electrons. Which response includes all the following statements that are **true**, and no false statements based on Crystal Field Theory?

I. It is octahedral.

II. It is a low spin complex

III. The metal ion is a d^5 ion

IV. The ligands are weak field ligands.

a) I, II

b) I, III, IV

c) I, IV

d) II, V

Section- B

1. What is sigma bonding?
2. What is pi bonding?
3. What is CFSE?
4. What is Jahn- Teller distortion?
5. How the d- orbitals will undergo splitting under the influence of magnetic field in the octahedral complexes?
6. In what type of complexes, geometrical isomerism will not happens?
7. What is lattice energy?
8. What are high spin and low spin complexes?
9. Give examples for strong ligands and weak ligands with reasons.
10. Why $[\text{NiCl}_4]^{2-}$ is paramagnetic and $[\text{NiCN}_4]^{2-}$ is diamagnetic?
11. How will you determine the complex is paramagnetic or diamagnetic? Give example.
12. Which of the following complexes containing en, F^- or CN^- is more likely to form a high-spin complex?
13. Sketch the geometries of the following two complexes. (i) $[\text{AlCl}_4]^-$ (ii) $[\text{Ag}(\text{NH}_3)_2]^+$
14. Give an account on $[\text{Co}(\text{en})_3]^{3+}$ is more stable than $[\text{Co}(\text{NH}_3)_6]^{3+}$.
15. Splitting energy of d orbitals by CN^- ligand is greater than that of F^- ligand. Why?

Section – C

1. Write a note on the stability of complexes with their unusual oxidation states?
2. Explain the spin paired and spin free complexes with examples.
3. Explain the splitting of d-orbitals in octahedral complexes.
4. Explain the splitting of d- orbitals in square planar complexes.
5. Explain the splitting of d- orbitals in tetrahedral complexes.
6. Explain the Jahn- Teller distortion in $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$.

- Write any two methods to determine the stability constants with example.
- Explain Irving William series.
- Reason out how Jahn Teller distortions affect the electronic spectra of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ complexes.
- Determine the coordination number and oxidation number of the central metal atom in each of the following: (i) $[\text{CrBr}_2(\text{NH}_3)_4\text{Br}]$ (ii) $\text{K}_4[\text{Co}(\text{C}_2\text{O}_4)_3]$
- Give a note on magnetic properties of metal complexes.
- Sketch and explain the splitting of d-orbital for tetrahedral complex for $[\text{CoCl}_4]^{2-}$
- Demonstrate postulates of VB theory.
- Defend the consequence of Jahn-Teller distortion
- Demonstrate the consequence Crystal Field splitting based on Ionic radii of transition metal ions.

Section – D

- Explain the importance of valence bond theory with examples.
- What is CFT? Give the applications of CFT to octahedral and tetrahedral complexes.
- On the basis of molecular orbital theory, explain the sigma and pi bonding involved in the octahedral and tetrahedral complexes.
- Explain Ligand field theory.
- State and explain the Jahn Teller theorem. What are its consequences?
- Determine the configuration, the number of unpaired electrons and the ligand field stabilization energy as a multiple of Δ_o or Δ_T for each of the following complexes using the spectrochemical series to decide, where relevant, which are likely to be strong- field and which weak- field.
(a) $[\text{Co}(\text{NH}_3)_6]^{3+}$; (b) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$; (c) $[\text{Fe}(\text{CN})_6]^{3-}$; (d) $[\text{Cr}(\text{NH}_3)_6]^{3+}$
- Compare the VB and CFT theory with suitable examples.
- Explain CFSE for octahedral complexes with evidence and give its applications.
- Debate what are the factors affecting the magnitude of Δ_o ? Explain it briefly.
- Explain in detail Jahn-Teller distortion.
- Justify the sigma and pi bonding involved in the octahedral and tetrahedral complexes on the basis of MO theory.

Unit III

Organometallic Chemistry I

Section – A

- What are oxidation states of metal ion in following complexes?
I. PdCl_2 II. $\text{Pd}(\text{PPh}_3)_4$ III. $\text{Pd}(\text{OAc})_2$ IV. ArPdBr (where Ar is aryl)
a) 2, 4, 2, 2 b) 2, 0, 2, 1 c) **2, 0, 2, 2** d) 0, 0, 0, 2
- Which of the following complex has a highest oxidation state of metal?
a) $(\eta^6\text{-C}_6\text{H}_6)_2\text{Cr}$ b) $\text{Mn}(\text{CO})_5\text{Cl}$ c) **$\text{Na}_2[\text{Fe}(\text{CO})_4]$** d) $\text{K}[\text{Mn}(\text{CO})_5]$
- Which of the following complex is in which organic ligand is having only bond with metal?
a) **$\text{W}(\text{CH}_3)_6$** b) $\text{K}[\text{PtCl}_3(\text{C}_2\text{H}_4)]$ c) $(\eta^5\text{-C}_5\text{H}_5)_2\text{Fe}$ d) $(\eta^5\text{-C}_6\text{H}_6)_2\text{Ru}$
- What is the oxidation state of molybdenum in $[\eta^7\text{-tropylium}] \text{Mo}(\text{CO})_3]^+$?
a) +2 b) +1 c) **0** d) -1
- Which of the following is the neutral complex which follows the 18- electron rule?
a) $(\eta^5\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_2$ b) $(\eta^5\text{-C}_5\text{H}_5)_2\text{Mo}(\text{CO})_3$ c) $(\eta^5\text{-C}_5\text{H}_5)_2\text{Co}$ d) **$(\eta^5\text{-C}_5\text{H}_5)_2\text{Re}(\eta^6\text{-C}_6\text{H}_6)$**

6. If complex $[W(Cp)_2(CO)_2]$ follows 18e- rule. What is Hapticity of Cp?
 a) 5 and 5 **b) 3 and 5** c) 3 and 3 d) 1 and 5
7. Which of the following complexes show easy oxidation?
 a) $(\eta^5-C_5H_5)_2Fe$ b) $(\eta^5-C_5H_5)_2Ru$ **c) $(\eta^5-C_5H_5)_2Co$** d) $(\eta^5-C_5H_5)_2Co^+$
8. How many M — M bonds are present in $[Cp Mo(CO)_3]_2$?
 a) 1 b) 2 **c) 0** d) 4
9. For metal olefin complexes (i) $[PtCl_3(C_2F_4)]^-$ and (ii) $[PtCl_3(C_2H_4)]^-$, which of the following is the correct statement?
 a) Carbon-carbon bond length is same both in (i) and (ii)
b) Carbon-carbon bond length in (i) is smaller
 c) Carbon-carbon bond length in (ii) is smaller
 d) A metallacycle is formed in each complex
10. Which metal centre doesn't obey the 18e- rule?
 a) Fe in $Fe(\eta^5-C_5H_4(OMe)_2)$ b) Co in $Co_2(CO)_8$ c) Ru in $[Ru(\eta^6-C_6Me_6)_2]^{2+}$ **d) V in $V(CO)_6$**
11. Which statement about ferrocene is incorrect?
a) I_2 Oxidises ferrocene to give a diamagnetic cation
 b) The ligands in ferrocene undergo electrophilic substitution with $RCOCl$ in presence of Lewis acid
 c) The Fe centre in ferrocene can be protonated by treatment with $Con H_2SO_4$.
 d) In gas phase C_5H_5 rings in ferrocene are eclipsed.
12. The formula of ferrocene is
 a) $[Fe(CN)_6]^{4-}$ b) $[Fe(CN)_6]^{3-}$ c) $Fe(CO)_5$ **d) $(C_5H_5)_2Fe$**
13. Which one is not an organometallic compound?
 a) $RMgX$ **b) C_2H_5ONa** c) $(CH_3)_4Sn$ d) KC_4H_9
14. Which of the following is an organometallic compound?
a) $Ti(C_2H_5)_4$ b) $Ti(OC_2H_5)_4$ c) $Ti(OCOCH_3)_4$ d) $Ti(OC_6H_5)_4$
15. Which of the following is not an organometallic compound?
 a) Ethyl magnesium bromide b) Tetra ethyl lead **c) Sodium ethoxide** d) Trimethyl aluminium.
16. An organometallic compound amongst the following is
 a) Ferrocene b) CaC_2 c) Tetraethyl lead **d) All of these.**
17. Which of the following are organometallic reagents?
 a) CH_3CH_2ONa b) $CH_3C\equiv CNa$ c) $CH_3CH_2BH_2$ **d) CH_3CH_2MgBr**
18. Which of the following Carbene is electrophilic in nature?
 a) Schrock carbene **b) Fischer carbene** c) Both (a) & (b) d) triplet carbene
19. Organometallic chemistry is used in the synthesis of _____ catalyst.
a) Homogeneous b) Heterogeneous c) Inorganic d) Organic
20. A metal atom was found between two parallel carbocyclic ring become known as

_____ compounds.

- a) Pericyclic **b) Sandwich** c) Eenzymes d) Biocatalyst

21. Organometallic compound is that possess a _____ bond.

- a) C - C b) C - N **c) Metal - Carbon** d) Metal - Nitrogen

22.. EAN rule was proposed by _____

- a) Sidgwick** b) Aufbau c) Rutherford d) Lewis

23. The sum of electron s on the central metal and the electrons donated by the ligands is called as _____.

- a) 18 electron rule **b) EAN rule** c) 1 electron rule d) Lewis octet rule

24. The EAN of $[\text{Cr}(\text{CO})_6]$ is

- a) 16 **b) 18** c) 20 d) 22

25. The number of atoms within the bonding distance of the metal atom is known as _____ of the ligand.

- a) Stability b) Cavity c) Probability **d) Hapticity**

26. $\text{Mn}(\text{CO})_5$ exists as a _____

- a) Monomer **b) Dimer** c) Trimer d) Tetramer

27. In ferrocene, cyclopentadienyl ion is a _____ ligand.

- a) Monohapto b) Dihapto c) Trihapto **d) Pentahapto**

28. In ferrocene, the EAN is _____

- a) 12 b) 14 c) 16 **d) 18**

Section - B

1. Differentiate Schrock and fischer carbenes.
2. Define 18 electron rule with example.
3. What is meant by hapticity? Give examples for monohapto and trihapto ligands.
4. What are the two methods for counting electrons in Complexes?
5. How will you prepare carbonyl complexes.
6. What are metallocenes? Give some example.
7. What is organometallic chemistry?
8. Calculate the EAN for the molecule $[\text{FeCl}_4]^-$
9. Draw the structure of $\text{Fe}(\text{CO})_5$.
10. Define isolabal analogy.
11. Draw the structure of ferrocene.
12. What is hapticity? Give examples for monohapto and trihapto ligands.

Section - C

1. How will you distinguish between terminal and bridging carbonyl group in metal carbonyls?

2. Explain the bridging structure of $\text{Mn}_2(\text{CO})_{10}$ and $\text{CO}_2(\text{CO})_8$
3. Discuss the covalent versus ionic bonding in metallocene with suitable example.
4. What are metal – metal bonds? Discuss the structure of carbonyls containing metal – metal bonds.
5. Explain carbene complexes with examples.
6. Describe Isolobal fragments of metal carbonyls.
7. Explain the synthesis of carbonyl hydride complexes.

Section – D

1. Discuss the structure and bonding in ferrocene.
2. Write an essay on Fischer and Schrock's carbenes and carbynes.
3. Explain the synthesis and reactivity of metal alkyne complexes.
4. Explain the synthesis and reactivity of metal alkene complexes?
5. Explain the preparation and properties of mono and poly nuclear carbonyl complexes?

Unit IV

Organometallic Chemistry - II

Section - A

1. The oxidative addition and reductive elimination steps are favoured by
 - a) Electron rich metal centres
 - b) Electron deficient metal centres
 - c) Electron deficient and electron rich metal centres respectively
 - d) **Electron rich and electron deficient metal centres respectively**
2. Which of the ligand is a poor ligand that displaces more than CO group in photolysis
 - a) **Tetrahydrofuran**
 - b) PR_3
 - c) Both
 - d) None
3. Which of the following process leads to decrease in the co-ordination number?
 - a) oxidation
 - b) reduction
 - c) oxidative addition
 - d) **Reductive elimination**
4. Insertion involves
 - a) changes in metal Oxidation state
 - b) changes in metal Reduction state
 - c) both
 - d) **No change in metal oxidation state**
5. Wilkinson's catalyst
 - a) **$(\text{Ph}_3\text{P})_3\text{RhCl}$**
 - b) $(\text{Ph}_3\text{P})_3\text{RuCl}$
 - c) $(\text{Ph}_3\text{P})_3\text{CoCl}$
 - d) $(\text{Ph}_3\text{P})_3\text{MnCl}$
6. The product formed in hydroformylation is
 - a) alcohol
 - b) **aldehyde**
 - c) ketone
 - d) ester
7. The reactions of $\text{Ni}(\text{CO})_4$ with the ligand ($\text{L} = \text{PMe}_3$ or $\text{P}(\text{OMe})_3$) yields $3 \text{Ni}(\text{CO})_3\text{L}$. The reaction is
 - a) Associative
 - b) **Dissociative**
 - c) Interchange (I_a)
 - d) Interchange (I_d)
8. The reaction, $[(\text{CO})_5\text{Mn}(\text{Me}) + \text{CO}] \rightarrow [(\text{CO})_5\text{Mn}(\text{CO})\text{Me}]$ is an example for
 - a) oxidative addition
 - b) electrophilic substitution
 - c) nucleophilic substitution
 - d) **migratory insertion**

9. ----- catalyst is used in Oxo process.

- a) Rhodium salts b) Cobalt salts c) **Either a) or b)** d) None

10. The hydrocarbon of ----- hapticity are more reactive with nucleophilic substitution reaction.

- a) Odd b) **Even** c) Both a) & b) d) None

Section - B

1. What is substitution reaction?
2. What is oxidative addition?
3. What is reductive elimination?
4. What is Wilkinson's catalyst?
5. What is Wacker process?
6. What is heterogeneous catalysis?
7. What is catalysis?
8. What is a Zeigler-Natta catalysis?
9. What is Wilkinson's catalyst?
10. What is insertion reaction?
11. What is Fischer-Tropsch process?
12. What is electrophilic displacement?

Section - C

1. Write a note on Zeigler-Natta catalysis.
2. Explain insertion and elimination reaction.
3. Discuss oxidative addition reaction.
4. Discuss reductive elimination reaction.
5. Debate the nucleophilic and electrophilic attack of co-ordination ligands.

Section - D

1. Explain the Wacker process for the production of aldehyde.
2. What is oxo process? Explain Heck and Breslow cycle.
3. Sketch the structure of Tolman Catalytic Loops and its reaction involved in hydrogenation reaction.
4. Demonstrate briefly Monsanto Acetic Acid process
5. Write about the substitution reaction in carbonyl complexes.

Unit V

Spectroscopy I

Section -A

1. Which among the following molecule exhibits IR spectra
a) CH₄ b) NH₃ c) SO₃ d) **CO₂**
2. In the vibrational spectrum of CO₂, the number of fundamental vibrational modes common in both IR and Raman are
a) **Zero** b) One c) Two d) Three
3. A nucleus has a quadrupole moment, if it has spin
a) Less than ½ b) **Greater than ½** c) Less than 1 d) Greater than 1
4. The selection rule for Mössbauer spectroscopy is
a) $\Delta m_I = 0$ b) $\Delta m_I = +1$ c) $\Delta m_I = -1$ d) **All the above**

5. Number of vibrational modes of CO_2 is
 a) 1 b) 2 c) **3** d) 4
6. The selection rule for IR spectra is
 a) $\Delta v = 0$ b) $\Delta v = +1$ c) $\Delta v = -1$ d) **Both (b) & (c)**
7. H_2 is
 a) IR active b) **IR inactive** c) Raman active d) None of the above
8. In the vibrational spectrum of H_2O , the number of fundamental vibrational modes common in both IR and Raman are
 a) Zero b) One c) Two d) **Three**
9. According to Mossbauer spectroscopy, the number of bridging carbonyls present in $\text{Fe}_3(\text{CO})_{12}$ is
 a) **2** b) 3 c) 4 d) 6
10. The most convenient spectroscopic technique to establish the presence of internal H- bonding in hydroxyl compounds is
 a) UV b) **IR** c) EPR d) Mass
11. Mossbauer effect is also related with resonance fluorescence of
 a) α - Rays b) β - Rays c) **γ - Rays** d) X - rays
12. One among the following which is not used as radioactive isotope for Mossbauer effect is
 a) Fe^{57} b) Zn^{67} c) Sn^{119} d) **P^{31}**

Section- B

1. What is spectroscopy?
2. Write the conditions for the molecule to be IR active.
3. What is intermolecular hydrogen bonding?
4. What is the principle involved in IR spectroscopy.
5. What is Raman spectroscopy?
6. What is IR spectroscopy?
7. How will you predict the number of active modes of vibrations?
8. What is the principle involved in Mossbauer spectroscopy?
9. What is isomer shift?
10. Give some important applications of IR spectroscopy.
11. What are the conditions of Mossbauer spectroscopy?
12. Give the modes of vibration for water molecule.
13. Write the selection rule for IR spectroscopy.
14. What is a quadrupole interaction?

Section- C

1. Interpret the spectra of iron and tin compounds.
2. Explain the quadrupole and magnetic interactions.
3. Explain the principle of IR spectroscopy with selection rules.
4. Explain the applications of IR spectroscopy.
5. Explain the principle and conditions of Mossbauer spectroscopy.
6. Explain the application of isotopic substitution in IR spectroscopy.
7. Describe the Mossbauer spectral characteristics of tin (IV) halides.
8. Sn(II) has positive isomer shift whereas Sn(IV) has negative shift. Explain why?
9. The Mossbauer spectrum of Fe(CO)_5 consists of doublet – Explain.

Section – D

1. Explain the principle and applications of IR in the study of inorganic structures and coordination compounds
2. What is isomer shift? Explain the quadrupole and magnetic interactions.
3. Discuss the interpretation of spectra of iron and tin compounds.
4. How will you detect the intermolecular and intramolecular hydrogen bonding using spectroscopy? Explain with an example.
5. How IR spectroscopy is used to detect the bridging carbonyls?
6. Show how IR spectroscopy could be useful to distinguish between the cis and trans isomers of a compound $ML_2(CO)_4$, where L is triphenyl phosphine. Sketch the possible vibrational modes.

Unit I Reactions and Methods of Determination of their Mechanism**Section – A**

Choose the correct answer:

- Change in rate brought about by isotopic substitution are known as
 - Kinetic isotopic effect**
 - Thermodynamic isotopic effect
 - Primary isotopic effect
 - Secondary isotopic effect
- Microscopic reversibility is
 - Forward reaction occur in different mechanism
 - Forward & Backward reaction occur in same mechanism**
 - Forward & Backward reaction occur in different mechanism
 - Backward reaction occur in same mechanism
- Order of reaction can be predicted by knowing that rate determining step have what
 - Intermediates**
 - Reactants
 - Products
 - Initiators
- Rate determining step containing single species(atom,ion or molecule) will make reaction
 - Bi molecular
 - Unimolecular**
 - Polymolecular
 - Multimolecular
- In primary kinetic isotope effect, k_H/k_D will be
 - 7 to zero
 - 14 to -7
 - 0 to 7
 - 7 to 14
- In comparing kinetic control to thermodynamic control for the reaction of butadiene and HCl which of the following statements represents kinetic control?
 - The intermediate is more stable and the product is more stable
 - The intermediate is less stable and the product is more stable
 - The intermediate is more stable and the product is less stable**
 - The intermediate is less stable and the product is less stable
- Hammond postulates states?
 - The transition state geometry resembles the starting material
 - The TS geometry resembles the product
 - The TS structure resembles the one closest in energy**
 - The TS structure resembles the one furthest in energy
- Which of the following statements is the best statement of the Hammond postulate?

- a) **Related species that are similar in energy are also similar in structure**
 - b) In an exothermic reaction, the TS is closer in energy to the products
 - c) In an endothermic reaction, the TS is closer to the reactants in structure
 - d) TS are molecular species of finite lifetime whose properties can be probed through free radical reactions
9. Order of reaction can be predicted by knowing that rate determining step have what
- a) Intermediate
 - b) Reactants
 - c) Product
 - d) Initiators
10. Rate determining step containing single species will make reaction
- a) Molecular
 - b) Unimolecular**
 - c) Polymolecular
 - d) Multimolecular

Section – B

Answer any seven in about 50 words each:

1. Draw and explain the energy profile diagram of two step reaction.
2. What do you mean the term transition state?
3. Bring out the difference between transition state and intermediate by considering suitable examples.
4. The σ value for F is larger than for Cl. Why?
5. Indicate if the following statements are true or false:
 - a) In case products are favoured at equilibrium ΔG° is negative while K_{eq} is larger than 1.
 - b) With a smaller rate constant, the reaction is fast.

Section C

Answer in about 200 words each:

1. What are isotopic labeling experiment and isotopic effect?
2. Explain hammett equation is primarily applicable to meta and para but not to ortho substituted aromatic compound.
3. Give a note on Taft equation.
4. How will you distinguish between intermediate and transition state.
5. Derive hammett equation.
6. Illustrate kinetic isotopic effect.
7. Brief note on Hammond postulates.
8. Explain transition state theory.
9. What are the kinetic and thermodynamic requirements of reaction?

10. Write note on i) Microscopic reversibility ii) Cross over experiment

Section D

Answer any three in about 500 words each:

1. How does ρ and σ signify in Hammett equation? How they are related?
2. Explain the importance of isotope labeling and crossover experiments.
3. Derive Hammett equation. Explain its application in understanding the mechanism of organic reactions.
4. Draw potential energy diagrams for reactions in the following cases:
 - i) A one step reaction with no intermediate.
 - ii) A two step process in which the first step is the rate determining
 - iii) A two step process in which the second step is rate determining
 - iv) A reaction proceeding via two intermediates in which the formation of the first intermediate is rate limiting.
5. What are the factors influencing kinetic and thermodynamic control of product formation?
6. Write the applications of Hammett equation.

Unit II Molecular Rearrangements with Migrating Aptitude

Section –A

1. Aryndt Eistert synthesis is based on the ----- rearrangement
 - a) **Wolff rearrangement**
 - b) Hofmann rearrangement
 - c) Beckmann rearrangement
 - d) Lossen rearrangement
2. In which rearrangement carbonyl compound are converted to esters by the action of peroxy acids.
 - a) Hofmann rearrangement
 - b) **Baeyer Villiger rearrangement**
 - c) Dakin rearrangement
 - d) Neber rearrangement
3. In which rearrangement, Tertiary 1,2- Glycol into a ketone in presence of acid catalyst?
 - a) Dakin rearrangement
 - b) Neber rearrangement
 - c) Hofmann rearrangement
 - d) **Pinacol-Pinacolone rearrangement**
4. The aliphatic primary amines undergoes 1,2 shift, the rearrangement is
 - a) **Demjanov rearrangement**
 - b) Hofmann rearrangement
 - c) Beckmann rearrangement
 - d) Lossen rearrangement

5. The reactant of the Beckmann Rearrangement is a:
- a) Urea b) Lactam c) Amine d) Oxime

Section –B

1. What is Lossen rearrangement?
2. What are the reagents used in Dakin reaction?
3. Name any two rearrangements which is belong to C-N migrating group.
4. Write a brief note on Baeyer- Villiger oxidation.
5. How to convert dienone phenol rearrangement?

Section - C

1. Write the mechanism of the Beckmann rearrangement.
2. Account the course of Dienone-Phenol rearrangement depends upon the structure of the substrate.
3. Write note on Neber rearrangement.
4. Account the ring expansion can occur in Demjanov rearrangement.

Section - D

1. What is the stereochemical structure of the oxime of acetophenone which undergoes rearrangement of acetanilide?
2. Write the mechanism of the following rearrangement
 - i) Beckmann rearrangement
 - ii) Lossen rearrangement
3. Giving your reasons predict the structure of the principal product from Pinacol-Pinacolone rearrangement of the following glycols.
 - i) 2-methyl-2,3-pentanediol
 - ii) 2-methyl-3-phenyl-2,3-butanediol

Unit III Alkaloids and Flavonoids

Section – A

1. Alkaloids are generally extracted from
 - a) **Pet ether**
 - b) Acetonitrile
 - c) HCl
 - d) NaOH
2. Alkaloids are easily soluble in
 - a) Water
 - b) **Chloroform**
 - c) HCl
 - d) NaOH
3. Which among the following is not a flavonoid?
 - a) Isoflavone
 - b) Quinine
 - c) Flavonols
 - d) Quercetin
4. The molecular formula of reserpine is

- a) $C_{33}H_{40}N_2O_9$ b) $C_{40}H_{33}N_2O_9$ c) $C_{33}H_{40}NO_9$ d) $C_{33}H_{40}N_2O$
5. Which of the alkaloid is obtained from the bark of cinchona tree?
 a) Nicotine b) Morphine c) **Quinine** d) Colchine
6. Which of the following statement is false?
 a) Found in plants **b) Acidic in character** c) Basic in character
 d) Heterocyclic ring containing nitrogen as base
7. The presence of carbonyl group in an alkaloid is detected by
 a) **Formation of oxime and hydrazone** b) Forms diazonic salts
 c) Forms esters d) Forms quaternary salts
8. Which spectra is used to detect the presence of many functional groups?
 a) **IR** b) UV c) X-ray d) ESR
9. Oxidation of an alkaloid provides information about
 a) Basic structure b) Exact position of side chain
 c) Nature and position of functional moieties **d) All of these**
10. The heterocyclic ring systems present in alkaloids in common is
 a) **Pyrrolidine –pyridine** b) pyridine- furan c) pyridine thiophene d) pyridine- conine

Section – B

1. What are alkaloids?
2. What is EMDE degradation?
3. Give the classification of alkaloids.
4. What are flavonoids?
5. How will you identify the presence of a nitrogen base in an alkaloid?
6. Give the molecular formula and structure of cocaine.
7. Write the physical and chemical properties of alkaloids.
8. What is the role of alkaloids in plants?

Section – C

1. Explain the methods to elucidate the structure of an alkaloid.
2. Discuss the general methods for the elucidation of flavones.
3. Give the structural determination of Quercetin.
4. Discuss the structural elucidation of Isoflavone.

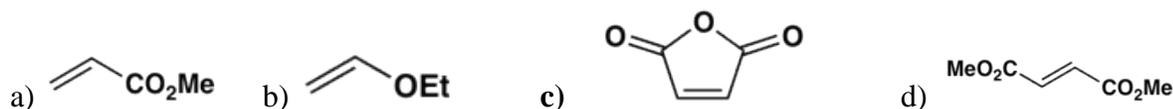
- How will you elucidate the structure of Flavone.
- Discuss the degradation studies of alkaloids.

Section – D

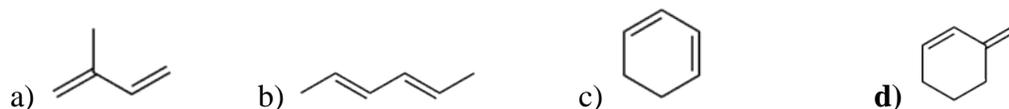
- Give a detailed account on the structural determination of cocaine.
- Write about the structural determination of morphine.
- What is quinine? Give its molecular formula and its structural elucidation.
- Write in detail the importance of papaverine and its structure along with the determination.
- Explain the structural relationship between Flavone, Isoflavone and Flavonol.

Unit IV Organic Photochemistry

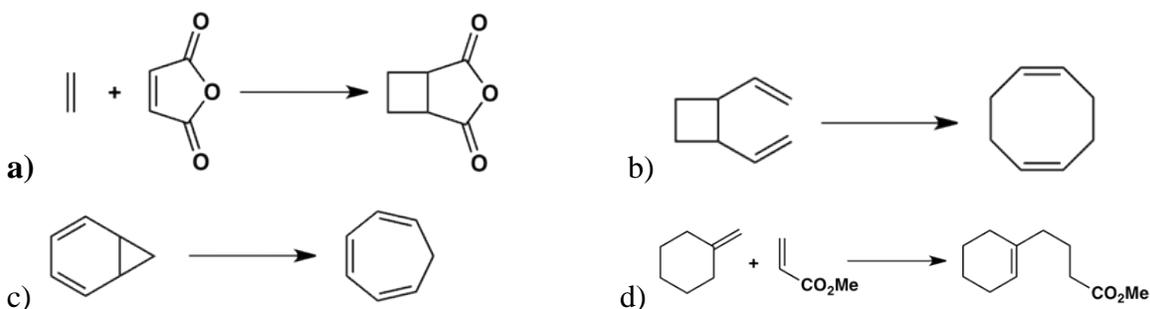
- Which of the following dienophiles is the most reactive with buta-1,3-diene?



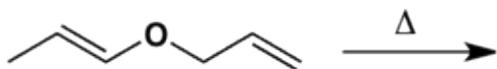
- Which of the following dienes cannot undergo Diels-Alder reactions?

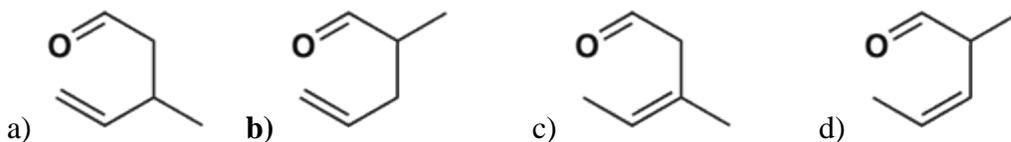


- Which of the following reactions is **not** thermally allowed?

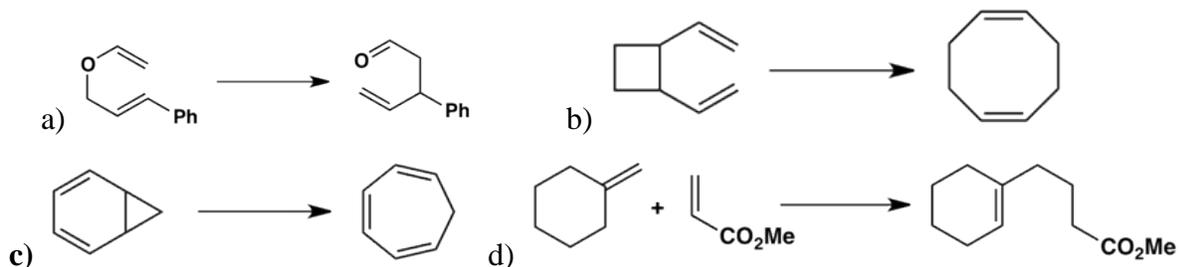


- Which of unsaturated aldehydes (a)-(d) is the sigmatropic rearrangement product obtained by heating the following ether?

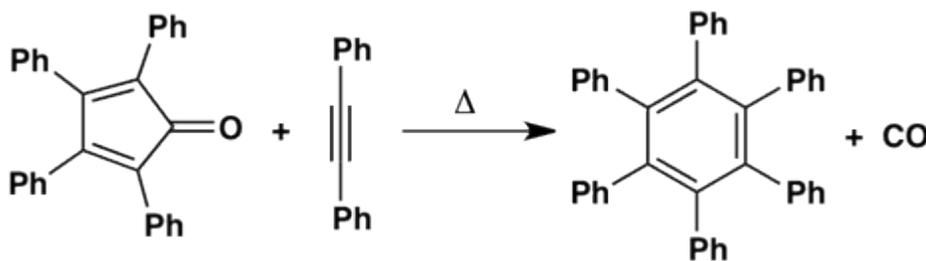




5. Which of the following reactions is classified as an electrocyclic reaction?

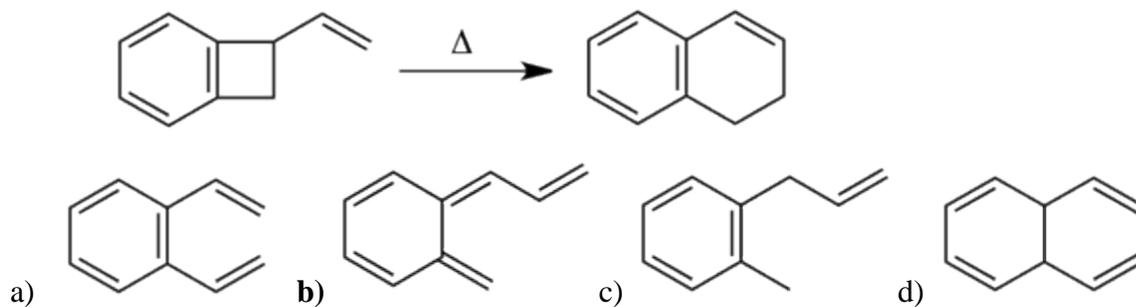


6. The following involves two pericyclic reactions. Which combination indicates correctly the types of reaction involved?

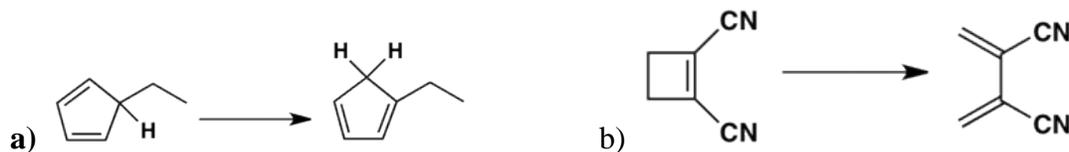


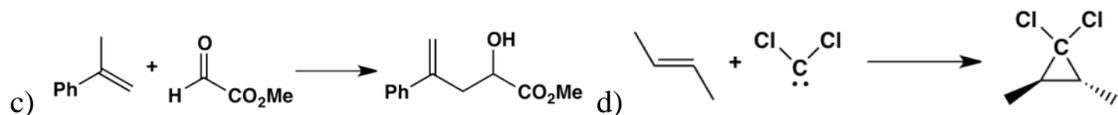
- a) [4+2] cycloaddition + [2+2] cycloreversion b) cheletropic reaction + [4+2] cycloaddition
 c) [4+2] cycloaddition + [4+1] cycloreversion **d) [4+2] cycloaddition + cheletropic reaction**

7. Which of compounds (a)-(d) is the likely intermediate of the following transformation involving two electrocyclic reactions (ring opening and ring closure)?

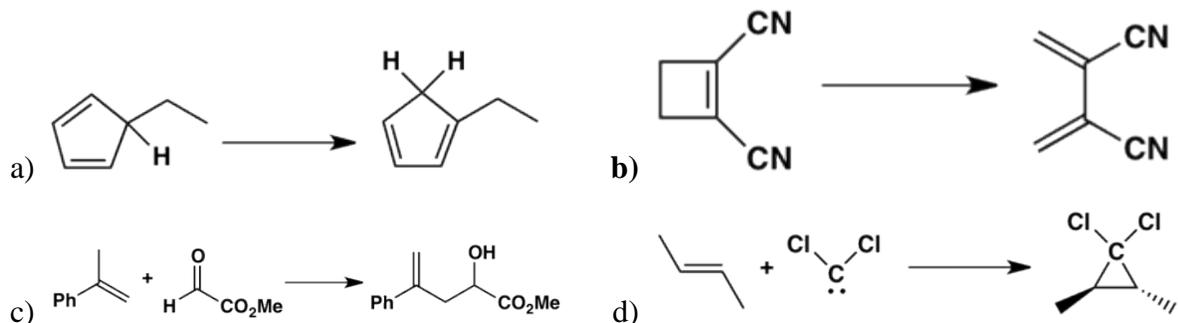


8. Which of the following reaction is classified as a sigmatropic rearrangement?





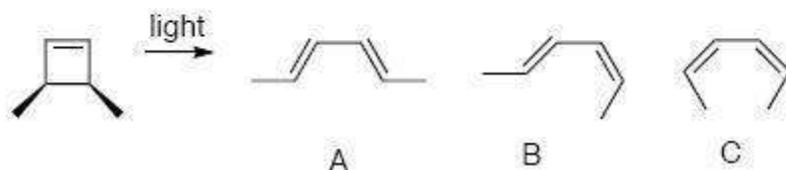
9. Which of the following is classified as an electrocyclic reaction?



10. A photochemically-induced electrocyclic reaction involves which of a molecule's molecular orbitals?

- a) HOMO-1 b) HOMO c) LUMO d) LUMO+1

11. In the electrocyclic ring-opening reaction shown below, which answer best describes the product mixture?

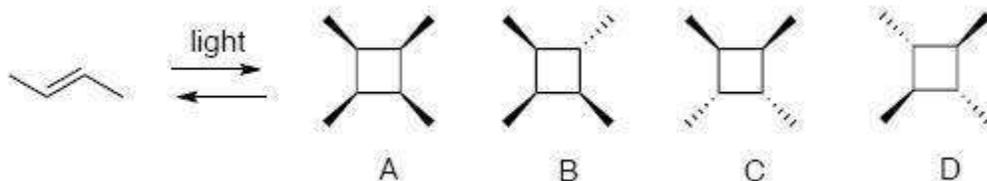


- a) The product will consist primarily of A b) The product will consist primarily of B
 c) The product will consist primarily of C d) **A and C are both major products.**

12. Which image correctly represents the HOMO for 1,3-butadiene?



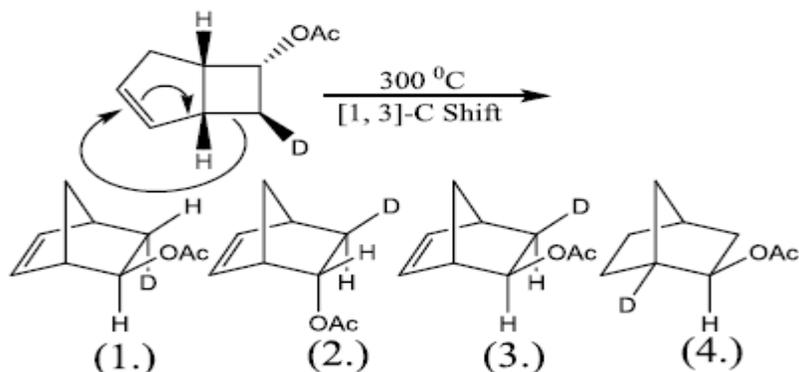
13. Photochemical reaction of *trans*-2-butene with itself will produce which of the following products?



- a) A and B b) **C and D** c) A and C d) B and D

14. A concerted [1,3]-sigmatropic rearrangement took place in the reaction shown below.

The structure of the resulting product is



Ans: 3

Section – B

1. What is photochemical reaction?
2. What do you understand by quantum yield?
3. List the difference between singlet and triplet states.
4. Define the terms – Fluorescence and phosphorescence.
5. Define photosensitisation.
6. Define the term – Internal conversion and Intersystem crossing.
7. What is photo Fries rearrangement?
8. What is Barton reaction?

Section C

1. Using FMO approach predict whether a [1, 5] antarafacial sigmatropic thermally or photochemically allowed condition.
2. Discuss photolysis of benzophenone in detail.
3. Explain the terms HOMO and LUMO.
4. Explain photo Fries rearrangement.
5. Draw the π orbital diagrams for the ground state and the lowest energy excited state of 1,3-butadiene and indicate the HOMO each.

Section D

1. Construct the correlation diagram for cycloaddition reaction and predict whether it is thermally allowed or photochemically allowed condition.
2. Write a note on Norrish type I and II reaction.
3. Explain the mechanism of Paterno- Buchi and Barton reaction.
4. Explain the following terms
 - i) Fluorescence
 - ii) Intersystem crossing
 - iii) Internal conversion
5. Draw correlation diagram for $[4n+2]$ cycloaddition reaction and explain why it is thermally allowed and photochemically forbidden.

Unit V UV - Visible and Infra - Red Spectroscopy

Section - A

1. In which region of the electromagnetic spectrum does absorption at 600 nm come?
 - a) Infraeered
 - b) Visible**
 - c) Near-UV
 - d) Vacuum - UV
2. A solution of $0.001 \text{ mol dm}^{-3} \text{ NiSO}_4$ is placed in an optical cell of path length 1 cm, and the absorption spectrum is recorded. The absorptions have characteristic λ_{max} and ϵ_{max} values. What are the correct units of ϵ_{max} ?
 - a) $\text{mol dm}^{-3} \text{ cm}^{-1}$
 - b) cm mol dm^{-3}
 - c) $\text{cm dm}^3 \text{ mol}^{-1}$
 - d) $\text{dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$**
3. In which region of the electromagnetic spectrum does absorption at 177 nm come?
 - a) Vacuum-UV**
 - b) Near -UV.
 - c) Visible
 - d) Infrared
4. What does the notation $\sigma^* \leftarrow n$ mean?
 - a) Emission; transition from a quantum level n to σ^* MO
 - b) Absorption; transition from a non-bonding MO to σ^* MO**
 - c) Absorption; transition from a quantum level n to σ^* MO
 - d) Emission; transition from a non-bonding MO to σ^* MO
5. How do values of λ_{max} for the $\pi^* \leftarrow \pi$ transitions vary among a series of conjugated polyenes?
 - a) Values vary but in no particular pattern
 - b) Values vary very little
 - c) Values shift to longer wavelength as the number of C=C double bonds increases**
 - d) Values shift to shorter wavelength as the number of C=C double bonds increases
6. What is a red shift?
 - a) Shifting of absorption to higher energy
 - b) shifting of absorption to lower energy**

solution A contained one absorption at $\lambda_{\max} = 230$ nm, while the spectrum of solution B contained absorptions at $\lambda_{\max} = 230$ and 365 nm. The difference in the spectra was because:

a) ϵ_{\max} for the absorption at 365 nm is much smaller than ϵ_{\max} of the band at 230 nm.

b) The value of λ_{\max} depends on concentration

c) The value of ϵ_{\max} depends on concentration

d) Electronic spectroscopic data are not always reproducible

17. A compound X is characterized in its electronic spectrum by an absorption with $\lambda_{\max} = 217$ nm ($\epsilon_{\max} = 21\,000$ dm³ mol⁻¹ cm⁻¹). Of the compounds given below, X is most likely to be:

a) β -Carotene

b) Water

c) Buta-1,3- diene

d) Ethanol

18. Which one of the following pieces of information cannot be obtained from an infra red spectrum?

a) Molecular mass

b) Presence of C=O bonds

c) Presence of O-H bonds

d) Identity of a compound through comparison with other spectra

19. The region of an infra-red spectrum where much absorption take place is known as

a) Thumbprint region

b) Handprint region

c) Fingerprint region

d) Footprint region

20. Signals in a proton NMR spectrum do not provide information about

a) Relative number of hydrogen atoms in a particular environment

b) Number of chemically different hydrogen atoms on adjacent atoms

c) Environment of different hydrogen atoms in a molecule

d) Molecular mass of an organic molecule

21. The proton NMR spectrum of propane will consist of

a) Triplet and singlet

b) Triplet and quartet

c) Doublet and sextet

d) Triplet and septet

22. The proton NMR of 1-bromopropane will consist of

a) Two doublets and sextet

b) doublet and septet

c) Singlet, doublet and triplet

d) two triplets and sextets

23. Which one of the following hydrocarbons produces an NMR spectrum with more than one peak?

a) Ethane

b) Methane

c) Butane

d) Cyclobutane

Section – B

1. Define Absorbance.

2. What do you mean by absorption of radiation in a spectrum or a record?

3. What happens to the excited molecule when radiation is cut off?
4. Which out of benzene or quinone has more easily promoted electrons?
5. Tell whether a molecule can undergo more than one electronic shift.
6. What is the effect of UV or visible light on the organic compound?
7. Why is absorption and not emission spectroscopy used to study the spectra of organic compounds?
8. Describe the shift in absorption ($n \rightarrow \pi^*$) when a more polar solvent is used.
9. Which spin state is observed at the instant of excitation?
10. What do you mean by fingerprint region?
11. How does hydrogen bonding change the position of absorption in the IR spectrum?
12. What is Hooke's law?
13. How does the inductive effect bring about a change in the position of absorption for a particular bond?
14. Why is methanol a good solvent for UV but not for IR spectroscopy?
15. What do you mean by fundamental vibrations and overtones?

Section – C

1. Write a short note on fingerprint region.
2. Briefly describe the scanning of an infrared spectrum of an organic compound.
3. How will you distinguish an aliphatic aldehyde from an aliphatic ketone?
4. An organic compound with molecular formula C_3H_3NO gives absorption peaks in the regions 3413(m), 3236(m), 3039 – 2899(m), 1634(s) and 1460 cm^{-1} (s). Give its probable structure.
5. Which groups do you detect on the basis of the following data: 2841(w), 2755(w), 1686(s), 1605, 1460 cm^{-1} (w).
6. Define the following terms.
 - i) Bathochromic shift
 - ii) Hypsochromic shift
 - iii) Hyperchromic shift
7. What are absorption laws? How is an Ultraviolet spectrum plotted?
8. Write a short note on electromagnetic spectrum.
9. 'A conjugated diene absorbs at a higher wavelength with higher value of excitation coefficient as compared to a diene in which double bonds are isolated'. Comment on this statement with examples which involved.

10. Give the various types of transitions involved in electronic spectroscopy with one example in each case.

Section – D

1. Discuss the inductive and mesomeric effects influencing the carbonyl absorption frequency. Give examples.
2. a) What are the factors which influence the position of absorption frequencies from their normal value?
b) Write a note on Fermi resonance.
3. Explain the electronic factors which influence the absorption frequency.
4. What do you mean by the number of fundamental vibrations? How will you detect the type of hydrogen bonding involved in a particular compound by infrared spectrum?
5. Discuss in detail the various factors which influence the vibrational frequency of a particular group. Give examples.
6. Discuss the various types of electronic transitions and explain the effect of the polarity of the solvent on each type of transition.
7. Explain the various applications of the Ultra violet spectroscopy.
8. The wavelength as well as the extinction coefficient increases with the increase in conjugation in the compound. Justify the statement.
9. Explain the transition probability.
10. Describe the Woodward – Fieser rules for calculating the absorption maximum in dienes. Do these rules obey strictly on all dienes? If not why?

Unit I Group Theory I**Section A**

- The point group of SF₆ is
a) T_d b) D₂ c) C_{4v} d) O_h
- The number of symmetry elements present in the group is called as
a) **Order** b) Class c) Sub-group d) Abelian group
- Which of the following molecule has centre of inversion?
a) BF₃ b) **CO₂** c) CHCl₃ d) CH₃Cl₃
- Rotation followed by reflection is
a) Proper axis of symmetry b) Inversion
c) **Improper axis of rotation** d) Plane of symmetry
- The sum of squares of the dimensions of the IRRs of a group is
a) Number of classes b) Order of the group c) Character of the IRR d) Matrix of the IRR
- Water belongs to _____ point group.
a) C_{2v} b) C_{3v} c) D_{2h} d) D_{3h}
- Which of the following molecule belongs to C_{3v}?
a) CH₄ b) CO₂ c) **NH₃** d) **BF₃**
- If IRR is 2-dimensional, then the notation is
a) A b) B c) **E** d) T
- The matrix notation for the plane of symmetry is
a) **1** b) -1 c) 3 d) -3
- The matrix notation for the improper axis of rotation is
a) 1 b) -1 c) 2Cosθ + 1 d) **2Cosθ - 1**
- In IRR, the primer is used when the molecule is symmetric with respect to
a) C_n b) σ_v c) **σ_h** d) σ_d

Section B

- Define symmetry element.
- What is symmetry operation?
- What is proper axis of symmetry?
- What is plane of symmetry ?
- What is improper axis of symmetry?
- Define centre of inversion.
- What are the symmetry elements present in H₂O?
- What are the symmetry elements present in ammonia molecule?
- The RR for a molecule belongs to C_{3v} point group is given as

C_{3v}	E	$2C_3$	3σ
Γ_{Red}	3	0	1

- Assign the point group of PF_5 .
- Deduce the matrix notations for rotation symmetry operation.
- Deduce the matrix notations for plane of symmetry.
- Deduce the matrix notations for centre of inversion.
- Deduce the matrix notations for improper axis of rotation.

Section C

- Write the properties of irreducible representations.
- Discuss the symmetry operations of NH_3 molecule as a group.
- Deduce the matrix notations for the following symmetry operations.
i) Plane of symmetry ii) Centre of inversion iii) Improper axis of rotation
- Discuss the group multiplication table for C_{3v} point group.
- Explain about reducible representation.
- What are reducible and irreducible representations? Bring out the relation between them.

Section D

- Explain the construction of character table for C_{2v} point group.
- Sketch the character table for H_2O .
- Construct the of character table for C_{3v} point group.
- Discuss the construction of character table for D_{2h} point group.
- Discuss symmetry elements and the corresponding symmetry operation.
- Write the properties of irreducible representations.
- Discuss about symmetry operations of NH_3 molecule as group.

Unit II Group Theory II

Section A

- _____ is used to reduce RR.
a) **Standard reduction formula** b) GOT c) Direct product
d) Group multiplication table
- Number of vibrational modes in linear molecule is
a) $3N$ b) $3N - 4$ c) **$3N - 5$** d) $3N - 6$
- Number of vibrational modes in CO_2 is
a) 2 b) 3 c) **4** d) 5
- Which of the following molecule involving sp^2 hybridisation?
a) CH_4 b) CO_2 c) NH_3 d) **BF_3**
- Hybridisation involved in CH_4 is
a) sp^2 b) **sp^3** c) dsp^2 d) dsp^3

6. Number of vibrational modes in linear molecule is
 a) $3N$ b) $3N - 4$ c) $3N - 5$ d) $3N - 6$
7. H_2O is
 a) Raman active b) IR active c) **IR & Raman active** d) IR & Raman inactive
8. Symmetry point group of NH_3 is
 a) C_{2v} b) **C_{3v}** c) D_{2h} d) D_{3h}
9. Irreducible representation of normal modes of vibration of NH_3 molecule is
 a) $2A_1 + B_2$ b) $2A_1 + 2E$ c) $2A_1 + 2B_2$ d) **$2A_1 + E$**

Section B

1. State the rule of mutual exclusion principle.
2. Give the standard reduction formula.
3. Define normal modes of vibration.
4. State the selection rule for IR spectroscopy.
5. State the selection rule for Raman spectroscopy.
6. How many number of modes vibrations present in methane molecule?
7. Mention the hybridization involved in water and ammonia.
8. How many number of modes vibrations present in CO_2 molecule?

Section C

1. Describe the hybrid orbitals of BF_3 molecule.
2. Explain the hybridisation schemes for atoms in AB_4 tetrahedral molecule.
3. Discuss the representation of vibrational spectrum of water molecule.
4. Discuss the representation of vibrational spectrum of NH_3 molecule.
5. Discuss the representation of vibrational spectrum of HCN.

Section D

1. Find out the hybridization involved in CH_4 .
2. Explain the hybridisation schemes for atoms in AB_3 triangular molecule.
3. Discuss the symmetries of vibrational modes of BF_3 molecule.
4. How would you determine the representations of vibrational modes in ammonia molecule?
5. Describe about the symmetries of vibrational modes in water molecule.
6. Describe about the symmetries of vibrational modes in CO_2 .

UNIT III Surface Chemistry and Catalysis

Section A

1. In the process of adsorption, change in
 a) Enthalpy, entropy is negative b) enthalpy and entropy is positive
 c) **Free energy, enthalpy and entropy are positive**
 d) Free energy, enthalpy and entropy are negative
2. In physical adsorption, increase in pressure will

- a) **Increase the rate of adsorption** b) Decrease the rate of adsorption
 c) No change d) First decreases and then increases
3. Which of the following gases are adsorbed easily?
 a) He b) N₂ c) H₂ d) **CO₂**
4. In gas masks, the adsorbent used is
 a) **Silica gel** b) Calcium Chloride c) Activated Charcoal d) palladium
5. In physisorption the forces acting are
 a) **Van der Waals forces** b) Bonding forces
 c) Electronic Interaction d) Inter molecular forces
6. In chemisorption the enthalpy of adsorption is
 a) less than in physical adsorption **b) In the range of 80-240 kJ mol⁻¹**
 c) The same as that of physical adsorption d) In the range of 20-40 kJ mol⁻¹
7. The process of removing an adsorbed substance from a surface is called
 a) Sorption b) Adsorption **c) Desorption** d) Absorption
8. A false statement among the following is
 a) Heat of adsorption for chemisorption is higher than that for physical adsorption
b) Multimolecular layers are formed on the surface of the adsorbent in chemical adsorption, while unimolecular layers are formed in physisorption
 c) Chemisorption takes place at comparatively high temperature while physical adsorption takes place at low temperature
 d) Chemical adsorption is irreversible while physical adsorption is reversible in nature
9. The slope and intercept of the graph obtained by plotting $\log x/m$ and $\log P$ are _____ respectively.
 a) $1/n$ and k b) $\log k$ and $1/n$ c) n and $\log k$ **d) $1/n$ and $\log k$**
10. In homogeneous catalysis,
 a) Reactants and products are in the same physical state
b) Reactants and catalyst are in the same physical state
 c) Catalyst and products are in the same physical state
 d) Reactants, catalyst and products are in the same physical state

Section B

1. What is adsorption?
2. What is Physisorption?
3. What is chemisorption?
4. What is adsorption isotherm?
5. Give the BET isotherm equation. Explain the terms involved in it.
6. What is heterogeneous catalysis?
7. What is catalysis?
8. What are the limitations of Langmuir adsorption isotherm?
9. What is the free energies relation at the interface?

10. What is Gibbs adsorption isotherm?

Section C

1. Distinguish between physisorption and chemisorption.
2. Deduce Freundlich adsorption isotherm.
3. Derive Gibbs adsorption isotherm.
4. Write a note on micelles and reverse micelles.
5. Explain the Langmuir-Hinshelwood mechanism.
6. Discuss Langmuir-Rideal bimolecular mechanism.

Section D

1. What is adsorption isotherm? Give the postulates and derive Langmuir adsorption isotherm.
2. Derive the BET equation.
3. What is catalysis? Explain the role of surface in catalysis.
4. What is homogeneous catalysis? Derive an expression of acid-base catalysis.
5. Derive an expression for Hammett acidity function.
6. Define enzyme catalysis. Discuss Michaelis-Menton kinetics for enzyme catalysis.

Unit IV Thermodynamics

Section – A

1. The partial molar volume is given by
a) $(\partial V/\partial T)_{P,n_j}$ b) $(\partial V/\partial P)_{T,n_j}$ c) $(\partial V/\partial N)_{T,P}$ **d) $(\partial V/\partial n_i)_{T,P,n_j}$**
2. Partial molar free energy is called as
a) Fugacity **b) Chemical potential** c) Activity d) Assembly
3. Chemical potential is defined as
a) $\mu_i = (\partial H/\partial n_i)_{T,P,n_j}$ b) $\mu_i = (\partial S/\partial n_i)_{T,P,n_j}$ c) $\mu_i = (\partial E/\partial n_i)_{T,P,n_j}$ **d) $\mu_i = (\partial G/\partial n_i)_{T,P,n_j}$**
4. The Gibbs-Duhem equation is
a) $\sum n_i \mu_i = 0$ **b) $\sum n_i d\mu_i = 0$** c) $\sum \mu_i dn_i = 0$ d) $\sum G_i dn_i = 0$
5. A system which can exchange neither energy nor matter with surrounding is called
a) Open system b) Closed system **c) Isolated system** d) Non-isolated system
6. Thermodynamics is the study of _____ and energy flow in chemical reactions.
a) Heat b) Free energy c) Work d) Pressure
7. Activity of a gas may be considered to be the thermodynamic counter part of
a) Pressure b) Concentration c) Temperature **d) Both a & b**
8. The activity of a substance in the standard state is
a) Zero **b) Unity** c) Infinity d) Negative value
9. A system which can exchange neither energy nor matter with surrounding is called
a) Open system b) Closed system **c) Isolated system** d) Non-isolated system
10. For an ideal gas, fugacity is equal to
a) Temperature b) Volume **c) Pressure** d) Concentration

Section – B

1. What is partial molar property?
2. Define chemical potential.

3. Mention the significance of partial molar properties.
4. Give the expression for partial molar volume.
5. What is activity?

Section – C

1. Derive Gibbs-Duhem equation.
2. How will you determine partial molar volume by intercept method?
3. Discuss the variation of activity with temperature.
4. Explain how the fugacity of gas determined by graphical method.
5. Determine the activity and activity coefficient for non-electrolytes.
6. Derive Gibbs-Duhem-Margulus equation.

Section – D

1. Define chemical potential. Derive Gibbs-Duhem equation.
2. Define fugacity and how to determine the fugacity with its dependence of temperature and pressure.
3. What are activity and activity coefficient? Derive the expression for activity.
4. Define partial molar volume. How is it experimentally determined?
5. Define fugacity and how to determine the fugacity with its dependence of temperature and pressure.

UNIT V Vibrational and Raman Spectroscopy

Section A

1. A linear molecule has _____ number of vibrations in IR
 a) $3N - 6$ **b) $3N - 5$** c) $3N$ d) $3N - 2$
2. Which of the molecule is IR active?
 a) O_2 b) N_2 c) H_2 d) **CO_2**
3. A non- linear molecule has _____ number of vibrations in IR
 a) **$3N - 6$** b) $3N - 5$ c) $3N$ d) $3N - 2$
4. Which spectroscopy is used to study the chemical equilibrium conveniently?
 a) IR b) **Raman** c) UV d) NMR
5. IR Spectroscopy is also known as _____
 a) Oscillational b) Rotatioal c) Vibrational **d) Vibrational-Rotational**
6. Which of the molecule has dipole moment
 a) H_2 **b) HCl** c) N_2 d) Cl_2
7. The fundamental vibration couples with the overtone of some other vibration is _____
 a) Overtones b) Combination bands **c) Fermi Resonance** d) Coupling
8. Fermi Resonance is given by
 a) Benzene **b) Benzoyl chloride** c) Benzene d) Naphthalene

Unit I Introduction to Nanotechnology**Section A**

1. The size of nanoparticle is
a) 10^{-3}m b) 10^{-6}m c) **10^{-9}m** d) 10^{-12}m
2. One nanometer is _____
a) **One billionth of a metre** b) One trillionth of a metre
c) One billionth of a centimetre d) One billionth of a millimeter
3. The non-carbon nanotubes are known as _____.
a) Nanowells b) **nanowires** c) nanodots d) nanotubes
4. An example of semiconductor is _____.
a) **Si** b) Ni c) Pt d) Ti
5. In the quantum dot laser the quantum dots play the role of the _____ atoms.
a) Passive b) **active** c) neutral d) static
6. An example for artificial nanomaterial is
a) Gelatine b) **Carbon nanotube** c) Fog d) Clay

Section B

1. What is nanochemistry?
2. What are nanomaterials?
3. Write any four examples for nanomaterials.
4. Explain the size of nanoparticles.
5. Give any four importance of nanomaterials.
6. Name some biological systems used in the preparation of nanomaterials.

Section C

1. Write the importance of nanomaterials.
2. Explain the size effect of nanoparticles.
3. Describe about thermolysis of metal nanomaterials.
4. How the nanoparticles are classified?

Section D

1. Describe the properties of nanomaterials?
2. Explain in details about quantum dot and quantum well?
3. Write a note on Quantum wire and nano crystals.

Unit II Synthesis and Characterisation**Section A**

1. Synthesis of metal nanomaterials by Laser ablation is _____ method.
a) **Physical** b) Chemical c) Biosynthesis d) Physico-chemical

2. The process of synthesis of nano powders is _____
 a) Sol-gel process b) Electro deposition c) Sputtering Technique d) **All are correct**
3. Which one is not categorized under Nano-phase deposition methodology?
 a) The growth in Nano beaker b) **Sol-gel processing**
 c) Scanning Probe Nano Lithography d) Epitaxial growth of Quantum dots
4. Nanotechnology focuses mainly in _____.
 a) Semiconductors b) **Hybrid materials** c) Healthcare d) Information technology
5. In the laser ablation method a laser vaporizes a _____ target.
 a) Carbon b) Hydrogen c) Diamond d) **Graphite**
6. _____ would reduce silver ions into silver atoms in sonochemical reduction.
 a) **Hydrogen radicals** b) Hydroxyl radicals c) Water d) Hydrogen peroxide
7. The application of ultrasound to chemical reactions is known as
 a) Radiation chemistry b) Thermochemistry c) **Sonochemistry** d) Applied chemistry
8. Photochemical etching can be applied to a surface activated by _____ light.
 a) **Laser** b) maser c) infrared d) ultraviolet
9. Frequency doublers and quadruplers can bring the wavelength to _____ nm.
 a) 200 b) 300 c) **150** d) 250
10. The density of states is _____ for negative energies.
 a) 1 b) **0** c) 2 d) 3
11. The infrared detector is sensitive for the wavelength range _____ μm .
 a) **8.5 – 10** b) 10-12.5 c) 9.5-11.5 d) 11-13.5
12. A stabilizer used in the synthesis of nanoparticles of metal sulphides is _____.
 a) **Sodium bisulphate** b) Sodium metaphosphate c) Sodium chloride
 d) Sodium carbonate
- 13 Nanoxide semiconductor nanoparticles are commonly synthesized by _____ of organometallic precursors.
 a) Hydrolysis b) **Pyrolysis** c) Reduction d) Oxidation
14. In thermal decomposition of complex precursors, the different particle sizes are obtained by changing _____.
 a) Precursor concentration b) Temperature c) Pressure d) **Both (a) & (b)**
15. Colloidal particles of metal oxides can be obtained by _____ of the corresponding salts.
 a) **Hydrolysis** b) Oxidation c) Reduction d) Redox reaction
16. _____ is a wet chemical route for the synthesis of colloidal dispersions of inorganic and organic-inorganic hybrid materials.
 a) Precipitation method b) **Sol-gel processing** c) Pyrolysis d) Condensation
17. The optical properties of a semiconductor nanoparticle shifts to the short wave length due to
An increased band gap

Section B

1. How is metal nanomaterials synthesized by sonochemical method?
2. Name some physical methods for the synthesis of metallic nanoparticles.
3. Give a short note on gas condensation.

4. Write a note on thermolysis?

Section C

1. How are nanomaterials characterized by AFM technique?
2. Explain the synthesis of metal nanomaterials by laser ablation.
3. Elucidate the characterization of Scanning Tunneling Microscope?
4. Describe XRD method of surface characterization technique for nanocrystals.

Section D

1. Explain the synthesis of metal nanomaterials by physical methods.
2. How are metal nanomaterials synthesised by chemical methods?
3. Explain the synthesis of metallic nanoparticles by evaporation and sputtering.
4. Describe about biosynthesis of metal nanomaterials.

Unit III Carbon nanotubes

Section A

1. Carbon nanotubes are allotropes of
a) Hydrogen **b) Carbon** c) Boron d) Sulphur
2. The shape of torus is
a) Doughnut b) Linear cylindrical c) Spherical d) Tube-like
3. The composition of Buckminsterfullerene is
a) C₅₀ b) C₅₅ **c) C₆₀** d) C₇₀
4. In electric arc – discharge method, the electrodes are
a) Platinum wire **b) Graphite rod** c) Zinc rod d) Diamond
5. The bonding in carbon nanotubes is
a) sp **b) sp²** c) sp³ d) dsp²
6. The target material used in the synthesis of CNTs by laser method is
a) Coal b) Fullerene c) Quantum well d) Graphite
7. In intercalation method, _____ acts as oxidizing agent.
a) Calcium b) Potassium c) Copper d) Nickel
8. _____ is used to cut diamond.
a) Fullerite b) Torus c) Nanobud d) SWCNT
9. Fullerenes are otherwise called as
a) Torus **b) Buckyball** c) Nanobud d) SWCNT
10. The superconductivity of CNTs is
a) Below 20°K b) Above 20°K c) At 0°K d) Below 20°K
11. The non-carbon nanotubes are known as _____.
a) Nanowells **b) nanowires** c) nanodots d) nanotubes

Section B

1. What are carbon nanotubes?
2. Mention the allotropes of carbon.
3. Name the different types of carbon nanotubes.
4. How are carbon nanotubes synthesized by laser ablation method?
5. What are fullerenes?
6. Write the chemistry of fullerenes.
7. What makes the carbon nanotubes becoming a best catalyst?

Section C

1. Discuss the allotropes of carbon.
2. Explain the types of CNTs.
3. How are CNTs synthesized by electric arc-discharge method?
4. Explain the fluidized-bed CVD method for the preparation of CNTs.
5. Give the important properties of CNTs.
6. Write a note on fullerenes.

Section D

1. Give in detail about solar production of carbon nanotubes.
2. Discuss in detail about the purification methods of carbon nanotubes.
3. List the applications of carbon nanotubes.
4. Explain the purification and properties of fullerenes.

UNIT IV Nanocomposites

Section A

1. Nano composites can include porous media, ----- gels and copolymers.
a) **Colloids** b) solution c) nanoparticles d) CNTs
2. The catalytic activity of nanocomposites found in -----
a) <50 nm b) **<5 nm** c) <100 nm d) < 25 nm
3. Super paramagnetism can be achieved in -----nm.
a) <5 b) <50 c) **<100 nm** d) none of these
4. Nanocomposites naturally occurs in -----
a) **Abalone shell** b) coral reefs c) igneous rocks d) carbon soot
5. Ceramic-matrix nanocomposites consists of ----- fibres embedded in ceramic matrix.
a) Metal b) Metal oxides c) polymer d) **Ceramic**
6. Major load carrier in dispersion- strengthened composites is -----.
a) Matrix b) Fiber c) **Both** d) can't define
7. Plastics and elastomers differ due to their properties of -----.
a) Resistivity b) dielectric strength c) acoustic insulation d) extensibility

Section – B

1. Define Ceramic-matrix nanocomposites.

2. What is emulsion polymerization?
3. List the types of nanocomposites.
4. Define metal-matrix nanocomposites.
5. Illustrate about elastomer nanocomposites.

Section – C

1. Enumerate the synthesis methods for nanocomposites.
2. Write a brief note on thermoset nanocomposites and epoxy nanocomposites.
3. Discuss about Nylon-6 nanocomposites.
4. Explain the properties of polymer nanostructured materials.

Section – D

1. Explain in detail about emulsion polymerization.
2. Explain the process of in situ polymerization.
3. Discuss the production and applications of thermo plastic nanocomposites in detail.

UNIT V Applications of Nanotechnology

Section A

1. _____ nano fibres is used for water purification
 a) **Ceramics** b) Composites c) CNTs d) Nano buds
2. ----- based materials is used for energy storage in nano technology
 a) Graphite **b) Graphene** c) both a&b d) None of the above
3. Which of the following nano semiconductors used in solar energy?
 a) Graphene based b) Ge based **c) Silicon based** d) nano cellulose
4. Nano cellulose based materials used in -----
 a) Water purification b) nano medicine c) IT **d) Photo voltaic devices**
5. Antimicrobial nano filters -----
 a) Nano Ag b) CNTs **c) Both a &b** d) None
6. Heavy metals can be removed using-----
a) Metal based Nps b) Carbon based Nps c) CNT d) Polymer based Nps
7. Oil spills can be cleaned using
 a) nano membrane **b) Nano wires** c) Nano tubes d) Fullerites
8. A sunscreen based on mineral nanoparticles include
a) TiO₂ b) SiO₂ c) EDTA d) Glycerin
9. Detection of genetic sequence in a sample can be done by
 a) Ag NPs **b) Au Nps** c) Pt Nps d) Pd Nps
10. Which of the following is used in drug delivery systems?
 a) Nano membrane **b) Dendrimer** c) nano chips d) Nano fibre

11. _____ are used as window layers in solar cells.
- a) **Nanostructured semiconductors** b) Metal nanoparticles
c) Ceramic nanomaterials d) Metal oxides
12. Nanostructured _____ finds application for rechargeable batteries for cars or consumer goods.
- a) CuO b) **MnO₂** c) PbO d) CaO

Section – B

1. What is hydrogen storage battery?
2. Define Nanonephrology.
3. List the applications of nanotechnology in food and textiles.
4. Elucidate the role of nanotechnology in rechargeable batteries.
5. Write a hint on cell repair machines.

Section – C

1. List the energy applications of nanotechnology.
2. Give the applications of consumer goods in nanotechnology.
3. Explain in detail the medical applications of molecular nanotechnology.
4. Describe the applications of nanotechnology in water purification process.

Section – D

1. List the applications of nanotechnology in detail.
2. Discuss the applications of nanotechnology in energy storage batteries.
3. Write a short note on applications of nanotechnology in heavy industries.
4. Explain how nanotechnology is applied in chemistry and environment.
5. Illustrate the role of nanotechnology in Information and communication.

St. Mary's College (Autonomous)

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Thoothukudi



PG Department of Chemistry

Semester III

QUESTION BANK

2021 - 2023

Unit I Solid state I

Section – A

Choose the Correct Answer:-

- In crystal structure of sodium chloride, the arrangement of Cl^- is
a) FCC b) both BCC and FCC c) BCC d) none of these
- Which of the following pairs of species are likely to show Schottky type defects?
a) NaCl, ZnS **b) CsCl, NaCl** c) ZnS, AgBr d) AgBr, NaCl
- FCC arrangement of atoms contains number of atoms in each unit cell equal to
a) 4 b) 6 c) 3 d) 8
- Frenkel defect is an example of
a) Line defect **b) Point defect** c) Surface defect d) Impurity defect
- The packing efficiency of hexagonal close packing is -----
a) 72 b) 74 c) 70 **d) 64**
- Which of the following will have more penetration power?
a) X-ray diffraction b) electron diffraction
c) Neutron diffraction d) none of the above
- Which of the following is an example of body centred cube?
a) Magnesium b) Zinc c) Copper **d) Sodium**
- Each Na^+ ion, in NaCl lattice, is surrounded by
a) 1 Cl^- ion b) 2 Cl^- ions c) 3 Cl^- ions **d) 6 Cl^- ions**
- In a solid 'AB' having NaCl like structure atoms occupy the corners of the cube unit cell. If all the face centred atoms along one of the axis are removed then resultant stoichiometry of the solid is
a) AB_2 b) A_2B **c) A_4B_3** d) A_3B_4
- The unit cell of a CsCl lattice is
a) face centered cubic **b) body centered cubic**
c) simple cubic d) electrically charged
- The number of kinds of space lattices that are possible in a crystal is
a) 23 b) 7 c) 230 **d) 14**
- In NaCl crystal, which statements are true
a. Co-ordination number of Na^+ and Cl^- ions is same
b. It is FCC type of crystal
c. It is a simple cubic type crystal
d. Cl^- ions occupy the corners of the cube and also its body center
a) i, iv **b) i, ii** c) ii, iii d) iv
- In which of the following, pairs the cation occupy tetrahedral hole?
a) Zinc blende, Na_2O b) Na_2O , CaF_2 c) NaCl, CaF_2 d) CsBr, NaCl
- Schottky defect is an example of
a) Interstitial defect **b) Vacancy defect** c) Impurity defect d) Plane defect
- Which of the following species are likely to exhibit Frenkel type defects?
a) CsCl, ZnS b) CsCl, NaCl **c) ZnS, AgBr** d) AgBr, NaBr

16. Each Na^+ ion, in NaCl lattice, is surrounded by
 a) 1 Cl^- ion **b) 6 Cl^- ions** c) 4 Cl^- ions d) 8 Cl^- ions
17. Frenkel defect is observed in
 a) AgBr b) AgI c) ZnS **d) All of these**
18. A solid XY adopts CsCl type structure. Pick up the true statements
 a. Co-ordination number of X^+ and Y^- are 8
 b. Y^- ions adopt fcc arrangement
 c. X^+ ions adopt hcp arrangement
 d. There is one XY unit in unit cell
a) i, iv b) iii c) ii, iii d) iv only
19. An ion occupies an interstitial position in the crystal lattice. This is an example of
 a) F-centers **b) Frenkel defect** c) Schottky defect d) Plane defect
20. A simple cubic lattice consists of eight identical spheres of Radius 'R' in contact, placed at the corners of the cube, what fraction of the total volume of cube is actually occupied by the cube?
 a) 74% b) 68% **c) 52.4%** d) 66%
21. In rock salt structure what percentage of the octahedral voids are occupied by cations?
 a) 50% **b) 100%** c) 25% d) 33%
22. The unit cell of a NaCl lattice is
a) Face centered cubic b) Body centered cubic
 c) Simple cubic d) Electrically charged
23. Schottky defect is generally observed in
a) KCl b) FeS c) ZnS d) All of these
24. Bragg's law is given by the equation
 a) $n\lambda = 2\theta \sin \theta$ b) $n\lambda = 2d \sin \theta$ c) $2n\lambda = d \sin \theta$ d) $n\theta = d \sin \lambda$
25. The number of atoms in a simple cubic unit cell is
a) 1 b) 2 c) 4 d) 6
26. In a simple cubic cell, an atom at the corner contribute to the unit cell
 a) 1 Part b) $\frac{1}{2}$ Part c) $\frac{1}{4}$ Part **d) $\frac{1}{8}$ Part**
27. ZnS is an example of
 a) Ionic crystal b) Covalent crystal c) Molecular crystal d) Metallic crystal
28. The number of atoms in a fcc unit cell is
 a) 2 b) 4 c) 5 d) 6
29. In a crystal, some ions are missing from the lattice sites. This is an example of
 a) F-centers b) Frenkel defect **c) Schottky defect** d) Interstitial defect
30. In a fcc cell, an atom at the face contribute to the unit cell
 a) 1 Part **b) $\frac{1}{2}$ Part** c) $\frac{1}{4}$ Part d) $\frac{1}{8}$ Part
31. Crystal growth is associated with
 a) Preparation of perfect crystal b) Shaping of crystal
c) Enlargement of tiny crystal d) None of the above

Section - B

1. What is radius ratio?
2. Mention the causes for crystal defects.
3. Define packing efficiency.
4. What is meant by crystal defects?
5. Write short notes on powder x-ray diffraction.
6. Explain neutron diffraction method.
7. Define point defect.
8. What is Frenkel defect?
9. Explain about Schottky defect.
10. Discuss about hydrothermal method.
11. Derive Bragg's equation.

Section - C

1. Explain the structure of NaCl.
2. Explain the CCP and HCP arrangements with suitable example.
3. Write notes on (i) Schottky defect (ii) Frenkel defect
4. Explain the structure of CsCl.
5. Describe the Chemical Vapour Transport method for crystal growth.
6. Explain the structure of Zinc blende and Wurtzite.
7. Discuss the structure of perovskite.
8. Write briefly about the structure of Rutile.
9. Discuss the Verneuil method for crystal growth.
10. Demonstrate Stacking faults.
11. Implement the correct method to grow the single crystal from solution.
12. Calculate the packing efficiency of hcp and ccp.

Section – D

1. Explain the structure of CdCl_2 and CdI_2 in detail.
2. Discuss the structure of Nickel arsenide and Perovskite in detail.
3. Explain the following crystal growth method in detail.
a) Bridgeman method b) Czochralski method c) Verneuil method
4. Explain the different types of crystal defects in detail.
5. Discuss the structure of Spinels and K_2NiF_4 in detail.
6. Figure out edge dislocation and discuss in detail.

Unit II Solid state II

Section – A

1. Which form of AgI is solid electrolyte?
a) α - form b) β -form c) γ -form d) It is not an electrolyte.
2. In n-type semiconductor doping is done with
a) Arsenic b) gallium c) Indium d) Aluminium

3. Which of the following is Optical property of semiconductors?
a) Photovoltaic effect b) Hall effect c) Thomson effect d) Peltier effect
4. The highest filled level at absolute zero is known as
a) Energy level **b) Fermi level** c) Valence level d) Acceptor level
5. The band gap in semiconductors lie in between
a) 0.5 to 3.0 eV b) 0.7 to 3.0 eV c) 0.5 to 2.0 eV d) 0.5 to 3.5 eV
6. Due to Schottky defect density of the crystal
a) Decreases b) Increases c) Remains same d) Slight increase
7. In n-type semiconductor Hall coefficient R_H is
a) Positive **b) negative** c) Zero d) Same as p-type
8. Photo voltaic cells are used in
a) Watches b) Batteries c) Rectifiers d) Transistors
9. Which of the following value related to superconductivity?
a) $Z\rho > 10^6$ b) $Z\rho > 10^3$ c) $Z\rho > 10$ d) $Z\rho < 10^6$
10. Fast electrical switching is applied in
a) Meglev train b) Transformers **c) Cryotron** d) Calculators
11. Meglev trains are made by the principle of
a) BCS theory b) Levitation c) Hall effect **d) Meissner effect**

Section - B

1. Define Band theory and what the conditions for conductivity in metals are.
2. Define Point defects with example.
3. Give reason: Graphite is conductor and Diamond is insulator.
4. Define Meissner effect with a diagram.
5. What are the applications of High temperature super conductor?
6. What are Cooper electrons?
7. Define Levitation.

Section - C

1. Write a note on Photovoltaic effect.
2. Discuss Schottky and Frenkel defect and its characteristics with suitable examples.
3. Explain about Super conductivity with their general features.
4. Explain Thomson effect.
5. Explain see-back effect in semiconductors.

Section - D

1. Explain Band theory for metals with corresponding Example.
2. Discuss briefly on band theory of p-type and n-type semiconductors.
3. Write down the applications of p-n, n-p-n junctions as rectifiers and transistors.
4. Explain in detail about BCS theory.
5. Explain in detail about Hall effect.
6. Explain in detail about High temperature superconductors and their applications.

Unit III Inorganic Chains, Rings and Cages

Section - A

- Structure of a carborane with formula $C_2B_4H_8$ is formally derived from
 - Closo borane
 - Nido borane**
 - Arachno borane
 - Conjuncto borane
- Silicates with continuous 3D framework are
 - Neso Silicate
 - Soro Silicate
 - Phyllo Silicate
 - d) Tecto Silicate**
- $CO_4(CO)_{12}$ adopts -----structure
 - Closo
 - b) Nido**
 - Arachno
 - d) Hypho
- According to Wade's rule anion $[C_2B_9H_{12}]^-$ adopts
 - Closo
 - b) Nido**
 - Arachno
 - d) Hypho
- Number of isomeric derivatives possible for the neutral closo carborane $C_2B_{10}H_{12}$ is
 - a) 3**
 - b) 2
 - c) 4
 - d) 6
- Total VE count and the structure type adopted by the complex $[Fe_5(CO)_{15}C]$ respectively are
 - a) 74 and nido**
 - b) 60 and closo
 - c) 84 and arachno
 - d) 62 and nido
- The number of 3c-2e bonds present in $Al(BH_4)_3$ is
 - Four
 - Three
 - c) Six**
 - d) Zero
- A sodolite cage in zeolite is
 - Truncated tetrahedron
 - An ico sahedron
 - c) A truncated octahedron**
 - d) A dodecahedron
- The STYX code of B_4H_{10} is
 - 4120
 - b) 4220
 - c) 4012**
 - d) 3203
- The ring size and the number of linked Td present in $[Si_6O_{18}]^{12-}$ are respectively
 - a) 6 and 6**
 - b) 12 and 6
 - c) 12 and 12
 - d) 6 and 12
- Using Wade's rules predict the structure type of $[C_2B_5H_7]$
 - Nido
 - b) Closo**
 - Arachno
 - d) Hypho
- Which of the following is orthosilicate
 - a) Olivine**
 - b) Crocidolite
 - c) Mica
 - d) Enstatite
- Which is one dimensional conductor
 - a) (SN)x**
 - b) graphite
 - c) borazine
 - d) alumina
- Diborane used in organic chemistry in conversion of..... to.....
 - a) Alkene to alcohol**
 - b) alcohol to aldehyde
 - c) Aldehyde to alkene
 - d) Alcohol to alkene
- General formula for orthosilicate is
 - a) SiO_4^{4-}**
 - b) $[Si_2O_7]^{2-}$
 - c) Si_3O_8
 - d) $[Si_6O_{18}]^{12-}$
- Beryl belongs to
 - Orthosilicate
 - b) Metasilicate
 - c) Pyrosilicate
 - d) Sheet Silicate
- The 1st inorganic polymer is _____
 - Borane
 - b) borazine
 - c) (SN)x**
 - d) Phosphazene
- Borazine derivatives replace with Aluminium to give _____
 - Aluminosilicates
 - b) Alumazenes**
 - c) Phosphazes
 - d) Cannot replaced by aluminium
- Which is most stable form of Tetrameric phosphazene
 - a) Chair or T**
 - b) Tub or K
 - c) Chain
 - d) Cage

20. Which of the following probably consists of infinite sheet caused by cross-linking.

- a) α -SO₃ b) β -SO₃ c) γ -SO₃ d) None

21. The molecule ----- is considered to be inorganic benzene

- a) Phosphazene b) **Borazine** c) Siloxanes d) Cyclopolyarsines

Section - B

1. What structure do you predict for the anions B₂H₇⁻ and B₃H₈⁻
2. How will you efficiently synthesis borazine?
3. Complete the following equations
$$\text{B}_2\text{H}_6 + 2\text{R}_3\text{N} \longrightarrow ?$$
$$\text{B}_4\text{H}_{10} + 2\text{NR}_3 \longrightarrow ?$$
$$\text{B}_2\text{H}_6 + 2\text{NH}_3 \longrightarrow ?$$
4. Write balanced equation for Diborane reacts with Oxygen to give boron (III) oxide & water
5. Write the preparation of monophosphazene with a balanced equation.
6. What are phytosilicates?
7. What are Amphiboles? Draw a structure.
8. Which is unidirectional conductor? And why it is called so?
9. Write the similarities between Benzene and borazine
10. Write the structure of diborane and Tetraborane.
11. What are Silicones and how dimethyl silicones are prepared?

Section - C

1. Explain heteropolyanions with structure.
2. Discuss the special features of isopoly and heteropoly anions.
3. What are the differences between benzene and borazine.
4. Write short notes on Tetraborane.
5. Discuss the properties of diborane.
6. How zeolite is used as shape selective catalyst?
7. Justify borazine is an inorganic benzene.

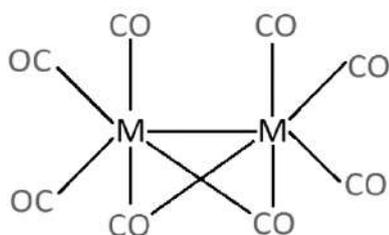
Section - D

1. Write down the preparation structure and mechanism of one dimensional conductor.
2. Write down the preparation and structure of phosphazene.
3. Explain the preparation structure and bonding in diborane.
4. Argue and sketch the structure and bonding of trimeric phosphazenes.
5. Predict the structure using wade's rule for the following compounds
a) B₃H₇Fe(CO)₃ b) Rh₆(CO)₁₆ c) Os₅C(CO)₁₅
6. Explain in detail on intercalation compounds.
7. How will you synthesis zeolite? What are the applications of zeolite?

UNIT IV Inorganic Clusters

Section - A

- According to Wade's rule cluster $[\text{Os}_3(\text{CO})_{12}]$ is type of -
 a) Closo b) Nido c) Arachno d) Hypo
- The fragment $[\text{Co}(\text{CO})_4]$ is isolobal with
 a) CH_4 b) CH_3 c) CH_2 d) CH
- Total number of M-M bonds in $[\text{Co}_4(\text{CO})_{12}]$ is
 a) 3 b) 4 c) 6 d) 5
- Total valence electron count and structure adopted by cluster $[\text{Fe}_5(\text{CO})_{15}]$ are
 a) 74 and Nido b) 60 and Closo c) 84 and Arachno d) 62 and Nido
- What is the geometry of pentacarbonyliron(0)?
 a) Square planar b) Tetrahedral **c) Trigonal bipyramidal** d) Octahedral
- The following structure of a carbonyl compound is formed by which transition metal.



- a) Ni b) Cr c) Mn **d) Co**
- The metal-carbon bond in metal carbonyls possesses only
 a) sigma character b) pi character c) both a & b d) none of the above
- How is the M-C pi bond formed?
 a) Donation of electron pair of half-filled metal d orbital to empty bonding pi orbital of CO
 b) Donation of electron pair of filled metal d orbital to empty bonding pi orbital of CO
c) Donation of electron pair of filled metal d orbital to empty antibonding pi orbital of CO
 d) Donation of electron pair of half-filled metal d orbital to empty antibonding pi orbital of CO
- The donation of lone pair of electrons of CO carbon into the vacant orbital of metal atom results in _____ bond.
 a) sigma b) pi c) back **d) synergic**
- The metal clusters of molecular formula -----are known as Chevrel phases.
a) MXMo_6X_8 b) $\text{MX}_6\text{Mo}_8\text{X}_6$ c) both a & b d) MX_6
- The main characteristics of zintl clusters are
a) semiconductors b) poor conductors c) nonconductors d) conductors
- Inorganic clusters may contain quadruple bonds due to the formation of an extra bond by the overlapping of the
a) $\text{dx}^2 - \text{y}^2$ or dxy orbitals b) px and py orbitals
 c) dxy and dxz orbitals d) none of the above
- The degree of overlapping and hence the bond strength of metal cluster is in the order-----
a) $\sigma > \pi > \delta$. b) $\pi > \delta > \sigma$ c) $\delta > \pi > \sigma$ d) $\delta = \pi = \sigma$
- The binuclear metal carbonyls due to ----- these complexes dimerize and form metal-metal bonds
a) odd number of valence electrons b) even number of valence electrons

c) both a& b

d) 3 electrons in the valence shell

15. The $\text{Fe}_2(\text{CO})_9$ molecule consists of two ----- sharing a triangular face containing three bridging carbonyl groups.

a) octahedron

b) pentagon

c) hexagon

d) bipymidal

Section - B

1. Mention the difference between complex and clusters.
2. Define clusters.
3. What is 18 electron rule?
4. What are carbonyl clusters?
5. Define dicarbonyl clusters.
6. Give the two examples of tetranuclear carbonyl clusters.
7. Explain the types of clusters.
8. List down the various examples of nitrosyl clusters.
9. What do you mean halide clusters?
10. What is EAN rule?
11. Brief note on capping rule.
12. Write the classification of clusters.
13. Write note on Re clusters.
14. What is Chevrel phases?
15. Write a note on isolobal relationship.
16. What is meant by zintl ions.

Section - C

1. Write the importance of EAN rule.
2. Describe how an carbide cluster formed.
3. Explain the bonding in $[\text{Mo}_2\text{Cl}_8]^{4-}$.
4. What is capping rule? Discuss the importance of it.
5. How do you predict the structure of clusters based on electronic configuration?
6. Write a brief note on properties of metal clusters.
7. How the cluster of hexanuclear halide forms?
8. Write a note on quadrupole bond
9. Write a brief note on Isolobal analogy.
10. Explain briefly about Chevrel phase.

Section - D

1. List down the classification of carbonyl clusters.
2. Compare the structure of $[\text{Nb}_6\text{Cl}_{12}]^{2+}$ and $[\text{Os}_6(\text{CO})_{18}]^{2-}$.
3. Write about cluster rotation with CO shells
4. Explain in detail the formation of Chromium (II) acetate.
5. Write a detail note on sulphur metal clusters.
6. Write about zintl ions.

Unit – V Spectroscopy II

Section – A

- When the total angular momentum $J=L+S$ the magnetic moment will be _____
a) parallel b) antiparallel c) both d) none
- When the total angular momentum, $J=L-S$, the magnetic moment will be _____
a) parallel **b) antiparallel** c) both d) none
- Term symbol is denoted as _____
a) $^{2L+1}J_L$ b) $^{2L+S}J_L$ **c) $^{2S+1}L_J$** d) $^{2S+1}J_L$
- The number of term is called as _____
a) Microstate **b) Multiplicity** c) Term symbol
- The no. of microstates can be calculated by
a) $\frac{n!}{r!(n-r)!}$ b) $\frac{r!}{r!(n-r)!}$ c) $\frac{(r-1)!}{r!(n-r)!}$ d) $\frac{(n-1)!}{r!(n-r)!}$
- Nickel (II) complex is _____ system
a) d^2 b) d^3 **c) d^8** d) d^9
- Calculate the microstates for p^3 configuration.
a) 10 b) 15 **c) 20** d) 25
- The colour of $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ is due to
a) d-d transition **b) vibronic coupling** c) LMCT d) MLCT
- Which transition is responsible for deep purple colour of MnO_4^-
a) $t_1 \rightarrow e_g$ b) $t_1 \rightarrow t_2^*$ c) $t_2 \rightarrow e_g$ d) $t_2 \rightarrow t_2^*$
- The spectra of higher actinides resembles those of
a) transition metal ion **b) lanthanides** c) both(a) & (b) d) none
- The Term symbol for carbon atom is
a) 2P_0 **b) 3P_0** c) $^2D_{1/2}$ d) $^3F_{3/2}$
- PES technique is based on _____
a) photo electric effect b) Compton effect c) stark effect d) chemiluminescence

Section – B

- What is term symbol? Calculate for p^5 and d^7 configuration.
- What are microstates? Calculate for p^3 and d^5 configuration.
- Write the Jahn – Teller theorem.
- Write the principle of photoelectron spectroscopy.
- Give the types of photoelectron spectroscopy.
- What are the advantages of UPES over XPES.
- What is ESCA?
- State Koopman's theorem
- Find out the term symbol and microstates for Mn^{2+} .
- Why the complex $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ gives colour even though it is laporte as well as spin forbidden?

Section – C

1. Assign the term symbols and microstates for the following
 - i) P^4
 - ii) d^5
 - iii) d^8
2. Sketch and explain the Orgel diagram for d^1 configuration.
3. Explain the selection rules which governing electronic transitions
4. State Koopman's theorem. Explain.
5. Explain the principle for UVPES and its spin-orbital coupling.
6. Give the applications of ESCA.
7. Describe briefly about electronic spectra of inner transition complexes.
8. For $[Ni(H_2O)]^{2+}$, ν_1 and ν_3 occur at 8600cm^{-1} and $26,000\text{cm}^{-1}$ respectively. Calculate Dq , B' and ν_2 .
9. Justify Laporte rule which govern electronic transitions.

Section – D

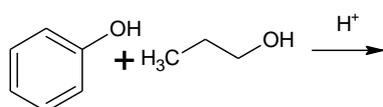
1. Explain the electronic spectrum of d^3 ion in tetrahedral and octahedral field with Orgel diagram.
2. Explain LMCT and MLCT states with examples.
3. Define Tanabe – Sugano diagram. Explain T – S diagram for d^6 octahedral complexes.
4. Discuss the principle and applications of Auger electron spectroscopy.
5. What is the principle behind UVPES? Explain briefly with examples.

Unit I Aromatic Electrophilic and Nucleophilic Substitution Reaction

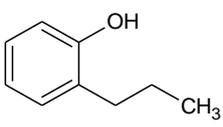
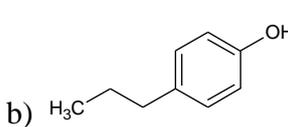
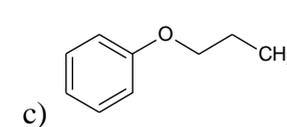
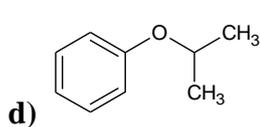
Section –A

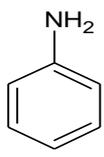
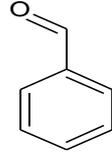
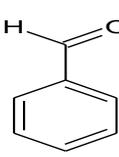
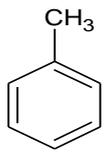
Choose the Correct Answer:-

- Friedel–Crafts reaction using $\text{CH}_3\text{COCl}/\text{AlCl}_3$ takes place at the slowest rate in
 - C_6H_6
 - $\text{C}_6\text{H}_5\text{OH}$
 - $\text{C}_6\text{H}_5\text{CHO}$
 - $\text{C}_6\text{H}_5\text{CH}_3$
- The correct order of reactivity towards electrophilic substitution is
 - benzoic acid > chlorobenzene > benzene > phenol
 - benzoic acid > phenol > benzene > chlorobenzene
 - phenol > benzene > chlorobenzene > benzoic acid
 - phenol > chlorobenzene > benzene > benzoic acid**



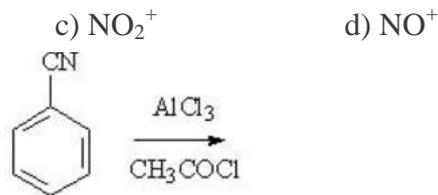
The structure should be

- 
- 
- 
- 

- Which of the following compound will show Friedel Crafts alkylation?
 - 
 - 
 - 
 - 

- Which of the following aromatic compounds undergo Friedel–Crafts alkylation with methyl chloride and aluminum chloride?
 - Benzoic acid
 - Nitrobenzene
 - Toluene**
 - Aniline

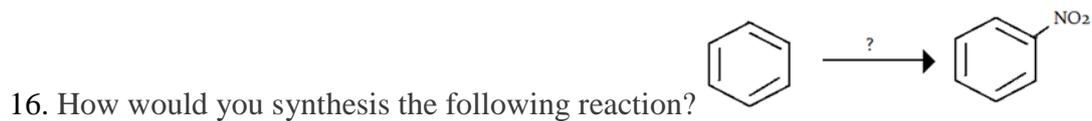
- What is the electrophile in the electrophilic substitution reaction of benzene using oleum and conc. H_2SO_4 ?
 - SO_3**
 - NO_3
 - NO_2^+
 - NO^+



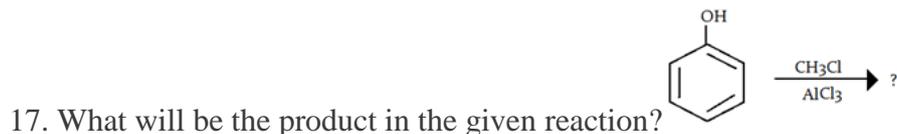
- Predict the major product of the following reaction.
 - acetophenone
 - benzoic acid
 - benzamide
 - cyanobenzene**

- What is the electrophile in the electrophilic substitution reaction of benzene using HNO_3 and H_2SO_4 ?
 - SO_3
 - NO_3
 - NO_2^+**
 - NO^+

- What is the electrophile in the electrophilic substitution reaction of acetyl chloride (CH_3COCl) and AlCl_3 reacting with benzene?
 - Cl
 - AlCl_3
 - $\text{CH}_3\text{C}^+=\text{O}$**
 - $\text{C}=\text{O}$

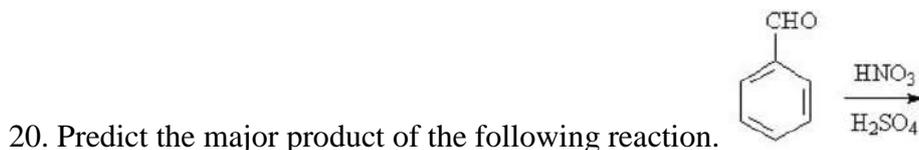


- a) **conc. HNO₃ + conc. H₂SO₄** b) conc. HNO₃
 c) anhydrous AlCl₃ + Ph-NO₂ d) conc. H₂SO₄ + Oleum

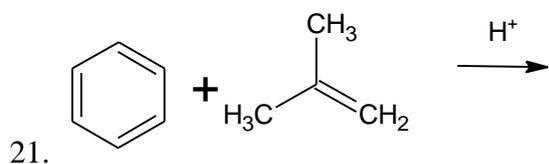


- a) m-chlorophenol b) o-chlorophenol and p-chlorophenol
 c) **o-hydroxytoluene and p-hydroxytoluene** d) m-hydroxytoluene
18. Which of the following is the most activating in electrophilic aromatic substitution?
 -NO₂ -NH₂ -NHCOCH₃ -CN

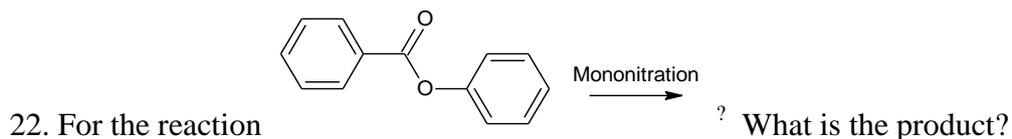
- a) -NO₂ b) **-NH₂** c) -NHCOCH₃ d) -CN

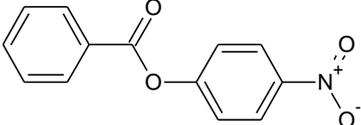
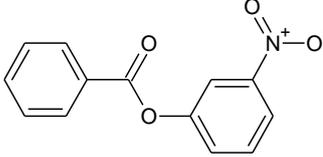
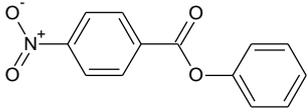
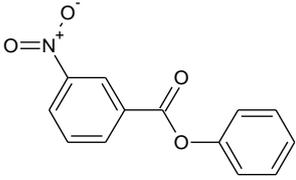


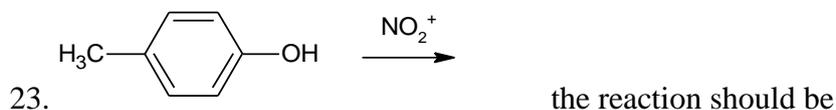
- a) O-nitrobenzaldehyde and p-nitrobenzaldehyde b) **m-nitrobenzaldehyde**
 c) o-formylbenzenesulfonic acid and p-formylbenzenesulfonic acid
 d) m-formylbenzenesulfonic acid

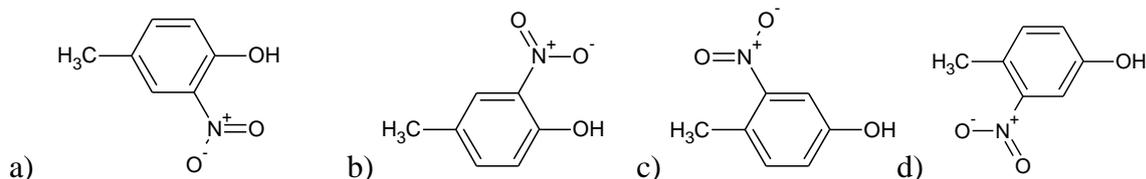


- a) N-propyl benzene b) **cumene** c) diethyl benzene d) none



- a)  b) 
 c)  d) 





24. The best sequence to use to form propylbenzene from benzene is
- Friedel–Crafts alkylation using 1-chloropropane and aluminum trichloride
 - Friedel–Crafts acylation followed by reduction.**
 - electrophilic addition of 1-chloropropane.
 - nucleophilic aromatic substitution using propyl Grignard.
25. Vilsmaier Haack reaction is
- Arylation
 - Formylation**
 - Sulphonation
 - Nitration
26. The synthesis of Coumarins by condensation of Phenols with β -keto esters in presence of acid is---
- Vilsmaier Haack reaction
 - Bischler Napieralski Reaction
 - Jacobsen Reaction
 - Pechmann Reaction**

Section – B

- What is the effect of leaving group in Nucleophilic substitution?
- Write the reaction of Houben-Hoesch reaction.
- How will you Convert benzene into benzoic acid and its mechanism?
- Nitrobenzene, but not benzene, is used as a solvent for the Friedel–Crafts alkylation of bromobenzene. Explain.
- Friedel–Crafts acylation requires an excess of the catalyst but Friedel–Crafts alkylation requires only a catalytic amount. Explain.
- Why is the reaction with fluorine the fastest?
- Why must the electron withdrawing group be on the ortho/meta position?
- How will you convert Benzene into m-dinitro benzene?

Section – C

- Discuss the role of Friedel Craft alkylations.
- Write Benzyne mechanism.
- Give a brief note on the reactivity of halogenations in aromatic electrophilic substitution.
- Explain the Pechman reaction.
- Write a note on Von Richter rearrangement.
- Explain the arenium ion mechanism.
- Illustrate the Smiles rearrangement.
- Write a note on Houben Hoesch reaction.
- Discuss the role of Vilsmeier reaction in aromatic substitution reaction.
- Write the effect of attacking nucleophile in aromatic nucleophilic substitution.
- How do we prove the formation of the benzyne intermediate?
- Explain the mechanism of a Smiles Rearrangement.
- Explain the mechanism of a Jacobsen Reaction.

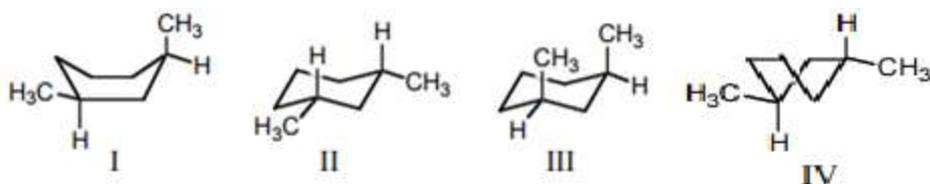
Section D

1. What is Bischler Napieralski reaction? Write its mechanism.
2. Discuss the aromatic electrophilic halogenations and nitrosation.
3. Write the mechanism of Sommelet-Hauser and Jacobson reaction.
4. Explain the effect of substrate and leaving group in aromatic nucleophilic substitution.
5. Write the mechanism of Pechman reaction and Smiles rearrangement.
6. Organise the arenium ion mechanism with evidences.
7. Evaluate the benzyne mechanism with evidences.

Unit II Conformational Analysis

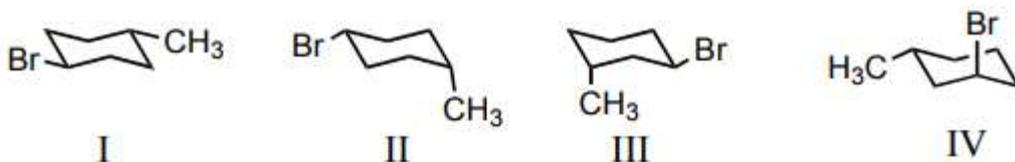
Section –A

1. Which of the following correctly lists the conformations of cyclohexane in order of increasing energy?
a) chair < boat < twist < half-chair b) half-chair < boat < twist < chair
c) chair < twist < half-chair < boat **d) chair < twist < boat < half-chair**
2. The energy difference between the axial and equatorial conformers of methylcyclohexane is:
a) < 0.1 kcal/mol b) 0.9 kcal/mol **c) 1.7 kcal/mol** d) 2.5 kcal/mol
3. In the lowest energy chair conformation of *cis*-1,3-dimethylcyclohexane, how many axial positions are occupied by hydrogen atoms?
a) 2 b) 3 c) 4 **d) 6**
4. The least stable conformation of cyclohexane is
a) boat b) twist boat c) chair **d) half-chair.**
5. The dihedral angle of cyclohexane
a) 54° b) 55° **c) 56°** d) 57°
6. Which of the statements below correctly describes the chair conformations of *trans*-1,4-dimethylcyclohexane?
a) The two chair conformations are of equal energy
b) The higher energy chair conformation contains one axial methyl group and one equatorial methyl group
c) The lower energy chair conformation contains one axial methyl group and one equatorial methyl group
d) The higher energy chair conformation contains two axial methyl groups. E) The lower energy chair conformation contains two axial methyl groups
7. Which of the statements below correctly describes the chair conformations of *trans*-1,3-diethylcyclohexane.
a) The two chair conformations are equal in energy.
b) The higher energy chair conformation contains two axial ethyl groups.
c) The higher energy chair conformation contains two equatorial ethyl groups.
d) The lower energy chair conformation contains two axial ethyl groups.
8. What structure represents the most stable conformation of *cis*-1,3-dimethylcyclohexane?



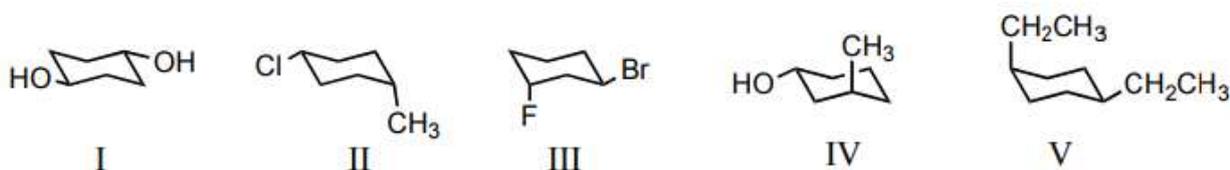
- a) I b) II c) III d) IV

9. Which conformation represents the most stable conformation of trans-1-bromo-4-methylcyclohexane?



- a) I b) II c) III d) IV

10. Which of the following will have the same energy after undergoing ring flip?



- a) I and II b) III c) IV d) V

11. Which of the following cyclohexane conformations has the MOST energy (is the LEAST stable)?

- a) Chair b) half chair c) boat d) twist boat

12. Which of the following molecules is *trans*-1, 2-dimethylcyclohexane?



13. How many gauche/diaxial interactions are present in *cis*-1,2-dimethylcyclohexane?

- a) **1 gauche and 2 diaxial interactions** b) 2 gauche and 1 diaxial interactions
c) 1 gauche and 1 diaxial interactions d) 2 gauche and 2 diaxial interactions

14. Which of the following is NOT a source of strain in “boat” cyclohexane?

- a) **angle strain** b) torsional strain c) flagpole or bowsprit interaction d) eclipsing strain

15. Which of the following correctly ranks the order of increasing ring strain per methylene group?

- a) cyclopropane < cyclobutane < cyclohexane < cyclopentane
b) **cyclohexane < cyclopentane < cyclobutane < cyclopropane**
c) cyclohexane < cyclobutane < cyclopentane < cyclopropane
d) cyclopentane < cyclopropane < cyclobutane < cyclohexane

Section – B

1. Define the term pseudorotation.
2. What are equatorial and axial bonds?
3. Draw the structure of cis and trans decalins.

- Define transoid and cisoid.
- Discuss the characteristics of the chair conformation.
- Illustrate the ring inversion of cyclohexane.
- Write a note on conformational free energy of monosubstituted cyclohexane.
- Draw the most stable conformation of trans- 1,2- dimethylcyclohexane.
- What is reflex effect?
- Draw the most stable conformation of cis- 1,2- dimethylcyclohexane.

Section – C

- Write a short note on torsion angles of junction and geometry of decalin.
- Discuss the structure of perhydrophenanthrenes.
- Explain the characteristics of Conformation of cyclohexane.
- Discuss the characteristics of Conformation of monosubstituted cyclohexane.
- Give a note on twist boat conformers and reflex effect for disubstituted cyclohexanes.

Section D

- Explain the Curtius Hammett principle.
- Discuss the conformation of monosubstituted cyclohexane.
- Explain the factors influencing disubstituted cyclohexane.
- Explain the conformation of alkanes.
- Discuss the fused bicycle system.
- Discuss the structure of 1,3- Dimethylcyclohexanes.

Unit III Steroids and Terpenoids

Section – A

- Steroids _____.
 a) **stimulate muscle growth** b) cause eyesight to improve
 c) increase intelligence d) increase fat
- Which of the following is classified as “steroid?”
 a) phospholipid b) glycerol c) wax **d) cholesterol**
- A very efficient inhibitor of steroid biosynthesis is
 a) **Aminoglutethimide** b) Aminoimidazole
 c) Aminoimidazolesuccinyl carboxamine d) Aminopterin
- In adrenal gland the cholesterol is stored
 a) Mostly in the free form **b) Mostly in esterified form**
 c) Large amount of free form and less amount of esterified form
 d) Equal amounts of free and esterified form
- The hormone required for uterine muscle contraction for child birth is
 a) Progesterone b) Estrogen **c) Oxytocin** d) Vasopressin
- Normal serum free testosterone in adult men varies between
 a) 1–5 ng/dl b) 6–9 ng/dl **c) 10–30 ng/dl** d) 50–100 ng/dl
- The serum estradiol level in women during 21–30 days of menstrual cycle is

- a) 10-20 pg/ml b) 22-66 pg/ml c) **73-149 pg/ml** d) 1000 pg/ml
8. Androgens are produced by
 a) Cells of sertoli **b) Leydig cells** c) Rete testis d) Efferent ductules
9. Stein-leventhal syndrome is due to overproduction of
 a) Estrogens **b) Androgens** c) Gastogens d) Ethinyl estradiol
10. Which among the following is not an terpenoid?
 a) camphor b) squalene c) chlosterol d) cembrene
11. The molecular formula of reserpine is
 a) **C₃₃H₄₀N₂O₉** b) C₄₀H₃₃N₂O₉ c) C₃₃H₄₀NO₉ d) C₃₃H₄₀N₂O

Section – B

1. How do you undergo Libermann- Burchard's reaction?
2. Draw the structure of cholesterol ring B.
3. What is ergosterol?
4. Write Annerand Miescher's synthesis.
5. How will you synthesis progesterone from cholesterol?
6. What is synthetic progesterone.
7. Write the physical action of testosterone.
8. Write the occurrence of androsterone.
9. What are terepenoids?
10. Exemplify any one Synthesis of Anderosterone.
11. State the physical action of testosterone.

Section C

1. Illustrate the position of the hydroxyl group and double bond in cholesterol.
2. Write any two synthesis of cholesterol.
3. Write the constitution of ergosterol.
4. Write the constitution of oestrone.
5. Write the constitution of testosterone.
6. Write the classification of Steroids.
7. Discuss the general methods for the elucidation of terpenes.
8. Give the structural determination of Zingiberene.
9. Discuss the structural elucidation of reserpine.
10. How will you elucidate the structure of α -pinene.
11. Outline the constitution of Estrone.

Section D

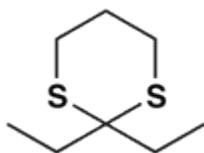
1. Write the constitution of Ergosterol.
2. How will you convert the Cholesterol into 5 α - and 5 β -Cholanic acid?
3. Discuss the structural determination of camphor.
4. Give a detailed account on the structural determination of squalene.
5. Write about the structural determination of morphine.

- What is quinine? Give its molecular formula and its structural elucidation.
- Write in detail the importance of papaverine and its structure along with the determination.
- Construct the structural elucidation of Cholesterol.
- Sketch any three synthesis of Progesterone.

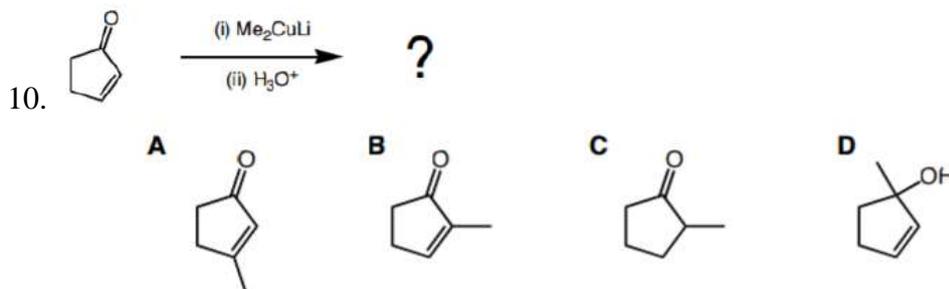
Unit IV Reagents in Organic Reactions

Section –A

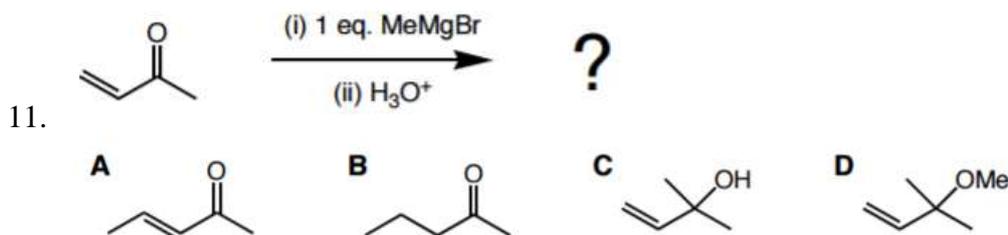
- Name the reagent which is used as dehydroxylation of alcohol
 a) DCC b) DDQ c) PCC d) NBS
- The organocopper reagent is called as
 a) Jones reagent **b) Gilman reagent** c) Johnson reagent d) Lemieux reagent
- Lithium dialkyl cuprate is _____ reagent
 a) Jones **b) Gilman's** c) Fetizon's d) Wilkinson
- Prevost hydroxylation involves the formation of
 a) Aldehyde b) ketone **c) trans-diols** d) alkenes
- Fetizon's reagent is
 a) $\text{OsO}_4/\text{NaIO}_4$ **b) $\text{Ag}_2\text{CO}_3/\text{celite}$** c) $\text{NaIO}_4/\text{KMnO}_4$ d) $\text{I}_2/\text{CH}_3\text{COOAg}$
- Which is the correct molecular formula of the following dithiane?



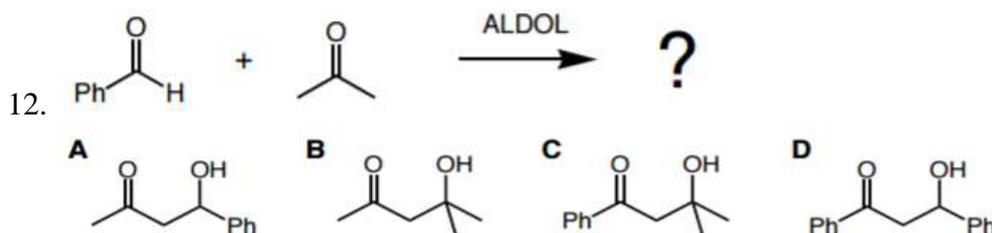
- $\text{C}_8\text{H}_{16}\text{S}_2$ b) $\text{C}_8\text{H}_{18}\text{S}_2$ c) $\text{C}_6\text{H}_{12}\text{S}_2$ d) $\text{C}_6\text{H}_{14}\text{S}_2$
- POCl_3 can be used in the presence of a base to
 a) Convert alcohol to an aldehyde b) Convert alcohol to chloroalkene
 c) Convert alcohol to an alkene d) Convert alcohol to phosphate derivative
 - Which of the following can be used to convert benzyl alcohol to benzoic acid?
 a) LiAlH_4 , ether **b. $\text{CrO}_3, \text{H}_3\text{O}^+$ (Jones' Reagent)** c. PCC, CH_2Cl_2 d. $\text{Hg}(\text{O}_2\text{CCH}_3)_2$
 - The catalyst used in the co-ordination polymerisation is _____
 a) **Ziegler-natta catalyst** b) Vanadium pent-oxide c) Nitric oxide d) Zeonar



Ans : C

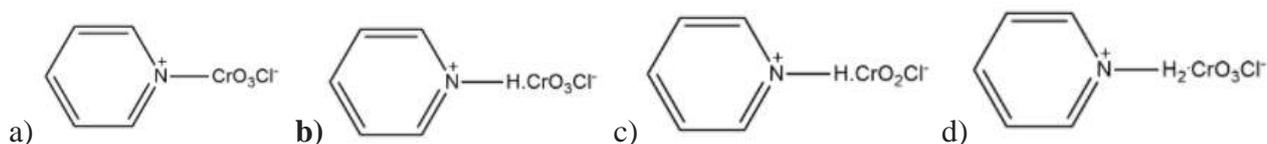


Ans : C



Ans : C

13. Which of the following is used in synthesis of peptides
 a) DDQ b) LDC c) **DCC** d) CrO₃- acetone
14. Prevost hydroxylation involves the formation of
 a) Aldehyde b) ketone c) **trans-diols** d) alkenes
15. Which of the following aromatic compounds undergo Friedel-Crafts alkylation with methyl chloride and aluminum chloride?
 a) Benzoic acid b) Nitrobenzene c) **Toluene** d) Aniline
16. Identify Pyridinium chlorochromate from the following:



17. Which one of the following is used as phase transfer catalyst?
 a) Primary Amine b) **Quaternary Ammonium Salts** c) Tertiary nitroalkane d) Tertiary Amine

Section – B

1. What is Fetizon's reagent?
2. How will you prepare a Wilkinson's catalyst?
3. Write the specific uses of PCC.
4. What is Jones reagent?
5. Give note on Lemieux reagent.
6. Write the preparation of DDQ.
7. Recognize the Scholl reaction with Example.
8. Describe the preparation of Gilman reagent.

Section – C

1. Write the synthetic application of Prevost and Woodward reactions.
2. What is DCC? Explain its synthetic uses.
3. What are the synthetic applications of DDQ in following reactions.
 a) Aromatisation b) allylic oxidation c) Oxidative cyclisation
4. Write the dehydrogenation mechanism of wilkinson catalyst.

- Explain synthetic applications of chromium trioxide reagents.
- Predict the reagents used for the following reaction mechanism Cinnamic acid to Methyl Cinnamate
- Predict the reagents used for the following reaction mechanism 2-phenylindane-1,3-dione to Tetrone
- Implement the preparation and application of Crown ethers.

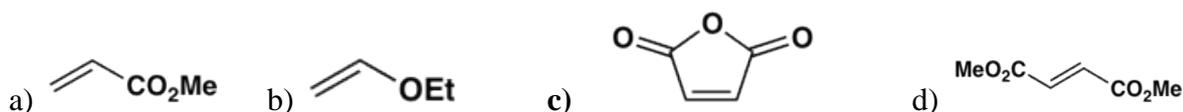
Section D

- Give the possible products of the following using Gilman's reagent.
 - alkyl halide to give hydrocarbon
 - epoxide to alcohol
 - α,β -unsaturated carbonyl compound
 - with acyl chlorides
- Write the synthetic applications of i) Fetizon's reagent ii) Biooxidant
- Explain in detail about Ziegler natta catalyst.
- Write down the synthetic uses of 1,3-dithiane.
- Predict the synthetic applications of i) Fetizon's reagent ii) DIBAL

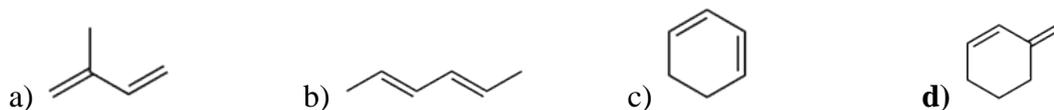
Unit V Pericyclic Reactions

Section – A

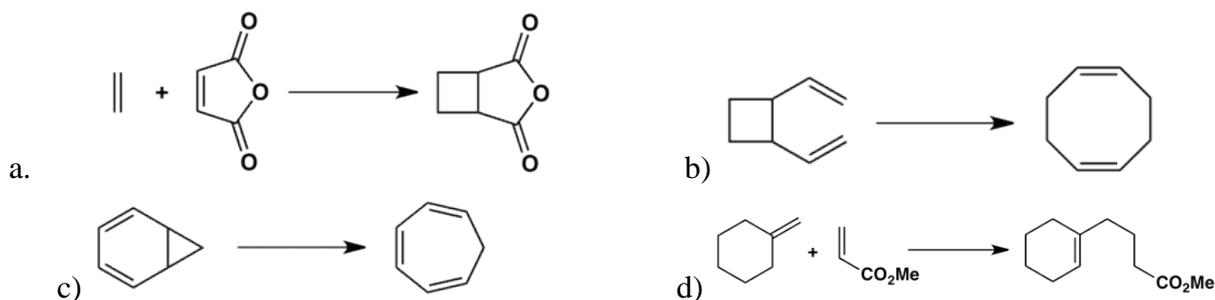
- Which of the following dienophiles is the most reactive with buta-1,3-diene?



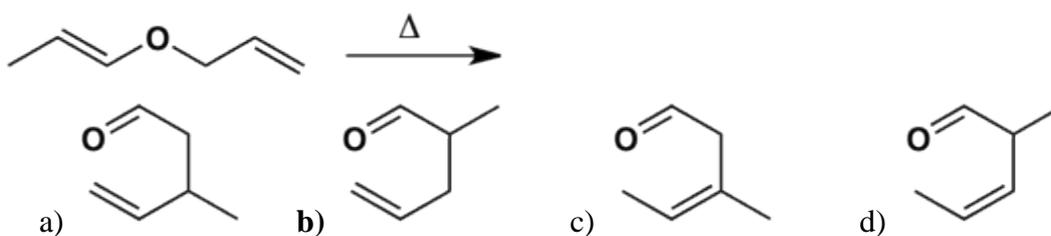
- Which of the following dienes cannot undergo Diels-Alder reactions?



- Which of the following reactions is **not** thermally allowed?

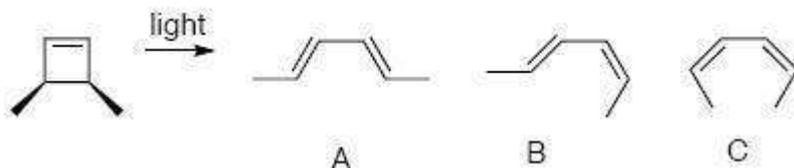


- Which of unsaturated aldehydes (a)-(d) is the sigmatropic rearrangement product obtained by heating the following ether?



- Which of the following reactions is classified as an electrocyclic reaction?

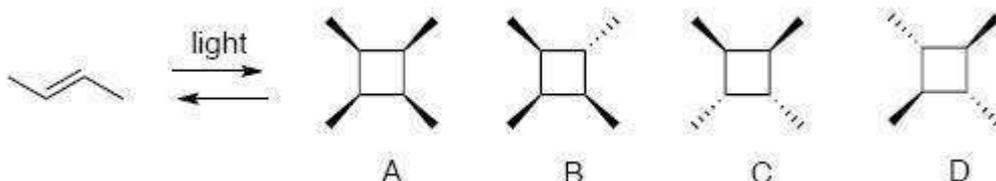
11. In the electrocyclic ring-opening reaction shown below, which answer best describes the product mixture?



- a) The product will consist primarily of A b) The product will consist primarily of B
 c) The product will consist primarily of C **d) A and C are both major products.**
12. Which image correctly represents the HOMO for 1,3-butadiene?



13. Photochemical reaction of *trans*-2-butene with itself will produce which of the following products?



- a. A and B **b) C and D** c) A and C d) B and D

14. Pericyclic reactions are concerted, unaffected by catalysts or solvents and have----- transition state.

- a) cyclic** b) acyclic c) inversion d) symmetry

Section – B

- Summarise the classification of pericyclic reactions.
- What are pericyclic reactions?
- Give the classification of pericyclic reactions.
- Define Woodward- Hoffmann selection rule for electrocyclic reaction.
- What is Diels Alder reaction?
- What are the preferences for cycloaddition reactions?
- Define Woodward- Hoffmann selection rule for cycloaddition reaction.
- Differentiate suprafacial and antarafacial symmetries.

Section – C

- Explain the terms HOMO and LUMO.

- Account for electrocyclic reactions of $4n\pi$ and $(4n+2)$ electron systems can be precisely explained with the help of FMO.
- Cycloaddition of unsymmetrically substituted diene and dienophile can in principle lead to regioisomers.
- Why cycloaddition with 1-substituted Butadiene yields 1,2-(ortho)adduct while 2-substituted Butadienes form 1,4-(para) adduct as the major products.
- Using FMO approach predicts whether a [1, 5] antarafacial sigmatropic thermally or photochemically allowed condition.
- Draw the π orbital diagrams for the ground state and the lowest energy excited state of 1, 3- butadiene and indicate the HOMO each.
- Explain Diels - Alder reaction.
- Explain the [1, 3] sigmatropic shift of hydrogen is thermally forbidden.
- S-cis dienes undergo Diels Alder reaction more readily- justify the statement.
- Give account on stereochemistry of photochemical and thermal cyclisation of 1,3-butadiene is different.

Section – D

- Construct the correlation diagram for conrotatory and disrotatory ring closure of $4n\pi$ electron system and draw the necessary conclusions.
- Construct the correlation diagram for conrotatory and disrotatory ring closure of $(4n+2)$ electron system and draw the necessary conclusions.
- What are sigmatropic rearrangements? State the Woodward- Hoffmann selection rules for such rearrangements.
- Construct the correlation diagram for cycloaddition reaction and predict whether it is thermally allowed or photochemically allowed condition.
- Explain the frontier molecular orbital method for analysing an electrocyclic reaction by taking one example.
- Construct the correlation diagram for [4+2] and [2+2] cycloaddition reaction and explain why it is thermally allowed and photochemically forbidden.
- Draw a correlation diagram for disrotatory conversion of butadiene to cyclobutene. Is the process allowed or forbidden? Explain.

Unit I Electrochemistry I**Section –A**

- The net charge of the ionic atmosphere is _____ in magnitude to that of the central ion.
a) Lesser b) Greater **c) Equal** d) Highly greater
- With increasing concentration, thickness of the ionic atmosphere
a) Decreases b) Increases c) Remains same d) Increases and then decreases
- The influence of an applied field on the speed of an ion is called
a) Steric effect **b) Relaxation effect** c) Polar effect d) Electrophoretic effect
- The slope of the plot of equivalent conductance with square root of concentration is
a) $A + B\Lambda_0$ b) $A - B\Lambda_0$ c) $A\Lambda_0 + B$ d) $A\Lambda_0 - B$
- For an ideal solution, the activity co-efficient is
a) Zero b) -1 c) Infinity **d) Unity**
- Plot of interfacial tension versus change in potential difference is known as
a) Conductometric curve b) Polarograph
c) Electrocapillary curve d) Monograph
- The influence of an applied field on the speed of ion is called as _____ effect.
a) Debye Falkenhagen b) Wein **c) Relaxation** d) Electrophoretic
- $(\partial r / \partial \nu)_{\text{const}} = -q_m$
a) Lippman equation b) Butler-Volmer equation
c) Tafel equation d) Gouy-Chapman equation

Section –B

- Define electrical double layer.
- What is ionic atmosphere?
- Write a brief note on electrode-electrolyte interface.
- What is Wein effect?
- Give Lippman equation.
- What is meant by electrocapillary phenomenon?
- What is asymmetric effect?
- Define electrophoretic effect.
- What is counter current effect?
- What is meant by interfacial tension?

Section –C

- Derive Lippman equation.
- How was Debye-Huckel limiting law modified? (or) Derive Debye-Huckel-Bronsted equation.
- Give an account on Wein effect.
- Write notes on Debye-Falkenhagen effect.

5. Derive Debye-Huckel-Bronsted equation.
6. Explain asymmetric and electrophoretic effects for strong electrolytes.
7. Discuss quantitative verification of Debye-Huckel limiting law.
8. Derive Debye-Huckel limiting law.
9. Explain Debye-Huckel-Onsager equation and its validity.

Section –D

1. Derive Debye-Huckel Theory for inter ionic attraction.
2. Derive Debye-Huckel-Onsager. How it verified?
3. Discuss about Debye-Huckel limiting law. How is it verified qualitatively and quantitatively?
4. Write notes on: i) Debye-Falkenhagen effect ii) Wien effect.
5. Discuss: i) Electrocapillary phenomenon ii) Electrode-electrolyte interface
iii) Electrical double layer

Unit II Electrochemistry II

Section –A

1. At zero current density, the over voltage of hydrogen is
a) Unity **b) Zero** c) remains constant d) Infinity
2. Resistance polarization is occurred by _____.
a) High resistivity b) Low resistivity c) High conductivity d) Low conductivity
3. When temperature decreases, over voltage _____.
a) Increases b) Decreases c) Remains constant d) Zero
4. Example of highly polarisable electrode is
a) Glass b) Hg c) Calomel **d) Ag**
5. During electrochemical corrosion in acidic environment causes
a) Oxygen evolution b) Oxygen adsorption c) Hydrogen evolution d) Hydrogen adsorption
6. The process of coating a thin layer of one metal on top of a different metal is known as
a) Electrodeposition b) Corrosion c) Metal selection d) Metal deterioration
7. Galvanic corrosion is otherwise called as
a) Crevice corrosion b) Filiform corrosion
c) Dissimilar metal corrosion d) Localised corrosion

Section –B

1. What is meant by polarization?
2. Define over potential.
3. Give the Butler-Volmer equation.
4. What are the significance of I_0 in Tafel equation?
5. What is diffusion over potential?
6. What is polarisable electrode?
7. What is non-polarisable electrode?
8. What is pourbaix diagram?
9. What is corrosion?

10. Explain Evan's diagram.

Section –C

1. Define polarization. Explain the different types of polarization.
2. Explain the concept of over potential.
3. Derive an expression for Tafel equation.
4. Explain Pourbaix diagram.
5. Discuss polarisable and non-polarisable electrodes.
6. Explain the different types of corrosion.
7. What is over potential? Explain the types of over potential.
8. What is corrosion? How is it happened?

Section –D

1. Derive Butler – Volmer equation and give its significance.
2. Derive Tafel equation. Write the significance of I_0 and transfer coefficient.
3. How do you derive Ilkovic equation from Fick's law of diffusion?
4. Explain Pourbaix and Evan's diagram.
5. Discuss the electrochemical mechanism in nervous system.

Unit III Irreversible Thermodynamics

Section – A

1. Entropy is a/an _____ property.
a) Intensive **b) Extensive** c) Colligative
2. All natural processes are
a) Reversible **b) Irreversible** c) Spontaneous d) Both b & c
3. In an irreversible process, there is a
a) Loss of heat b) No loss of heat **c) Gain of heat** d) No gain of heat
4. What is the relation between work obtained in an reversible and irreversible process?
a) $W_{rev} > W_{irr}$ b) $W_{rev} < W_{irr}$ c) $W_{rev} = W_{irr}$ d) It depends on change in temperature
5. Which of the following is an example of reversible process?
a) Wood to ashes b) Burning of matchstick c) Making roti from wheat flour
d) Frictionless to and fro motion
6. Irreversibility of a process may be due to
a) Lack of equilibrium during the process b) Involvement of dissipative effects
c) Both of the mentioned d) None of the mentioned
7. A heat transfer process approaches reversibility as the temperature difference between two bodies approaches
a) Infinity **b) Zero** c) -1 d) 1
8. A process will be reversible if it has
a) No dissipative effects b) Dissipative effects
c) Depends on the given conditions d) None of the mentioned

9. Irreversibility can be distinguished in how many types?
 a) 0 b) 1 c) **2** d) 3
10. Mass transfer is given by
 a) Newton's law **b) Fick's law** c) Fourier's law d) Ohm's law
11. The driving force for mass flux is
 a) Temperature gradient b) Potential gradient **c) Concentration gradient** d) Mass gradient
12. μ is the transfer coefficient for _____ flux.
 a) Mass b) Heat c) Electric current **d) Momentum**
13. According to Onsager's reciprocal relation, $J =$
 a) **LX** b) 2L c) L + X d) L - X
14. $dS =$
 a) **$d_e S + d_i S$** b) $d_e S - d_i S$ c) $d_e S \times d_i S$ d) $d_e S / d_i S$

Section – B

1. What is flux?
2. Write the phenomenological laws of irreversible thermodynamics.
3. State the principle of microscopic reversibility.
4. Give the Onsager's reciprocal relation.
5. What is electrokinetic effect?
6. What is Knudsen effect?
7. What is thermo-osmosis?
8. What is thermomechanical effect?

Section – C

1. List the various transport processes and write their phenomenological equations.
2. Derive the Onsager's reciprocal relations from the principle of microscopic reversibility.
3. Derive an expression for entropy production due to heat flow.
4. Discuss the transformation properties of fluxes and forces in a chemical reaction.
5. Define and discuss the four electrokinetic effects SP, EO, EOP and SC.
6. Discuss the applications of irreversible thermodynamics to biological systems.
7. Discuss the applications of irreversible thermodynamics for non-linear thermodynamics.

Section – D

1. Derive an expression for entropy production in chemical reactions.
2. Derive an expression for entropy production and entropy flow in an open system.
3. Verify the Onsager's reciprocal relations for a simple reversible reaction.
4. Use Onsager's reciprocal relations to study electrokinetic effects.
5. Discuss the applications of irreversible thermodynamics to biological systems.

Unit IV Nuclear Magnetic Resonance Spectroscopy

Section –A

1. Which of the molecule have resultant nuclear spin?

- a) C^{12} b) C^{13} c) N^{14} d) O^{16}
2. Which of the following molecule has no magnetic moment
 a) Si^{28} b) N^{15} c) F^{19} d) P^{31}
3. The actual value of nuclear spin depends on
 a) Mass number b) Atomic number c) **Both (a) and (b)** d) Shielding effect
4. The nuclear spins of 1H and 2H are _____ respectively.
 a) $\frac{1}{2}$ and **1** b) $\frac{1}{2}$ and $\frac{1}{2}$ c) 1 and $\frac{1}{2}$ d) $\frac{1}{2}$ and 0
5. The region for Electromagnetic spectrum employed in ESR spectroscopy is
 a) Radiowave b) Microwave c) **IR** d) Visible
6. The standard reference used in NMR study is
 a) Water b) Ethanol c) Acetone d) **TMS**
7. The spacing of adjacent lines in the multiplets of NMR spectrum is called
 a) **Coupling constant** b) g factor c) Chemical shift d) Quantum number
8. The enhancement in intensity due to dipole-dipole relaxation mechanism is
 a) Relaxation effect b) Double resonance c) **Overhauser effect** d) Spin decoupling
9. Which of the factor does not influence the chemical shift?
 a) Inductive effect b) Anisotropic effect c) Hydrogen bonding d) **Mesomeric effect**
10. Which of the following system has hyperfine splitting with $I=1$?
 a) $^1H^1$ b) $^1D^2$ c) N^{15} d) Both b & c

Section –B

1. What is Nuclear magnetic resonance?
2. What is coupling constant?
3. What is chemical shift?
4. How does solvent affect the chemical shift in NMR spectra?
5. When does the coupling constant J_{AB} in NMR become negative? Explain with an example.
6. What is double resonance?

Section –C

1. Discuss the theory of PMR spectra.
2. Illustrate the factors which affect the chemical shift.
3. Define coupling constant. Explain in what circumstances it is positive and negative.
4. Explain the theory of spin-spin splitting.
5. What is spin-spin splitting? Discuss the causes of spin-spin splitting.
6. What are the factors affecting coupling constant? Explain.
7. Analyse how hydrogen bonding affect the chemical shift in NMR spectra.

Section –D

1. Define chemical shift and discuss the factors affecting chemical shift.
2. Explain about the NMR for simple AX type molecule.
3. Explain about the NMR for simple AMX type molecule.

4. What is relaxation process? Discuss the types of relaxation process.

5. Discuss the double resonance technique in NMR.

UNIT V Electronic Spectroscopy and Photoelectron Spectroscopy

1. Born-Oppenheimer approximation is used in _____ spectra of diatomic molecule.

- a) Vibrational b) **Electronic** c) Raman d) Infra-red

2. Vibrational changes will produce a _____ structure on the spectra of electronic transitions.

- a) **Coarse** b) Fine c) Hyperfine d) Same

3. Rotational changes will produce a _____ structure on the spectra of electronic transitions.

- a) Coarse b) **Fine** c) Hyperfine d) Same

4. _____ molecules show no vibration or rotation but gives an electronic spectrum.

- a) Heteronuclear b) **Homonuclear** c) Absorption d) Linear

5. There is no selection rule for v when molecule undergoes _____ transition.

- a) Vibrational b) Rotational c) **Electronic** d) Fine

6. _____ spectrum is considered from the electronic ground state.

- a) Vibrational b) Rotational c) Electronic d) **Absorption**

7. (0,0), (1,0), (2,0) are sets of transition called a _____ under low resolution.

- a) **Band** b) Coarse c) Fine d) Bond

8. _____ spectrum of diatomic molecule will be more complicated.

- a) Vibrational b) Rotational c) Electronic d) **Absorption**

9. _____ principle states that an electronic transition takes place so rapidly that a vibrating molecule does not change its inter-nuclear distance.

- a) **Franck-Condon** b) Maxwell's c) Debye's d) Raman's

10. Energy fixed at $r=0$ and other is allowed to oscillate between the limits of the curve is known as the _____ curve.

- a) Parabolic b) Ellipsoid c) **Morse** d) Parallel

11. If $B' > B''$, then band head occurs at ----- branch.

- a) P b) Q c) **R** d) S

12. The selection rule for rotational fine structure is

- a) $\Delta J=0$ b) $\Delta J=\pm 1$ c) **Both (a) & (b)** d) None

13. PES technique is based on _____

- a) **Photo electric effect** b) Compton effect c) Stark effect d) Chemiluminescence

14. The source used for UVPES is

- a) $MgK\alpha$ b) $AlK\alpha$ c) Na lamp d) He lamp

15. The Binding energy is

- a) $B.E = h\nu + K.E$ b) **$B.E = h\nu - K.E$** c) $B.E = K.E + h\nu$ d) $B.E = K.E - h\nu$

Section B

1. What is dissociation energy?

2. Define dissociation products.

3. What is predissociation?

4. What is Fortrat parabola?
5. State Franck – Condon principle.
6. What is band head?
7. Give the selection rule for rotational fine structure of Electronic –Vibration transitions.
8. Difference between sequences and progressions.
9. Give the principle of photo electron spectroscopy.
10. Write types of PES.
11. Define ESCA.
12. What are Cooper electrons?

Section C

1. Discuss Born-Oppenheimer approximation.
2. Explain the following:
 - i) Band progression
 - ii) Sequence
3. With a neat diagram explain the Fortrat diagram.
4. Compare progression and sequence.
5. Give a detailed account of the intensity of vibration electronic spectra based on the Franck-Condon principle.
5. Explain the principle of photo electron spectroscopy.

Section D

1. Explain in detail about dissociation energy and dissociation products.
2. Discuss in detail about rotational fine structure of electronic band.
3. Describe in detail about Frank-Condon principle.
4. Photoelectron spectroscopy of core electrons has become a very powerful technique for structure determination. Explain.
5. Write a note on the principle and theory of photoelectron spectroscopy.
6. What is ESCA? Give the applications of ESCA.

UNIT I Research methodology - I

Section A

Choose the correct answer:

- The total body of the chemical knowledge is called
a) Abstract b) Paper c) **Literature** d) Journal
- A new method for making known compound is
a) **Patent** b) Journal c) Abstract d) Paper
- Abstract comes under
a) Primary source b) **Secondary source** c) Journal d) Paper
- Descriptive research is otherwise called as
a) **Analytical** b) Theoretical c) Fundamental d) Applied
- The sources which are used to refer the primary sources are called
a) Journals b) Literatures c) **Secondary sources** d) Abstracts
- _____ gives the summary of the paper with other details.
a) Patent b) Journal c) **Abstract** d) Paper
- A brief paper published without a summary and abstract
a) Paper b) Communications c) **Notes** d) Patent
- Most of the journals published articles in _____ language.
a) Russian b) German c) French d) **English**
- The chemical abstracts are published _____ by the American Chemical Society.
a) Monthly b) **Weekly** c) Yearly d) Half yearly
- Research is
a) Searching again and again b) Finding solution to any problem
c) **Working in a scientific way to search for truth of any problem** d) None
- Which of the following is the first step in starting the research process?
a) Searching sources of information to locate problem b) Survey of related literature
c) **Identification of problem** d) Searching for solutions to the problem
- The first page of research report is
a) Acknowledgement b) Index page c) **Title page** d) Bibliography
- Conference proceedings are considered as.....documents.
a) Conventional b) **Primary** c) Secondary d) Tertiary
- An example of scientific knowledge is
a) Authority of the prophet or great men b) social traditions and customs
c) Religious scriptures d) **laboratory and field experiments**
- Which technique is generally followed when the population is finite?
a) Area Sampling Technique b) Purposive Sampling Technique
c) **Systematic Sampling Technique** d) None
- The main purpose of research is education is to
a) Help in the personal growth of an individual

- b) Increase job prospects of an individual
c) Help the candidate become an eminent educationist
 d) Increase social status of an individual
17. Information acquired by experience or experimentation is called as
 a) empirical b) scientific c) facts d) scientific evidence
18. All research process starts with
 a) Hypothesis b) Experiments to test hypothesis **c) Observation** d) All of these
19. While writing research report a researcher
 a) Must not use the numerical figures in numbers in the beginning of sentences
 b) Must arrange it in logical, topical and chronological order
 c) Must compare his results with those of the other studies
d) All the above
20. Which of the following is not true about journals?
 a) They are distributed through digital methods **b) They are always free of cost**
 b) They also have editors or editorial boards d) They are publications of serial nature
21. ----- is a systematic way to solve a research problem
a) Research method **b) Research methodology** c) Both (a) & (b) d) None
22. -----research involves surveys and studies that aim to identify the facts.
 a) Analytical b) Applied c) Fundamental **d) Descriptive**
23. All network such as new preparation method, new compound, new technique will be published first in -----
a) Journals b) Patents c) Abstract d) Monograph
24. Which of the following gives the important historical notes, occurrence, formation, preparation, properties and technical application of a compound.
 a) Abstract b) Monograph **c) Beilstein** d) Treatise
25. Chemical Abstract is published by -----
 a) Chemical Abstract Service **b) American Chemical Society**
 c) Chapman and Hall d) McGaw -Hill

Section B

1. Mention the difference between papers and communications.
2. Define research methodology.
3. What are patents?
4. What are abstracts?
5. Define research method.
6. Give the objective of research.
7. Explain the types of research.
8. List down the various steps involved in research.
9. What do you mean actual investigation?
10. What are the contents present in the preliminaries?
11. Brief note on certificate.
12. Write the classification of Index.

13. Write note on reference.
14. What is analytical research?
15. Write a difference between paper and notes.
16. What are the basic characteristics of good scientific report?
17. Define Research Methodology.

Section C

1. Write the importance of literature survey.
2. Describe how an abstract is useful in literature survey of research work.
3. Selection of research problem is most important in research. Explain.
4. What is research methodology? Discuss its importance and various steps involved in it.
5. How do you select a research problem?
6. Write a brief note on patents.
7. How the actual investigation and analysis of experimental results can be done?
8. Write a note on identification of research problem.
9. Write a brief note on Chemical Abstracts.
10. What is primary sources of literature? Explain briefly about the patents.

Section D

1. List down the sources from which a research topic may be identified.
2. What are primary source of literature? Write detailed notes on literature survey.
3. How to write a research paper for publication in a journal?
4. Explain in detail the literature survey.
5. Write a detail note on secondary source of literature.
6. How will you write dissertation?

Unit II Thermo and Electro Analytical Methods

Section A

1. In -----TGA technique the sample is heated to a constant weight at each of increasing temperatures.

a) Isothermal	b) Static	c) Quasistatic	d) Dynamic
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2. The melting of microcrystals is due to ----- reaction.

a) Physical Endothermic	b) Physical Exothermic
c) Chemical Endothermic	d) Chemical Exothermic
3. Which of the following is used for determining levels of crystallinity?

a) TGA	b) DTA	c) DSC	d) GC-MS
--------	--------	---------------	----------
4. The shape of the voltammogram depends on the

a) Nature of driving force	b) Mass Transfer	c) Boh (a) & (b)	d)None
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5. For oxidizable materials, the deposition potential should be ----- with respect to the half-wave potential.

a) Positive	b) Negative	c) Neutral	d) None
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6. In a ----- stripping method, the working electrode behaves as an anode during the deposition step and as a cathode during stripping.
 a) Anodic **b) Cathodic** c) Adsorptive d) None
7. -----is most often used for detection of carbohydrates after an anion exchange separation.
 a) Amperostatic Coulometry b) Potentiostatic Coulometry
 c) Single potential Amperometry **d) Pulsed Amperometry**
8. Which of the following is used as reference electrode?
 a) SCE b) (Ag/AgCl) Electrode **c) Both a & b** d) Platinum Electrode
9. Conditioning is not required with ----- electrode in stripping voltammetry.
a) HMDE b) TFME c) SCE d) Both a & b

Section- B

1. Differentiate potentiostatic and amperostatic coulometry.
2. What is switching potential?
3. Differentiate cathodic and anodic peak potential.
4. Explain AdSV.
5. Differentiate DSC and DTA.
6. What is CV?
7. What are the types of coulometry?
8. Explain the term TGA.
9. Differentiate cathodic and anodic stripping voltammetry.

Section- C

1. Write a note on principle of TGA.
2. Explain in brief on instrumentation and working of TGA.
3. Write a note on DTA applications.
4. What is DSC? Explain its principle.
5. What are the applications of CV?
6. Explain the operation principle involved in CV.
7. Write a note on potentiostatic coulometry.
8. Explain the principle and the types of amperometry.
9. What are the steps involved in stripping voltammetry?

Section- D

1. Explain in detail on principle, instrumentation and application of DTA.
2. What is TGA? Explain its principle and its instrumentation.
3. Describe the stripping voltammetry with its principle and its applications.
4. Demonstrate the instrumentation of CV with its operation.
5. Explain the instrumentation of DSC.
6. Write a note on instrumentation and application of amperometry.

Unit III Spectroscopic & Surface Techniques

Section – A

- The width of atomic spectral lines
 - Broad
 - Narrow
 - Finite**
 - Infinite
- SEM process starts with
 - Electron gun**
 - Coil
 - Lenses
 - X-rays
- The source of EDXA
 - α -rays
 - β -rays
 - γ -rays
 - X-ray**
- Atomic spectra is an example of
 - Line Spectra**
 - Continuous Spectra
 - Band Spectra
 - both a and b
- Absorbed wavelengths in atomic absorption spectrum appear as
 - Dark Background
 - Dark Lines**
 - Light Background
 - Light Lines
- Lines which appear in absorption and emission spectrum are
 - Same**
 - Different
 - Very Different
 - Far A part
- Which of the microscope uses electrons to provide a three dimensional view of the surface of the object?
 - Light Microscope
 - Transmission Electron Microscope
 - Scanning Electron Microscope**
 - Scanning Probe Microscope
- Which type of microscope has a useful magnification limit of about 1,000X?
 - Light Microscope**
 - Transmission Electron Microscope
 - Scanning Electron Microscope
 - Scanning Probe Microscope
- TEM refers to a photomicrograph taken by a _____.
 - Triple Emission Microscope
 - Transmission Electron Microscope**
 - Scanning Electron Microscope
 - Telephoto Electroplating Microscope
- Electrons of scanning electron microscope are reflected through
 - Glass Funnel
 - Specimen
 - Metal Coated Surfaces**
 - Vacuum Chamber
- lamps are useful for the alkali metals, zinc, cadmium and mercury.
 - Arc lamp**
 - Hollow Cathode lamp
 - Electrodeless discharge lamp
 - None
- The pressure maintained in the hollow cathode lamp is.
 - 1 to 3 torr
 - 1 to 5 torr**
 - 5 to 10 torr
 - 1 to 10 torr
- The function of ----- is to select a given absorbing line from spectral lines emitted from the hollow cathode.
 - Monochromator**
 - Amplifier
 - Radiator
 - Nebulizer
- Which of the following metals are commonly analyzed by hydride analysis?
 - Cd
 - Cu
 - Te**
 - W
- wavelength for Pb is used in Atomic Absorption spectrophotometer
 - 2833 Å**
 - 2388 Å
 - 2320 Å
 - 3281 Å

Section – B

- What are the types of atomic spectroscopy?
- Define Atomization.

3. Write any two differences between atomic emission and atomic absorption spectroscopy.
4. Define Debye-Scherrer formula.
5. What are the source of TEM and SEM?
6. What are the function of Ne or He used in hallow cathode lamp?
7. How atomic absorption spectroscopy distinct advantages over flame emission spectroscopy?

Section C

1. How will you calculate the particle size of nanoparticles from XRD spectra?
2. Write the applications of atomic emission spectroscopy.
3. How will you calculate the particle size of nanoparticles?
4. Write a note on Debye-Scherrer formula.
5. Write the principle of XRD analysis.

Section D

1. Explain the principle, instrumentation and data interpretation of SEM analysis.
2. Write a detailed note on atomic emission spectroscopy.
3. Write the theory, instrumentation and applications of TEM.
4. Illustrate the principle, instrumentation of EDAX.
5. Discuss the principle, instrumentation of XRD analysis.

UNIT IV Data Analysis

Section A

1. Determinate error can be evaluated
 - a) Experimentally
 - b) Theoretically
 - c) **Both a & b**
 - d) Can not be evaluated
2. How many significant figures are present in the number 0.0075?
 - a) 4
 - b) 5
 - c) 6
 - d) **2**
3. Which type of error effects to the same degree the results of a series of determinations?
 - a) **Determinate**
 - b) Indeterminate
 - c) Accidental
 - d) Erratic
4. Which of the errors does not fall under the category of constant error?
 - a) Operational error
 - b) Reagent error
 - c) **Erratic error**
 - d) Proportional
5. The closeness of data to the other data that have been obtained in exactly the same way is
 - a) Accuracy
 - b) **Precision**
 - c) Absolute error
 - d) Relative error
6. The closeness of a result to its true or accepted value is
 - a) **Accuracy**
 - b) Precision
 - c) Mean
 - d) Median
7. Random or indeterminate errors are the errors in the measurement which affects
 - a) Precision
 - b) **Accuracy**
 - c) Both a & b
 - d) None
8. Method error is due to
 - a) Slowness of reactions
 - b) Impurities in reagents
 - c) Instability of reactants
 - d) **All the above**
9. If the $Q_{\text{exp}} > Q_{\text{critical}}$ then the suspect result can be
 - a) Retained
 - b) **Rejected**
 - c) Both a & b
 - d) None

10. The absolute error expressed as a percentage of true value is known as ----- error.
 a) Additive **b) Relative** c) Method d) Random
11. Which of the following is also known as indeterminate error.
 a) Random b) Accidental c) Statistical **d) All the above**
12. Find the median value in a data set of {3, 13, 2, 34, 11, 17, 27, 47}
 a) 13 **b) 15** c) 17 d) 19
13. ----- is the study of nature of the relationship in the variables.
 a) **Regression Analysis** b) Correlation analysis c) Both (a) & (b) d) None
14. Errors which can be avoided or whose magnitude can be determined is known as ----- error.
 a) Indeterminant **b) Determinant** c) Random d) Statistical
15. The significant figures for 1.30×10^3 is -----
 a) 2 **b) 3** c) 4 d) 6
16. The ----- error is independent of the size of the sample and concentration of the substance being analyzed.
 a) Proportional b) Additive **c) Constant** d) Operational
17. ----- method is capable of providing highest accuracy among all methods for determining the analyte.
 a) **Definitive** b) Absolute c) Comparative d) Reference

Section B

1. Define absolute error.
2. What is relative error?
3. What is meant by determinate error?
4. What is indeterminate error?
5. What is precision?
6. What is accuracy?
7. What is standard deviation?
8. Mention the difference between precision and accuracy.
9. Differentiate mean and median.
10. What is Q- test?
11. What is t- test?
12. What is f- test?
13. Explain is presentation of data?
14. Define variance ratio test. Compare F-value with critical value of F.
15. When will you reject the results?
16. What are the function of Ne or He used in hallow cathode lamp?
17. What is meant by correlation analysis?

Section C

1. What is precision? How is it expressed?
2. What is accuracy? How is it expressed?
3. Write note on significant figures.

4. How would you present the data?
5. In which condition the observed results should be rejected?
6. Explain the analysis of variance.
7. Write the comparison of accuracy and precision.
8. How the errors can be avoided or minimized?

Section D

1. What is meant by error? What types of errors are generally involved in analytical work?
2. What is test of significance? Explain the test of significance of mean and standard deviation.
3. Explain the following
 - (i) “t” test (ii) ‘f’ test (iii) “chi” square test.
4. How will you determine the accuracy of methods?
5. Explain i) linear regression ii) Correlation.

UNIT V Research and Teaching Methodology

Section – A

1. The objective of teaching is
 - a) Modifying Students behaviour b) Fun c) Open education to all **d) Both a and c**
2. The method of teaching which involves presentation by the instructor to students with use of instructional aids is
 - a) Discovery method b) Inquiry method c) Group Discussion Method **d) Lecture Method**
3. The evaluation activities are part of
 - a) Post teaching phase** b) Pre-teaching activities c) Interactive Phase d) Both a & b
4. Which is not a characteristic of learning?
 - a) Modification of behavior is learning
 - b) Learning is always positive**
 - c) Learning is a continuous process
 - d) Learning is a process of growth and problem solving
5. Authoritarian level teaching is _____
 - a) Child-centered b) Experience-based c) Headmaster-centered **d) Teacher-centered**
6. Which is not an Activity of Pre Active phase?
 - a) Determining goals or Objectives b) Content selection
 - c) Instructional method **d) Starting teaching**
7. What are required for good teaching?
 - a) Diagnosis b) Remedy c) Direction & Feedback **d) All of these**
8. Democratic Teaching means _____
 - a) Whatever a teacher teaches according to his own will, the pupil’s will have to accept.
 - b) An interactive process, involves classroom talk which takes place between teacher and pupil.**
 - c) A process which requires memory & understanding levels and works for highly thoughtful Activity

d) None of these

9. Which one of the following is best suited for emotional development of children?

a) **democratic classroom environment**

b) no involvement of the teachers as it is the task of the parents

c) controlled classroom environment

d) authoritarian classroom environment

10. Which of the following is not an attribute of cognition?

a) it is a mental process involved in gaining knowledge and comprehension

b) thinking, knowing, remembering, judging and problem-solving are the elements of cognition

c) cognition is the higher-level function of brain that includes imagination and perception

d) **cognition is an integral part of learning though not necessary for children in the earlier stages**

11. Which of the given combinations, in terms of instincts-emotion, is correct?

a)fight-disgust **b) curiosity-wonder** c)self-assertion-subjection d)appeal-lust

12. Which of the following is not a type of evaluation?

a) norms b) formative c) summative d) continuous and comprehensive

13. To make assessment a 'useful and interesting' process, one should be careful about

a) making comparisons between different students

b) labelling students as intelligent or average learners

c) using a variety of ways to collect information about the student's learning across the scholastic and co-scholastic boundaries

d) using technical language to give feedback

14. Continuous and comprehensive evaluation emphasises

a) redundancy of the board examination

b) continuous testing on a comprehensive scale to ensure learning

c) how learning can be observed, recorded and improved upon

d) fine-tuning of tests with the teaching

15. Which one of the following is not a suitable formative assessment task?

a) open-ended questions b) project c) observation **d) ranking the students**

16. Which of the following statements is true?

a) evaluation is a component of measurement

b) evaluation is an extension of measurement

c) evaluation is a term used interchangeably with measurement

d) evaluation is completely different from measurement

17. Formative assessment may be a

a) pre-test b) post-test **c) both 1 and 2** d) neither 1 nor 2

18. Which of the following statements is not true about Continuous and Comprehensive Evaluation?

a) it is a school based evaluation b) it reduces stress among learners

c) it uses grades instead of marks **d) it increases the burden on teachers**

19. Which of the following is not a part of the triangle of evaluation?
a) educational objectives b) evaluation c) **teaching experiences** d) learning experiences
20. ----- allows the teacher to arrange the pictures and charts systematically according to the topics.
a) **PowerPoint** b) Chart c) Assessment d) None of the above

Section – B

1. What is meant by teaching methodology?
2. List out the various phases of teaching.
3. What is an intermediate phase in teaching?
4. What is the difference between post and pre-teaching phase?
5. What are the basic advantage of lecture method?
6. What is documentation?
7. What are the advantages of discussion method?
8. Define later adolescence.
9. Define cognitive development.
10. What is inquiry method?
11. What is problem solving method? Give example.

Section – C

1. Write few applications of ICT in teaching.
2. Describe the principle of project method.
3. Discuss the methods of evaluation
4. Give a note on social development through education.
5. Discuss in brief the later adolescence problem.
6. Discuss the teaching methodology of modern education.
7. Write the disadvantage of inquiry method.
8. Discuss the impact of emotional development during adolescence.
9. What is evaluation? Explain its methods with the example.

Section – D

1. Discuss the advantage of project method as teaching methodology.
2. Explain the different phases of teaching.
3. How the discovery method is helpful for the students.
4. Discuss the principle of problem-solving method.
5. What is discussion method? Discuss its advantage and disadvantage.
6. Discuss cognitive development in later adolescences.
7. Discuss the merits and demerits of seminar method.
8. Write a detailed account on formative and summative evaluation.
9. Explain the integration of ICT in teaching.

St. Mary's College (Autonomous)

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Thoothukudi



PG Department of Chemistry

Semester IV

QUESTION BANK

2021 - 2023

Unit I Bioinorganic Chemistry I

Section – A

Choose the Correct Answer:-

- protein is used for respiration.
a) Rubidoxins b) Ferridoxins c) **Blue Copper Proteins** d) None
- The biological functions of the myoglobin is -----.
a) **O₂ storage** b) O₂transport c) electron carrier d) none
- Which among the following is electron transfer protein
a) Rubidoxins b) Ferridoxins c) **Both a) & b)** d) None
- The primary product of photo system I is -----.
a) **Reduced Carbon** b) Oxidised Carbon c) Energy d) Carbohydrate
- The reduction of nitrogen to ammonia, carried out by the enzyme nitrogenase needs
a) 2 electrons b) 4 electrons c) 6 electrons d) **8 electrons**
- The blue copper proteins are found in -----.
a) shells b) bacteria c) rhizobium d) **cyano bacteria**
- In photosynthetic systems the redox metalloproteins involved in electron transfer are cytochrome (cyt, b), cytochrome bf complex (cyt bf) and plastocyanin (PC). The pathway of electron flow is
a) PC → cyt b → cyt bf b) cyt bf → cyt b → PC
c) **cyt b → cyt bf → PC** d) PC → cyt bf → cyt b
- Under physiological condition, oxygen is binding to deoxyhemoglobin and deoxymyoglobin, the binding curve and its pH dependence, respectively, are
a) **Sigmoidal and pH dependent, Hyperbolic and pH independent**
b) Hyperbolic and pH independent sigmoidal and pH dependent
c) Sigmoidal and pH independent;
d) Hyperbolic and pH dependent; sigmoidal and pH independent
- For the metalloprotein hemerythrin, the statement that is NOT TRUE is
a) there are two iron centres per active site.
b) **both iron centres are hexacoordinated in the active state.**
c) one iron is hexacoordinated while the other is penta coordinated in the active state.
d) it is found in marine invertebrates

10. Correct combination of number and size of rings present in a metal ion-porphine complex (including metal ion bearing chelate rings) is

- a) **four 5-membered and four 6-membered** b) two 5-membered and six 6-membered
c) six 5-membered and two 6-membered d) five 5-membered and three 6-membered

Section – B

1. Give the overall reaction of photosynthesis.
2. Draw the structure of Hemoglobin
3. Sketch the structure of Myoglobin.
4. What are metalloporphyrins?
5. Name some electron transfer Proteins.
6. Differentiate rubrioxins and ferridoxine.
7. What is blue copper protein
8. What is energy sources of life?
9. What are the three redox systems in bioinorganic chemistry?

Section – C

1. Argue how the photosynthesis happens in chlorophyll by its mechanism?
2. Write in detail about structure and functions of blue copper proteins.
3. Explain the interaction between heme and dioxygen.
4. Explain Non Photosynthetic processes.
5. Sketch the structure and functions of myoglobin.
6. Explain the oxygen binding in myoglobin.
7. Demonstrate structure and functions of Rubridoxin.
8. Sketch structure and explain the functions of different types of Ferridoxin.

Section – D

1. Write in detail about structure and functions of Rubridoxin and Ferridoxin.
2. Explain in detail about Photosynthesis PS-I and PS-II.
3. Explain in detail about O₂ binding properties of Hemoglobin.
4. Discuss in detailed about the structure and function of cytochrome
5. Compare structure and functions of myoglobin with hemoglobin.

Unit II Bioinorganic Chemistry II

Section – A

- Superoxide dismutase contains the metal ions
a) Zn(II) & Ni (II) **b) Cu (II) & Zn(II)** c) Ni(II) & Co(II) d) Cu(II) & Fe(II)
- Which among the following is storage protein?
a) **Ferritin** b) Transferrin c) Siderophore d) SOD
- Carbonic anhydrase serves as catalyst for hydration – dehydration equilibrium of ____
a) **CO₂** b) H₂S c) C₆H₁₂O₆ d) Acid
- Carboxy peptidase contains _____ ions.
a) Copper **b) Zinc** c) Cobalt d) Magnesium
- The porphyrin rings consists of _____ system.
a) Pyridine **b) Pyrrole** c) Purine d) Pyrimidine
- Among the following enzymes, which do not have zinc as a central metal atom?
a) Carboxy peptidase b) Carbonic anhydrase c) Alcohol dehydrogenase **d) Peroxidase**
- The complex having magnesium as a central metal atom is _____
a) Vitamin B₁₂ **b) Chlorophyll** c) Cytochrome d) Vitamin B₆
- is the pancreatic enzyme.
a) **Carboxy peptidase** b) Carbonic anhydrase c) Superoxide dismutase d) Xanthane oxidase
- Among the following enzymes, which have Molybdenum as a central metal atom
a) Carboxy peptidase b) Carbonic anhydrase c) Superoxide dismutase **d) Xanthane oxidase**
- The drug ----- is used for treating alcoholism.
a) Allopurinol **b) Antabuse** c) Anistreplase d) Urokinase
- The drug ----- is used to treat gout.
a) **Allopurinol** b) Antabuse c) Anistreplase d) Urokinase

Section – B

- Name the metals present in alcohol dehydrogenase?
- What is Metalloenzymes?
- What is the Active site in carboxy peptidase A? Mention its role.
- Write down the structural features of Cu-Zn SOD.
- Name some energy transfer and Iron containing proteins.
- Define Invitro Nitrogen fixation.
- What is meant by Invivo Nitrogen fixation?

8. Differentiate *invivo* and *invitro* nitrogen fixation.
9. Name some iron transport and storage proteins.
10. What is hemosiderin?
11. Differentiate xanthane oxidase and aldehyde oxidase.

Section – C

1. Explain the structure and function of carbonic anhydrase.
2. Give an detailed account on structural features of superoxide dismutase.
3. Explain the structure and function of Aldehyde oxidase.
4. Explain about Iron storage protein (Ferritin).
5. Justify siderophores are iron transfer protein and classify them based on Fe(III) binding groups and molecular structure.
6. Explain the role of metallothionines in toxicity of metals.
7. Explain the inhibition and poisoning of enzymes illustrated by xanthane oxidase.

Section – D

1. Sketch the structure and interpret the function of Carboxypeptidase A.
2. Explain the structure and function of Xanthine oxidase.
3. Compare the *Invivo* and *Invitro* Nitrogen Fixation reaction.
4. Discuss about Iron Transport Proteins Siderophores and Transferrin.
5. Demonstrate the role of Ferritin and Hemosiderin.

Unit III Nuclear Chemistry

Section - A

1. Geiger-Muller counter uses the principle that radioactive rays-----
 - a) **ionize the gaseous molecule**
 - b) cause condensation of water vapour
 - c) cause luminescence on a ZnS screen
 - d) none of the above
2. Alpha particle is the nucleus of
 - a) hydrogen
 - b) helium**
 - c) deuterium
 - d) tritium
3. The instrument used in the measurement of radioactivity is
 - a) Cyclotron
 - b) G.M.counter**
 - c) Nuclear reactor
 - d) Mass spectrograph
4. Radioactivity is due to
 - a) stable electronic configuration
 - b) stable nucleus
 - c) unstable electronic configuration
 - d) unstable nucleus**

Section - B

1. Define stellar energy.
2. What is radioactive decay?
3. Define Nuclear reaction. List out the types of nuclear reaction.
4. What is nuclear fission?
5. Discuss about nuclear fusion.
6. Write notes on fission product.
7. Which principle involved in nuclear reactor? Explain.
8. What is meant by thermonuclear reaction?
9. Define neutron activation analysis.
10. How to dispose the high level nuclear waste?
11. Discuss the cross section of reaction.
12. What is spallation reaction? Give example.
13. What is a use of moderator in nuclear power plant? Give example.
14. Differentiate photonuclear and radiative capture with example.
15. Define Q-value. Give an example.

Section - C

1. Discuss Stellar energy. Sketch H-H and C-N cycle.
2. How is the activity of a radioactive substance measured by G.M.counter?
3. What are nuclear reactions? How are they classified?
4. Demonstrate transmutation reactions.
5. Demonstrate neutron evaporation and spallation reaction.
6. What is the artificial disintegration? Explain its methods.
7. Discuss about cross section of reactions.
8. Explain the direct nuclear reaction.
9. Demonstrate Pinch effect.

Section - D

1. Write notes on:
 - i) Neutron activation analysis
 - ii) G. M Ionisation
2. Explain the tracer techniques in detail.
3. Explain the theory of nuclear fission reaction.
4. How will you measure radioactive element by neutron activation analysis method?

- Argue the methods for disposal of nuclear wastes and its management.
- What are nuclear reactions? Explain their classifications with an examples.

Unit IV Inorganic reaction mechanism

Section - A

- $[\text{Pt}(\text{NH}_3)_4]^{2+}$ on treatment with Cl^- gives a product of composition, $[\text{PtCl}_2(\text{NH}_3)_2]$. It is a
 - trans-isomer**
 - mixture of cis- and trans-isomer
 - None of the above
 - cis-isomer
- A complex that shows anti-tumour activity is
 - cis $[\text{PtCl}_2(\text{NH}_3)_2]$**
 - trans $[\text{PtCl}_2(\text{NH}_3)_2]$
 - cis $[\text{PdCl}_2(\text{NH}_3)_2]$
 - trans $[\text{PdCl}_2(\text{NH}_3)_2]$
- Which of the following complexes/ion is expected to be inert to ligand substitution reaction?
 - $[\text{Rh}(\text{NH}_3)_6]^{3+}$
 - $[\text{Co}(\text{NO}_2)_6]^{3-}$
 - $[\text{Cr}(\text{NH}_3)_6]^{3+}$
 - All the above**
- Isomerism exhibited by the complex $[\text{Co}(\text{NH}_3)_5\text{NO}_2] \text{SO}_4$ is
 - Linkage isomerism**
 - ligand isomerism
 - Coordination isomerism
 - optical isomerism
- Trans- $[\text{PtCl}_2(\text{NH}_3)_2]$ is treated with thiourea (tu). The final product is
 - $[\text{Pt}(\text{tu})_4]^{2+}$
 - $[\text{PtCl}_2(\text{tu})_2]$
 - $[\text{Pt}(\text{NH}_3)_2(\text{tu})_4]^{2+}$**
 - none of the above
- Which of the following is having higher trans effect?
 - NH_3
 - CN^-**
 - en
 - Cl^-
- $[\text{Pt}(\text{Cl})_4]^{2-}$ on treatment with NH_3 followed by the action of NO_2^- gives a product of composition, $[\text{PtCl}_2(\text{NH}_3)(\text{NO}_2)]^-$. It is a
 - trans-isomer
 - mixture of cis- and trans-isomer
 - None of the above
 - cis-isomer**
- Generally stepwise stability constant gradually decreases.
 - Statistical factor
 - steric factor**
 - Electrostatic factor
 - all the above
- The complex used in tumor therapy is
 - $[\text{Pb}(\text{EDTA})]^{2-}$
 - cisplatin**
 - $[\text{Ca}(\text{EDTA})]^{2-}$
 - none
- $[\text{Pt}(\text{Cl})_4]^{2-}$ on treatment with NH_3 gives a product of composition, $[\text{PtCl}_2(\text{NH}_3)_2]$. It is a
 - trans-isomer
 - mixture of cis- and trans-isomer
 - None of the above
 - cis-isomer**
- Cis- $[\text{PtCl}_2(\text{NH}_3)_2]$ is treated with thiourea (tu). The final product is
 - $[\text{Pt}(\text{tu})_4]^{2+}$**
 - $[\text{PtCl}_2(\text{tu})_2]$
 - $[\text{Pt}(\text{NH}_3)_2(\text{tu})_4]^{2+}$
 - none of the above

12. Which of the following complexes/ion is expected to be labile to ligand substitution reaction?
 a) $[\text{Ir}(\text{NH}_3)_6]^{3+}$ b) $[\text{Co}(\text{NO}_2)_6]^{3-}$ c) $[\text{Mo}(\text{NH}_3)_6]^{3+}$ d) $[\text{Ni}(\text{en})_3]^{2+}$
13. $[\text{PtCl}_4]^{2-} + \text{NO}_2^- \longrightarrow [\text{PtCl}_3(\text{NO}_2)]_2^- + \text{NH}_3 \longrightarrow [\text{PtCl}_2(\text{NO}_2)(\text{NH}_3)]$ the final product is
 a) cis-isomer b) **trans-isomer** c) mixture of cis and trans d) none of the above
14. The reaction, $[\text{Cr}(\text{H}_2\text{O})]^{2+} + [\text{IrCl}_6]^{2-} \longrightarrow [\text{Cr}(\text{H}_2\text{O})]^{3+} + [\text{IrCl}_6]^{3-}$ is an example for
 a) Anation b) Aquation c) **Electron transfer reaction** d) Water exchange
15. An electron with no net chemical is called
 a) Anation b) Aquation c) **Electron transfer reaction** d) Water exchange
16. The reaction in which H_2O ligands in a complex replaced by an anion is called
 a) **Anation** b) Aquation c) Electron transfer reaction d) Water exchange
17. Outer sphere mechanism follows _____ order kinetics.
 a) Zero b) First c) **Second** d) Third

Section - B

1. What is labile complex?
2. Differentiate labile and inert complex.
3. How will you synthesis cis and trans isomers of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$?
4. Write notes on trans effect.
5. Discuss about inert complex.
6. Explain Associative interchange (Ia) mechanism.
7. What is anation reaction?
8. Write short notes on template reaction?
9. List out the application of template reaction.
10. Discuss water exchange.
11. What is Dissociative interchange mechanism?
12. What is Associative mechanism?
13. What is acid catalyzed reactions?
14. What is isomerization reaction?

Section - C

1. Write notes on, (i) Water exchange (ii) Anation
2. Explain redox reactions with examples.
3. Explain isomerization and electron transfer reaction in complexes.
4. Discuss the methods used to determine stability constants.
5. Discuss the factors which influence in trans effect.
6. How stability of a complex is explained using formation constant values?

- Discuss the mechanism of substitution reactions in octahedral complexes.
- Justify trans effect influences the substitution reaction of coordination complex.
- Sketch four different types of mechanisms take place during substitution of metal complexes.
- Explain the template reactions.
- Demonstrate briefly on water exchange reaction.

Section - D

- Give a detailed account on inner and outer sphere electron transfer mechanism.
- What is substitution reaction? Explain substitution reaction in octahedral and square planar complexes.
- Explain in detail outer sphere electron transfer mechanism for octahedral complex.

Unit V Spectroscopy III

Section - A

- Which of the molecule have resultant nuclear spin
a) C^{12} b) C^{13} c) N^{14} d) O^{16}
- Which of the following molecule has no magnetic moment
a) Si^{28} b) N^{15} c) F^{19} d) P^{31}
- The region for Electromagnetic spectrum employed in ESR spectroscopy is
a) Radiowave b) **Microwave** c) IR d) Visible
- Which spectroscopy is used for detecting para magnetism
a) UV b) NMR c) IR d) **ESR**
- The actual value of nuclear spin depends on _____
a) Mass number b) Atomic number c) **Both (A) and (B)** d) Shielding effect
- The nuclear spins of 1H and 2H are respectively
a) $\frac{1}{2}$ **and 1** b) $\frac{1}{2}$ and $\frac{1}{2}$ c) 1 and $\frac{1}{2}$ d) $\frac{1}{2}$ and 0
- The ^{19}F NMR spectroscopic signal of NH_4PF_6 is a _____
a) **Doublet** b) Septet c) Sextet d) Singlet
- For Co(III) complex, ----- band do shift in different solvents.
a) Ligand field b) **charge-transfer** c) both a) & b) d) None.
- Which of the following semiconductor is n-type?
a) TiO_2 b) $SrTiO_3$ c) Ga-P d) **Both a) & b)**
- Which of the following system has hyperfine splitting with $I=1$
a) $^1H^1$ b) **$^1D^2$** c) N^{15} d) Both b) & c)

11. What will be the frequency for ^{31}P NMR at 2.35 T?
 a) 94.13 MHz b) 25.15 MHz c) 100.04 MHz **d) 40.48 MHz**
12. ^{15}N NMR for NH_3 molecule is -----.
 a) Singlet b) Doublet c) Triplet **d) Quartet**
13. Which of the following system has hyperfine splitting with $I=3/2$
 a) $^1\text{H}^1$ b) $^1\text{D}^2$ c) N^{15} d) CH_3 radical
14. A-electron nuclear hyperfine coupling constant for ^{63}Cu is -----.
 a) 11 G b) 5.5 G **c) 80 G** d) 88 G
15. When the species contains odd number of unpaired electrons, the spin degeneracy remains doubly degenerate is known as -----.
 a) Zero-field splitting b) Kramer's Degeneracy
 c) J-T distortion d) Hyperfine Splitting

Section - B

1. What is Nuclear magnetic resonance?
2. What is spin – spin coupling?
3. What is double resonance?
4. What is quadrupole moment?
5. What is hyperfine splitting?
6. Sketch the structure for P_4S_3 using ^{31}P NMR.
7. What is fluxional molecule?
8. What is double resonance?
9. What is photo dissociation reactions?
10. What is matrix isolation?
11. Write a note on gyromagnetic ratio.
12. Differentiate Kramer's degeneracy and Zero-field splitting.
13. Sketch the structure of BrF_5 and P_4F_3 .
14. Write the hyperfine splitting of $[(\text{NH}_3)_5\text{Co}-\text{O}-\text{O}-\text{Co}(\text{NH}_3)_5]^{5+}$

Section - C

1. Write the principle involved in the ^{31}P and ^{19}F NMR.
2. What is Berry pseudo rotation? Explain this fluxionality using PF_5 and PCl_2F_3 .
3. Discuss the applications of EPR to transition metal complexes.
4. What is hyperfine splitting? Explain its splitting in isotropic systems.

5. Write a note on double resonance in NMR.
6. Write the comparison between ^1H & ^{15}N NMR splitting of NH_3 and ^1H NMR for H_3PO_3 & H_3PO_2
7. Explain briefly about the hyperfine splitting of $[(\text{NH}_3)_5\text{Co-O-O-Co}(\text{NH}_3)_5]^{5+}$
8. Discuss Kramer's degeneracy and Zero-field splitting

Section - D

1. Discuss briefly about the hyperfine splitting involved in EPR spectroscopy.
2. Explain in detail about fluxional molecule in NMR spectroscopy.
3. Write a note on Jahn-Teller distortion in $\text{Cu}(\text{II})$ complexes.
4. Explain in detail EPR spectroscopy for bis(salicylaldimine)copper(II) complex.
5. Sketch the ^1H , ^{31}P , ^{19}F NMR splitting for H_2PF_3 and HPF_2

Unit I Addition and Elimination Reaction

Section –A

I. Choose the Correct Answer:-

1. Which of the following statements regarding the E1 mechanism is wrong?

- a) Reactions by the E1 mechanism are unimolecular in the rate-determining step.
 b) Reactions by the E1 mechanism are generally first order.
 c) **Reactions by the E1 mechanism usually occur in one step.**
 d) Reactions by the E1 mechanism are multi-step reactions

2. Which of the following reacts by the E1 mechanism in ethanol most readily?

- a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ b) $(\text{CH}_3)_2\text{CHCH}_2\text{Br}$ c) **$(\text{CH}_3)_3\text{CBr}$** d) CH_3Br

3. Based on Saytzeff's rule, select the most stable alkene.

- a) **1,2-dimethylcyclohexene** b) 1,6-dimethylcyclohexene
 c) cis-3,4-dimethylcyclohexene d) They are all of equal stability

4. When 3-iodo-3-ethylpentane is treated with sodium methoxide in methanol, the major organic product is an _____ that is generated through an _____ mechanism.

- a) ether, SN1 b) ether, SN2 c) ether, E1 **d) alkene, E2**

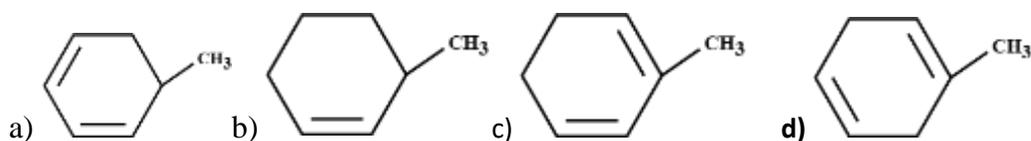
5. Which compound would undergo dehydrohalogenation with a strong base to give the alkene shown below as the only alkene product? $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$

- a) 1-chloropentane b) 2-chloropentane c) **3-chloropentane** d) 1-chloro-2-methylbutane

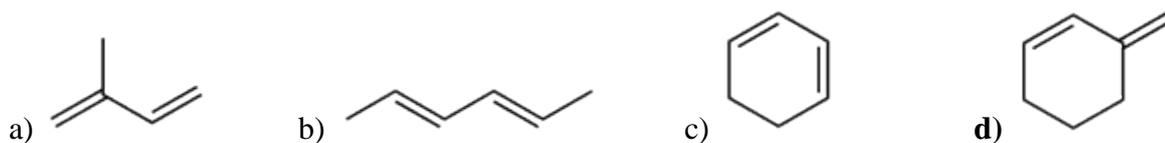
6. What type of reaction takes place upon treatment of a ketone with HCN to form a cyanohydrin?

- a) **Nucleophilic addition** b) Nucleophilic substitution
 c) Electrophilic addition d) Electrophilic substitution

7. The Birch reduction of toluene gives :



8. Which of the following dienes cannot undergo Diels-Alder reactions?



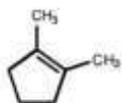
9. Which of the following dienophiles is the most reactive in normal Diels-Alder reactions?



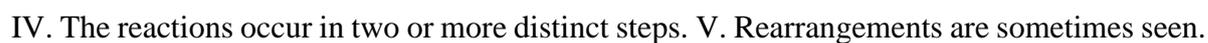
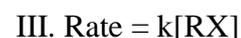
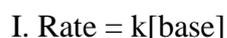
Section – B

II. Answer any FIVE in about 50 words each:

1. Summarise the E1 and E2 mechanism reaction.
2. What is birch reduction?
3. What is the reactant of Darsen glycedic ester?
4. State Saytzeff rule.
5. What is mannich reaction?
6. What is birch reduction?
7. Why must the electron-withdrawing group be on the ortho/meta-position?(meienheimer complex).
8. Predict the most likely mechanism and the product from the reaction between 2-chloro-2-methylpentane and sodium ethoxide in ethanol.
9. What is the effect of leaving group in Nucleophilic substitution?
10. One of the products that results when 1-bromo-2,2-dimethylcyclopentane is heated in ethanol is shown below. Give a mechanism by which it is formed and give the name of this mechanism.

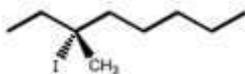


11. Which of the following statements apply to E1 reactions of alkyl halides? Choose as many as necessary.

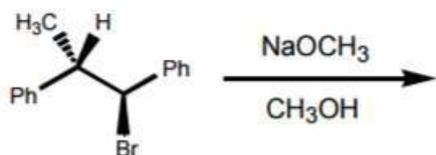


12. How many distinct alkenes can result from E2 elimination of the compound below? Give their

structures and IUPAC names.



13. Give the major product and the mechanism of the following reaction.



Section – C

III. Answer in about 200 words each, choosing either (a) or (b):

1. Predict the dehydration of alcohols.
2. Simulate the E1CB mechanism.
3. Illustrate the mechanism of Claisen and Stobbe condensation.
4. Appraise the Electrophilic addition reaction.
5. Examine the hydration of olefins.
6. What is Mannich reaction? Explain the mechanism of it.
7. Write the mechanistic pathway of E₁ and E₂ reactions.
8. Give a brief note on hydroboration.
9. What is Cope elimination? Write a brief on dehydrohalogenation.
10. Discuss the dehydration of alcohols.
11. Write a short note on
 - a) Claisen Condensation
 - b) Stobbe Condensation
12. Explain the C-C bond in nucleophilic additions.
13. Give an account on hydration of olefins.

Section – D

IV. Answer any THREE in about 500 words each:

1. Organise the mechanism of Chugaev reaction and Cope elimination.
2. Investigate the mechanism and orientation in pyrolytic elimination.
3. Organise the Mannich reaction and Darsen Condensation.
4. In the AlCl₃ catalyzed Diels-Alder reaction of pyrroles substituted with electron withdrawing groups at the 1-position and dimethylacetylenedicarboxylate yields Diels-Alder adduct whereas when the substituents are electron donating α -addition products are obtained.

5. Explain the mechanistic pathway of C-C bond additions.
6. Why hydroxide or ethoxide ion is ineffective in promoting the benzoin condensation?
7. Illustrate the mechanism of Darsen and Benzoin condensation.
8. Write in detail MPV reduction and Micheal condensation.
9. Discuss the Diels-Alder reaction and Grignard reactions.
10. The reaction of benzaldehyde with acetaldehyde in presence of 10% NaOH gives benzyldeneacetone. What is this reaction called? Give its mechanism.
11. What is the stereochemical structure of the oxime of acetophenone which undergoes rearrangement to acetanilide?
12. How α -diazoketones are obtained? How they are converted into carboxylic acid and amides? Give all mechanistic steps.

Unit- II Retrosynthetic Analysis

Section -A

Choose the correct answer:

1. Retrosynthetic analysis is good, because

a) Number of steps are low	b) Flexibility
c) Avoidance of toxic intermediates	d) All the above
2. Which of the following is suitable synthetic equivalent for CH_2OH ?

a) HCHO	b) CH_3MgBr	c) RCHO	d) CH_3COOH
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3. Alcohols are protected as-----

a) Acids	b) Amines	c) Ethers	d) Aldehydes
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4. Which of the following is not a starting material for the synthesis of Cis jasmine

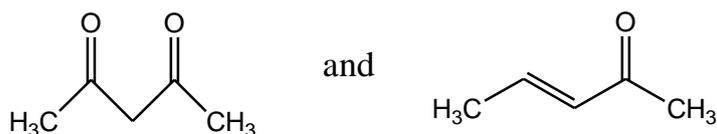
a) Adipic acid	b) Acetylene	c) HCHO	d) α-bromo actic acid
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Section - B

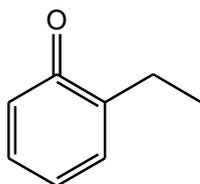
Answer any seven in about 50 words each:

1. Define synthons?
2. What are synthetic equivalent?
3. Why retrosynthesis is better than normal synthesis?
4. Give some examples for electrophilic synthons and their synthetic equivalent.
5. Write the synthesis of ethanol by disconnection method.

- What are the qualities of good protecting group? Define synthons?
- What are synthetic equivalent? Give the synthetic equivalent of the synthon $\text{^-CH}_2\text{-CO-CH}_3$
- Define retrosynthesis and mention its advantage.
- What are the synthetic equivalents for the synthons RCO^+ and RCOO^-
- Explain the methods available for the conversion of RCONH_2 to RNH_2
- Write the structure of the key intermediate for camphor.
- Write the structure of cascarillic acid.
- Illustrate the terms synthon and synthetic equivalent. What is the synthetic equivalent of acetyl methyl cation (CH_3COCH_2)
- Give some examples for electrophilic synthons and their synthetic equivalent.
- Write the synthesis of ethanol by disconnection method.
- What are the qualities of good protecting group?
- Write down the disconnection of the following:



- Explain synthetic equivalent with an example- $\text{CH}_3\text{CH}_2\text{C}\equiv\text{CH}$
- What do you mean by Umpolung? Explain with an example.
- Perform retrosynthetic analysis on the following molecule and propose a method of synthesizing this compound.



- What are key intermediates?
- Explain how RCOOH can be converted to RCHO .

Section- C

Answer in about 200 words each, choosing either (a) or (b) :

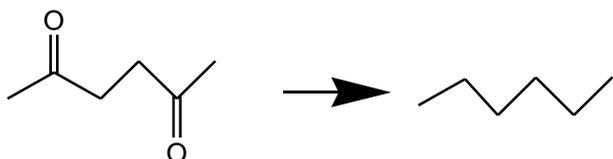
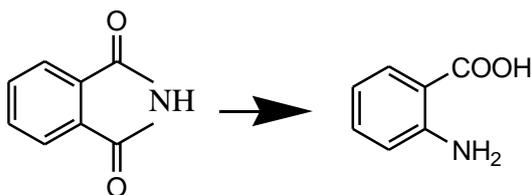
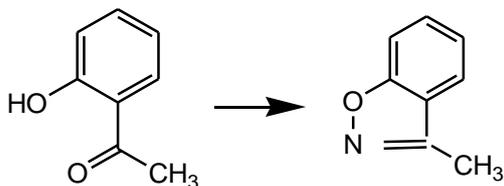
- How do you protect the following functional groups?
 - Carboxylic acid
 - amines
- Write the retrosynthesis of Cascarrilic acid.
- What are the possible routes to disconnect Trihexylphenethyl?
- Explain the role of Key intermediate in Organic synthesis.

- How to convert Camphoric acid to Camphor?
- Discuss about Robinson annulation reaction.
- Explain the role of Key intermediate in Organic synthesis.
- Carryout the retrosynthetic analysis of α -Onocerin.
- Describe the synthetic strategies involved in the retrosynthesis of baclofan.
- Give a critical analysis of the total synthesis of Isonootkatone

Section –D

Answer any three in about 500 words each:

- What are the possible ways to protect alcohols and carbonyl compounds.
- Write the disconnection approach and synthesis of Bisabolene
- Disconnect completely and synthesise Cis jasmone from its starting materials.
- Write down the retrosynthetic analysis of Twistane.
- Explain the total synthesis of Trihexylphenyldyl.
- Explain how the following functional group transformations are effected.



12. In RNA structure, its guanine content does not necessarily equal its cytosine content, and its adenine content does not necessarily equal its uracil content since it is a -----

- a) double stranded molecule
- b) **single-stranded molecule**
- c) stable molecule
- d) unstable molecule

Section – B

II. Answer any FIVE in about 50 words each:

1. Differentiate the spectral properties of Pyrimidine and Pyrazine.
2. Define nucleotides?
3. What is nucleoside?
4. Mention the various nucleic acids in DNA.
5. State the purine bases present in DNA.
6. List out the various pyrimidine bases in RNA.
7. What is transcription?
8. List out the base pairing in DNA.
9. What is DNA sequencing?
10. Give the steps for RNA synthesis.
11. List out the properties of RNA.

Section – C

III. Answer in about 200 words each, choosing either (a) or (b):

1. Demonstrate the nucleophilic substitution reaction of Indole.
2. Compile the electrophilic substitution reaction of Oxazole.
3. Outline the nucleic acid and its related heredity factors.
4. Comprehend about Watson and Crick model.
5. Explain about DNA replication.
6. Discuss the Structure of RNA and DNA.
7. Differentiate nucleotides and nucleosides.
8. Discuss the complementary pairing in DNA.
9. Outline the bonding nature of various nucleic acids in DNA.

Section – D

IV. Answer any THREE in about 500 words each:

1. Discriminate the chemical properties of Thiazole.
2. Differentiate DNA and RNA.
3. Discuss about RNA and protein biosynthesis.

- Analyze the base pairing in DNA.
- Diagrammatically represent the Watson - Crick Model of DNA.
- Classify the nucleic acid present in DNA as purine bases and pyrimidine bases
- Summarize the role of RNA and DNA in heredity.

Unit IV NMR and C¹³ Spectroscopy

Section –A

Choose the Correct Answer:-

- Which of the molecule have resultant nuclear spin?
 a) C¹² b) C¹³ c) N¹⁴ d) O¹⁶
- Which of the following molecule has no magnetic moment
 a) Si²⁸ b) N¹⁵ c) F¹⁹ d) P³¹
- The actual value of nuclear spin depends on
 a) Mass number b) Atomic number c) **Both (a) and (b)** d) Shielding effect
- The nuclear spins of ¹H and ²H are _____ respectively.
 a) **½ and 1** b) ½ and ½ c) 1 and ½ d) ½ and 0
- The region for Electromagnetic spectrum employed in ESR spectroscopy is
 a) Radiowave b) Microwave c) **IR** d) Visible
- The standard reference used in NMR study is
 a) Water b) Ethanol c) Acetone **d) TMS**
- The spacing of adjacent lines in the multiplets of NMR spectrum is called
 a) **Coupling constant** b) g factor c) Chemical shift d) Quantum number
- The enhancement in intensity due to dipole-dipole relaxation mechanism is
 a) Relaxation effect b) Double resonance c) **Overhauser effect** d) Spin decoupling
- Which of the factor does not influence the chemical shift?
 a) Inductive effect b) Anisotropic effect c) Hydrogen bonding **d) Mesomeric effect**
- Which of the following system has hyperfine splitting with I=1?
 a) ¹H¹ b) ¹D² c) N¹⁵ d) Both b & c

Section – B

II. Answer any FIVE in about 50 words each:

What is Nuclear magnetic resonance?

2. What is coupling constant?
3. What is chemical shift?
4. How does solvent affect the chemical shift in NMR spectra?
5. When does the coupling constant J_{AB} in NMR become negative? Explain with an example.
6. What is double resonance?
7. What is NOESY?

Section – C

III. Answer in about 200 words each, choosing either (a) or (b):

1. Discuss the theory of PMR spectra.
2. Illustrate the factors which affect the chemical shift.
3. Define coupling constant. Explain in what circumstances it is positive and negative.
4. Explain the theory of spin-spin splitting.
5. What is spin-spin splitting? Discuss the causes of spin-spin splitting.
6. What are the factors affecting coupling constant? Explain.
7. Summarize about INEPT

Section – D

IV. Answer any THREE in about 500 words each:

1. What is chemical shift? Discuss about the factors affecting chemical shift.
2. Explain about the NMR for simple AX type molecule.
3. Explain about the NMR for simple AMX type molecule.
4. What is relaxation process? Discuss the types of relaxation process.
5. Discuss the 2D pulse sequences in COSY NMR.
6. Outline the role of germinal, vicinal and long range coupling in NMR spectra.

8. Describe the importance of metastable peaks.
9. Define Molecular ion.
10. Compare single focussing and double focussing magnetic deflection.

Section – C

III. Answer in about 200 words each, choosing either (a) or (b):

1. How will you distinguish between the isomeric alcohols with molecular formula $C_4H_{10}O$ by Mass spectroscopy?
2. Describe the various fragmentation mode of diphenyl ether.
3. Sketch the general rules for interpretation of Mass spectra.
4. Write some important features of mass spectra i) Esters and ii) Ethers
5. Describe some special features of amines which help to identify them.
6. How do you explain that m/e 94 ion is formed in the mass spectrum of phenol?

Section – D

IV. Answer any THREE in about 500 words each:

1. Organize the components of Mass Spectrometer.
2. Write in detail the general fragmentation modes in mass spectroscopy.
3. Simulate the gas phase and desorption fragmentation modes in mass spectrometry.
4. Describe in detail the instrumentation for scanning mass spectroscopy.
5. Describe some important features of mass spectra i) Aldehyde ii) Hydrocarbon and iii) Acids.

UNIT I

Chemical Kinetics

Section A

- According to the collision theory of kinetics which of the following factors best accounts for the effective collision?
 - The orientation of the molecule at the moment of collision
 - The energy of the activated complex
 - The energy of the colliding molecules
 - All of these factors**
- Choose the correct statement related to the collision theory of rate of reaction?
 - All the chemical reactions involving gaseous reactant occurs in a fraction of second
 - All the bimolecular collisions lead to the formation of products irrespective of their energy
 - No chemical reaction is possible without a collision between reactant molecule in a bimolecular reaction**
 - The energy barrier required to cross during the reaction by reactant molecules is always less than the energy of normal molecules
- The minimum amount of energy required by the reacting molecules to produce effective collision is called as
 - Activation energy
 - threshold energy**
 - kinetic energy
 - average energy
- For effective collision between reactant molecules, the colliding molecules must possess
 - Proper orientation
 - Energy equal to or greater than the activation energy
 - Energy equal to or greater than the threshold energy
 - Both a & c**
- Increase in which of the following will not increase the rate of a chemical reaction?
 - Activation energy**
 - concentration of reactants
 - temperature
 - none
- According to collision theory the rate of a chemical reaction is infinity (∞) to
 - Number of product molecules
 - the change in temperature per second
 - Number of collisions per second**
 - the change in Kinetic energy per second
- According to Arrhenius equation, the correct relation between sp. rate (K), temperature (T) and activation energy (Ea) is
 - $K = Ae^{-E_a/RT}$
 - $\log K = \log A - E_a/2.303 RT$
 - $\ln k = \ln A - E_a/RT$
 - all**
- The factor that affects the activation energy of a chemical reaction is
 - Absolute temperature
 - Nature of reactants**
 - Collision frequency
 - Concentration of reactants
- The frequency factor A in the Arrhenius equation $k = Ae^{-E_a/RT}$ mainly depends on
 - Collision frequency
 - Probability factor
 - Orientation of colliding molecules
 - All**
- The unit of frequency factor A in Arrhenius equation $k = Ae^{-E_a/RT}$ is
 - Same as that of action energy Ea
 - Same as that of temperature
 - Same as that of rate constant, k**
 - Inverse to the unit of rate constant

11. Which of the following is an first order reaction?

- a) $\text{N}_2\text{O}_5 \longrightarrow \text{N}_2\text{O}_4 + \frac{1}{2} \text{O}_2$ b) $\text{H}_2\text{O}_2 \longrightarrow \text{H}_2\text{O} + \frac{1}{2} \text{O}_2$
c) $\text{SO}_2\text{Cl}_2 \longrightarrow \text{SO}_2 + \text{Cl}_2$ **d) All**

12. Collision theory is satisfactory for _____ reaction

- a) Unimolecular **b) Bimolecular** c) Termolecular d) Any order

13. If E_a of a reaction is zero, K is equal to

- a) Infinity b) 0 **c) A** d) A^{-1}

Section B

1. Write the Arrhenius equation.
2. Write the postulates of collision theory.
3. What is kinetic isotopic effect?
4. What is Lindemann hypothesis?
5. What are the theories of reaction rate?
6. What are the limitations of Lindemann hypothesis.

Section C

1. Discuss Arrhenius equation and its significance.
2. Write in detail about Kinetic isotopic effect.
3. Discuss hard sphere collision theory of gas phase reaction.
4. Derive the equation for Activated complex theory.

Section D

1. Explain and derive the Formulation for Lindemann hypothesis for unimolecular reactions.
2. Discuss the relationship between the activated complex theory and collision theory.
3. Write in detail about RRK theories of reaction rate.
4. Explain about RRKM theories of reaction rate.

Unit II Chemical and Phase Equilibria

Section-A

1. The number of phase lines obtained for phase diagram of sulphur will be -----
a) 4 b) 3 **c) 6** d) 1
2. The maximum number of phases that can be simultaneously in equilibrium for a one Component system is -----
a) 1 **b) 3** c) 4 d) 6
3. When three phases of two component system are simultaneously in equilibrium, the number of degrees of freedom is-----
a) 1 **b) 3** c) 4 d) 6
4. The boundary line between (liquid+solid) and (solid) regions must be part of -----
a) Solvus **b) Solidus** c) Liquidus d) Tie-line
5. Following is wrong about a phase diagram-----
a) It gives information on transformation rates.
b) Relative amount of different phases can be found under given equilibrium conditions.
c) It indicates the temperature at which different phases start to melt.
d) Solid solubility limits are depicted by it.

8. What is meant by partition function?
9. Write a short note on micro canonical ensemble.
10. Define the term canonical ensemble.
11. Derive the internal energy from translational partition function.

Section C

1. Explain the relationship between thermodynamic probability and entropy. (or) How will you derive the Boltzmann expression for entropy?
2. Obtain the translational partition function.
3. Derive the expression for the translational partition function.
4. Derive the enthalpy and entropy from translational partition function.
5. Derive the rotational partition function of monoatomic molecule.
6. Derive the expression for G, Cv and Cp from translational partition function.

Section D

1. Derive Maxwell – Boltzmann distribution equation.
2. Derive Sackur - Tetrode equation.
3. Derive the rotational partition function of diatomic molecule.
4. Derive the expression for the translational partition function.
5. Derive the expression for the vibrational partition function.
6. Derive the expression for Bose – Einstein statistics.
7. Derive the expression for Fermi – Dirac statistics.
8. Compare Bose – Einstein and Fermi – Dirac statistics with Boltzmann statistics.

Unit IV Radiation Chemistry

Section A

1. An alpha particle is same as -----
a) a helium nucleus b) a hydrogen nucleus c) A proton d) A positron
2. Radioactivity is the characteristics of which of the following-----
a) Nucleus b) Electron c) Proton d) neutron
3. -----have same atomic numbers but different atomic masses
a) Isotope b) Atom c) Radioisotope d) None of these
4. Which one of the following are Gamma rays? -----
a) Low energy waves b) High energy protons c) High energy electron
d) High energy electromagnetic waves
5. Which one of the following has no charge? -----
a) Gamma rays b) Beta rays c) Alpha rays d) Cathode rays
6. Which one of this is not a source of high energy radiation -----
a) Cosmic radiation b) terrestrial radiation c) internal radiation **d) gamma rays**
7. A ----- in radiation chemistry is a region of high concentration of chemical products after ionizing radiation passes through.
a) spur or track b) Alpha rays c) Cathode rays d) gamma rays

8. The ----- of an electron is composed of a random sequence of more or less isolated entities called spurs, blobs, and short tracks
 a) **low LET track** b) high LET track c) double beam d) radioisotope
9. Units of Dosimeter-----
 a) Gray (Gy) energy absorbed per unit of mass ($\text{J}\cdot\text{kg}^{-1}$)
 b) Equivalent dose (H) measured in sieverts (Sv)
 c) Effective dose (E) measured in sieverts.
 d) All the above
10. The radiation track structure is highly dependent on the ----- of the incident radiation.
 a) type and energy b) cathode rays c) gamma rays d) radioisotope

Section B

1. Mention the sources of high energy radiation.
2. What is meant by radiation track spurs?
3. List out the units of radiation energy.
4. What is meant by chemical dosimeter?
5. Define hydrated electrons?

Section C

1. Explain about photoelectric effect.
2. Outline the concept of pair production.
3. Discuss the role of charged particles causing primary effects.
4. Analyse the free radical products during radiation.
5. Derive Mean LET in water hydrolysis.
6. Explain about the units of measuring radiation energy.

Section D

1. Differentiate radiation chemistry and photochemistry.
2. Sketch the Compton Effect based on radiation.
3. Point out the various application of radiation chemistry.
4. Discuss the tracks spurs in radiation.
5. Derive the expression for Mean LET in water radiolysis.

Unit V EPR and Mossbauer Spectroscopy

Section - A

1. The value of g depends on the ----- of the molecule having unpaired electron.
 a) Shape b) Size c) Both a) & b) **d) Orientation**
2. For ----- metals, the spin-orbit coupling is comparable with crystal field splitting.
a) First row transition b) Second row transition c) Inner transition d) None

3. In naphthalene anion, there are ----- sets of equivalent protons.
 a) One **b) Two** c) Three d) Four
4. The actual value of nuclear spin depends on _____
 a) Mass number b) Atomic number **c) Both (a) and (b)** d) Shielding effect
5. Which technique is called zero field NMR?
 a) **NQR** b) ESR c) UV d) IR
6. The g-value is ----- quantity
 a) Scalar b) Vector c) Tensor **d) Both a) & b)**
7. Short lived species at room temperature can be studied if they are produced at ----- temperature.
a) Low Temperature b) High Temperature c) Low Pressure d) High Pressure
8. Number of lines present for anthracene radical anion
 a) 25 **b) 75** c) 5 d) 35
9. Which spectroscopy is used for detecting para magnetism?
 a) UV b) NMR c) IR **d) ESR**
10. Which of the following electronic configuration undergo Kramer's Degeneracy?
 a) d^2 b) d^3 c) d^5 **d) Both b) & c)**
11. What is the hyperfine splitting constant of benzene anion?
 a) 2.4 G b) 4.84 G c) 1.83 G **d) 3.75 G**
12. The electron which contribute to the isomer shift in Mossbauer spectroscopy -----
a) s-electron b) p-electron c) d-electron d) f-electron
13. Recoil effect is best defined by -----
a) $E = 1/2 mv^2$ b) $E = 0$ c) $E = h c/v$ d) $E = F \times D$
14. The correct order of the isomeric shift in Mossbauer spectra (^{57}Fe source) of iron compounds is
 a) $\text{Fe(II)} > \text{Fe(III)} > \text{Fe(IV)}$ b) $\text{Fe(III)} > \text{Fe(II)} > \text{Fe(IV)}$
c) $\text{Fe(IV)} > \text{Fe(III)} > \text{Fe(II)}$ d) $\text{Fe(IV)} > \text{Fe(II)} > \text{Fe(III)}$
15. Among the following, those can act as Mossbauer nuclei are
 (A) ^{129}I (B) ^{57}Co (C) ^{57}Fe (D) ^{121}Sb
 a) A, B, C and D b) B, C and D only c) A, B, and D only **d) A, C and D only**
16. To record Mössbauer spectrum of Fe containing samples, a source 'X' is used. X after a nuclear transformation (Y), gives γ -radiation used in Mössbauer spectroscopy. X and Y respectively, are
 a) ^{57}Fe , β -emission b) ^{57}Co , β -emission **c) ^{57}Co , e^- capture** d) ^{57}Fe , e^- capture
17. The correct value of isomer shift (in Mossbauer spectra) and its explanation for Fe(II)-TPP and Fe(III)-TPP respectively from the following are:
 (TPP = tetraphenylporphyrinate)
 (A) 0.52 mms^{-1} (B) 0.45 mms^{-1}
 (C) Increase in s electron density (D) Decrease in s electron density
 a) (A) and (D); (B) and (C) **b) (A) and (C); (B) and (C)**
 c) (B) and (D); (A) and (D) d) (B) and (D); (A) and (C)

18. In $^{57}\text{Fe}^*$ Mossbauer experiment, source of 14.4 keV (equivalent to 3.48×10^{12} MHz) is moved towards absorber at a velocity of 2.2 mm s^{-1} . The shift in frequency of the source for this sample is:

- a) 35.5 MHz **b) 25.5 MHz** c) 20.2 MHz d) 15.5 MHz

19. Mossbauer spectrum of a metal complex gives information about

- (A) Oxidation state and spin state of metal (B) Types of ligands coordinated of metal
(C) Nuclear spin state of metal (D) Deometry of metal

Correct answer is

- a) A and C b) B and C **c) A, B and D** d) B and D

Section B

1. What is basic principle of NQR spectroscopy?
2. What is matrix isolation?
3. Write a note on gyromagnetic ratio.
4. Differentiate Kramer's degeneracy and Zero-field splitting.
5. What is McConnell equation?
6. Write the hyperfine splitting of methyl radical.
7. What is coupling constant?
8. Calculate electron density for methyl radical.
9. Why some ionic crystals have very different g values between 0.2 – 0.8?
10. Sketch the hyperfine splitting of p-benzosemiquinone radical anion.
11. What is Doppler shift?
12. Define isomer shift in Mossbauer spectroscopy.
13. Define recoil energy of Mossbauer spectroscopy.

Section C

1. Give a brief note on magnetic hyperfine splitting.
2. Explain about Zero field splitting and Kramer's degeneracy.
3. Calculate the electron density for Benzene anion.
4. Sketch the hyperfine splitting of o-, m- & p- xylene.
5. Describe about the fine structure in EPR studies.
6. Explain briefly the formation of quadruple interactions in Mossbauer spectroscopy.
7. Discuss the principle of Mossbauer spectroscopy.
8. Comment on the selection rule in Mossbauer spectroscopy.
9. With suitable example outline the magnetic hyper fine interaction in Mossbauer spectroscopy.

Section D

1. Explain in detail about the Double resonance in EPR spectroscopy.
2. Write a note on factors affecting 'g' value.
3. Sketch the hyperfine splitting of methyl, naphthalene and anthracene radicals.
4. Discuss the chemical applications of Mossbauer spectroscopy.
5. Analyse the Mossbauer spectroscopy using Fe in various oxidation states.

**ST. MARY'S COLLEGE (Autonomous)-Thoothukudi
QUESTION BANK**

M.Com.

Core 1 Advanced Management Accounting Sub. Code: 21PCOC11

I Semester

(For those who joined in July 2021 and after)

Section A (1 mark)

Unit I Choose the correct answer:

1. Management Accounting relates to
(a) Recording of accounting data (b) Recording of costing data
(c) **Recording of management data** (d) Presentation of accounting data
2. The indicated quotient of two mathematical expressions is known as -----
a) Ratio Analysis b) Working capital c) Inter statement d)
3. Current ratio is an example of _____ ratio.
a) Balance sheet b) Income statement c) Turn over d) Profitability
4. The relationship between current assets and current liabilities known as _____ ratio.
a) Gross profit b) Net profit **c) current** d) Stock turnover
5. The ideal current ratio is -----
a) 2:1 b) 3:1 c) 4:1 d) 3:2
6. The primary objective of _____ ratio is to measure the liquidity
a) Gross Profit b) Net Profit **c) Current** d) Solvency.
7. To measure the overall performance and effectiveness of the firm _____ ratios are used.
a) Profitability b) Activity c) Liquidity d) Leverage
8. The ideal liquid ratio is
a) 1:2 b) 1:3 **c) 1:1** d) 1:4
9. If the operating ratio is 75%, the net operating profit ratio will be
a) 25% b) 100% c) 65% d) 10%
10. Higher the ratio, the lower the profitability is applicable to
a) Gross profit ratio b) Net profit ratio
c) Operating ratio d) Return on Investment

Unit II

11. Working capital is the difference between -----and current liabilities.
a) Cash **b) current assets** c) fixed assets d) fictitious assets
12. Flow of funds means -----
a) change of funds b) change in inflow c) change in outflow d) change in cash
13. A statement of changes in financial position prepared on cash basis is known as _____
a) Fund flow statement **b) Cash flow statement**
c) Balance sheet d) Income statement

14. Opening stock + purchases—Closing stock is
 a) Sales **b) cost of goods sold** c) Prime cost d) Cost of production
15. The difference between the current assets and quick assets is _____
a) Stock b) Sales c) Goodwill d) Debtors
16. Payment of proposed dividend is _____
a) Application of fund b) Sources of fund c) Non- flow of fund d) Outflow of cash
17. Funds flow refers to changes in _____
 a) Cash **b) Working capital** c) Fixed Assets d) Sales
18. Purchase of fixed assets is _____
 a) Sources of funds **b) Uses of funds** c) Funds from operation d) neither (a) nor (b)
19. Depreciation of machinery is a _____
 a) Out flow of cash b) Sources of funds c) Application of funds **d) No flow of funds**
20. Which of the following is a non current item?
a) Share premium b) Payment of wages c) Sundry creditors d) Bank balance

Unit III

21. The process of preparing a budget is known as -----
 a) budget **b) budgeting** c) budgetary control d) budget manual
22. Generally the budget period is _____
 a) 2 years b) 3 years **c) 1 year** d) 5 years
23. A Master budget is also known as _____ of functional budget
a) Summary b) Production c) Sales d) Finance
24. _____ is a plan of estimated receipts and payments of cash transaction.
a) Cash budget b) Sales budget c) Purchase budget d) Production budget
25. Zero base budgeting overcomes the weaknesses of _____
a) Conventional budgeting b) Sales budget
 c) Production budget d) Cash budget
26. The _____ budgets are prepared for a given level activity.
a) Flexible b) Fixed c) Sales d) Master
27. Cash budget is a _____
 a) Time budget **b) Functional budget** c) Flexible budget d) Fixed budget
28. Which of the following is not a functional budget?
a) Flexible budget b) Sales budget c) Purchases budget d) Production budget
29. _____ budgeting reviews activities from scratch.
 a) Flexible b) Cash **c) Zero base** d) Sales
30. A budget which is prepared for the entire organisation is called _____
a) Master budget b) Fixed c) Zero base d) Sales

Unit IV

31. Standard costing is _____
a) a technique b) a procedure c) a method d) a system
32. _____ are based on technical assessments.

- a) **Standards** b) Budgets c) Actuals d) Costs
33. _____ variance is the difference between the standard cost of materials specified and the actual cost of materials used.
- a) **Material cost** b) Material price c) Material usage d) Material yield
34. _____ department is responsible for Labour Rate Variance.
- a) Production Department b) Sales Department
c) **Personnel Department** d) Purchase Department
35. _____ is the difference between the actual cost and standard cost.
- a) **Variance** b) Profit c) Marginal revenue d) contribution
36. Standard costing helps in -----
- a) reducing losses b) **measuring efficiency** c) controlling prices d) fixing prices
37. An adverse variance is a sign of _____
- a) **Inefficiency** b) Efficiency c) Normal d) Basic
38. _____ variance is the difference between recovered overheads and actual overheads.
- a) **Overhead cost** b) Overhead efficiency
c) Overhead expenditure d) Overhead volume
39. Accounting for costs which are actually incurred is called _____
- a) standard costing b) **Historical costing** c) Variance analysis d) differential costing
40. Standard quantity x Actual output
_____ = ?
- Standard output
- a) **Standard quantity for actual output** b) Revised standard quantity
c) Actual quantity d) Standard quantity

Unit V

41. _____ is a system in which managers are given authority and responsibility for specific area of the company.
- a) Profit centre b) **Responsibility accounting** c) Transfer pricing d) Investment centre.
42. A _____ is a responsibility centre whose manager is responsible for cost incurred by the segment.
- a) Profit centre b) Revenue centre c) **Cost centre** d) Investment centre
43. MIS means _____
- a) Marketing Information System b) **Management Information System**
c) Material Inspection System d) Material Inspection System
44. Reports meant for the top management _____
- a) Delegation of responsibility b) Weekly report of production costs
c) Sales force progress of work d) Publicity and advertisement
45. The term information means data processed for
- a) specific purpose b) Control c) Outsider d) Analysis
46. External reports are meant for persons _____ the business
- a) Inside b) **Outside** c) both (a) & (b) d) execute
47. Balance sheet is a _____ report.
- a) Dynamic b) static c) financial d) information
48. Control Reports help in _____ different activities of the organisation.
- a) Controlling b) Managing c) Planning d) organising

49. _____ provide information about the financial position of the company
 a) Routine reports b) Operating reports c) financial reports d) Special reports
50. Reports according to period _____ Report
 a) Routine b) Operating c) Control d) Venture Measurement

Unit I

Section B (2marks)

Answer in about 50 words each

1. What do you mean by financial statement?
2. What is Trend Analysis?
3. What do you mean by the term Management accounting?
4. What is a comparative statement?
5. Write a note on common- size statement,
6. Net sales Rs 1, 00,000; cost of goods sold Rs 70,000 Find out gross profit ratio.
7. Total current assets Rs 1, 00,000 including stock Rs 10,000; creditors Rs 20,000. Calculate quick ratio.
8. Define “ratio analysis”.
9. Current ratio=1.5; Working capital Rs 40,000 Calculate the amount of current assets and current liabilities
10. What do you mean by Current ratio?

Unit -II

11. What is Cash flow statement?
12. What are the sources of fund flow statement?
13. What is funds flow statement?
14. What is the need for preparing the funds flow statement?
15. Give four examples of Applications fund items.
16. Give four examples of Sources of fund items.
17. What is cash from operations?
18. Write any two differences between fund flow statement and Cash flow statement.
19. What do you meant by fund?
20. Prepare a schedule of changes in the working capital.

	2007	2008
Current assets (Rs)	1,00,000	80,000
Current liabilities (Rs)	40,000	30,000

Unit -III

21. Define the term Budget.
22. What is flexible budget?
23. Define ‘budgetary control’
24. What is a master budget?
25. What is a cash budget?
26. Write note on Zero base budgeting.
27. What is budget centres?
28. Write any two merits of budget.
29. Prepare a production budget for the following:
 Sales 10,000 units

Closing stock 4,000 units

Opening stock 2,000 units

30. Prepare cash budget for the following:

Opening cash balance Rs 10,000

Cash receipts during the year Rs 20,000

Cash payments during the year Rs 25,000

Unit- IV

31. Define the term standard costing.

32. What do you mean by variance analysis?

33. What is meant by standard cost?

34. What is a standard hour?

35. What is the different material variance?

36. What is meant by Labour idle time variance?

37. From the following, calculate material price variance.

Standard : 1000 units at Rs 10 each Actual; 1200 units at Rs 8 each

38. Calculate labour rate variance:

Actual rate per hour : Rs 3.80

Standard rate per hour : Rs 4.00

Actual hours worked :10,000

39. Calculate Sales Volume Variance:

Budgeted quantity : 10,000 units

Actual quantity : 9,000 units

Standard price : Rs 8 per unit

40. Calculate variable overheads cost variance from the following:

Recovered variable overheads Rs 1,00,000

Actual variable overheads Rs 80,000

Unit- V

41. What is responsibility accounting?

42. What do you mean by transfer pricing?

43. What do you mean by profit centre?

44. What is cost centre?

45. What is MIS?

46. What is meant by ideal report?

48. What are the different modes of report?

49 Write any two essentials of good report?

50. Give the meaning of report.

Section C (6marks)

Answer in about 200 words each choosing either (a) or (b).

Unit-I

1. What are the objectives of analysis of financial statement ?

2. Explain the nature of financial statements.

3. What is the significance of liquid ratio?

4. What are the limitations of ratio analysis?

5. From the balance sheet of Reshmeena ltd as on 31.12.07 and' 08

Prepare a common size balance sheet and Interpret.

8. From the following information find out (i) Current Ratio (ii) Acid Test Ratio.

	Rs		Rs
Creditors	30,000	Stock	10,000
Bills payable	20,000	Debtors	30,000
Bank overdraft	12,000	B/R	2000
		Cash	20,000
	62,000		62,000

Comment on its liquidity.

9. You are given the following information:

	Rs
Cash	18,000
Debtors	1,42,000
Closing stock	1,80,000
B/P	27,000
Creditors	50,000
Outstanding expenses	15,000
Tax payable	75,000

Calculate

- a) Current ratio
- b) Liquid ratio
- c) Absolute liquid ratio

10. Calculate the trend percentage from the following data .

	2007	2008
	Rs	Rs
Working Capital	2000	2800
Furniture	50,000	75,000
Long term debt	37620	28040
Net tangible assets	40020	32,900

Unit-II

11. Explain the importance of working capital?
12. Explain the procedure for preparing a Fund Flow Statement.
13. How does Cash flow statement differ from Fund flow statement?
14. From the following Balance sheet, Prepare Schedule of changes in working capital and statement showing sources and application of fund.

Liabilities	2007	2008	Assets	2007	2008
	Rs	Rs		Rs	Rs
Share Capital	3,00,000	4,00,000	Machinery	50,000	60,000
Creditor	1,00,000	70,000	Furniture	10,000	15,000
Profit & Loss a/	15,000	30,000	Stocks	85,000	1,05,000
			Debtors	1,60,000	1,50,000
			Cash	1,10,000	1,70,000
	4,15,000	5,00,000		4,15,000	5,00,000

Good will	10,000	5,000
Preliminary Expenses	6,000	4,000
Provision for depreciation on Machinery	10,000	12,000

20. Balance Sheets of A and B on 1.1.2008 and 31.12.2008 were as follows:

Balance Sheets

Liabilities	1.1.2008	31.12.2008	Assets	1.1.2008	31.12.2008
Creditors	40,000	44,000	Cash	10,000	7,000
Mrs. As loan	25,000	-	Debtors	30,000	50,000
Loan from Bank	40,000	50,000	Stock	35,000	25,000
Capital	1,25,000	1,53,000	Machinery	80,000	55,000
			Land	40,000	50,000
			Building	35,000	60,000
	2,30,000	2,47,000		2,30,000	2,47,000

During the year a machine costing Rs. 10,000 (accumulated depreciation Rs. 3,000) was sold for Rs. 5,000. The provision for depreciation against machinery

As on 1.1.2008 was Rs. 25,000 and on 31.12.2008 Rs. 40,000. Net profit for the year 2008 amounted to Rs. 45,000. You are required to prepare cash flow statement.

Unit III

21. What are the advantages of Budgetary control?
22. What are the differences between a flexible budget and fixed budget?
23. What is meant by production budget? How it is prepared?
24. What are the demerits of budgetary control?

25 Draw a material procurement budget from the following information:

Estimated sales of a product 40,000 units. Each unit of product requires 3 units of material A and 4 units of material B.

Estimated opening balances at the commencement of next year are as follows:

Finished Product: 5,000 units

Raw material: A : 12,000 units B : 20,000 units

Material on order:

Raw material; A: 7,000 units

B:11,000 units

The desirable closing balances at the end of the next year are:

Finished products: 7,000 units

Raw material: A: 15,000 units B: 25,000 units.

Material on order;

Raw material; A : 8,000 units B : 20,000 units

Prepare a quantitative chart showing material purchase budget for the next year.

26. For the production of 10,000 electric automatic irons, the following are the budgeted expenses:

	Per unit
Direct material	60
Direct labour	30
Variable overhead	25
Fixed overhead (Rs 1,50,000)	15
Variable expenses (direct)	5
Selling expenses (10%) fixed	15
Administration expenses (Rs50,000 rigid for all levels)	5
Distribution expenses (20%) fixed	5
Total cost of sale per unit	160

Prepare a budget for the production of 5,000 and 7,000 irons

27. Prepare a Production Budget for the three months ended March 31, 1998 for a factory producing four products.

Type of Product	Estimated Opening Stock on Jan 1, 1998 (Units)	Estimated Sales Jan – March (Units)	Closing Stock on March 31, 1998 (Units)
A	2,000	10,000	3,000
B	3,000	15,000	5,000
C	4,000	13,000	3,000
D	3,000	12,000	2,000

28. From the following figures prepare Raw material Budget for 2002.

Material (Units)	Estimated Stock on Jan 1 st	Estimated Stock on Jan 31	Estimated Consumption	Standard Price per unit
A	16,000	20,000	1,20,000	25 P
B	6,000	8,000	44,000	5 P
C	24,000	28,000	1,32,000	15 P
D	14,000	16,000	88,000	20 P
E	2,000	4,000	36,000	10 P
F	28,000	32,000	1,72,000	30 P

29. With the following data are available for 60% capacity, prepare a budget for production at 80% and 100% capacity. Production at 60% activity:600 units.

Materials	Rs100 per unit
Labour	Rs 40 per unit
Expenses	Rs 10 per unit
Factory Expenses	Rs 40,000 (40% fixed)
Administrative expenses	Rs 30,000 (60%)

30. Following particulars, prepare a production budget of Sales Corporation for the year ended 30th June 2006

Sales (units)	Estimated stock(units)
----------------------	-------------------------------

Product	As per Sales Budget	1 st July 2006	30 th July 2006
A	1,50,000	14,000	15,000
B	1,00,000	5,000	4,500
C	70,000	8,000	8,000

Unit IV

31. Using the following information, calculate labour cost variance, labour rate variance, labour efficiency and idle time variance.

Standard hours: 5000

Standard wage rate: Rs.4 per hour.

Actual hours: 6000

Actual wage rate: Rs 3.50 per hour.

Time lost on account of machinery breakdown: 300 hours.

32. From the following data, calculate overhead variances.

	Budgeted	Actual
Output	15,000 units	16,000 units
Number of working days	25	28
Fixed over heads	Rs. 30,000	Rs. 30,500
Variable overhead	Rs. 45,000	Rs. 47,000

There was an increase of 5% in capacity.

33. From the following details calculate

(i) Materials cost variance (ii) Materials price variance

(iii) Materials usage variance.

Standard output = 100 units

Standard materials per unit = 3 kgs

Standard price per kg = Rs.2

Actual output = 80 units

Actual price per kg = Rs.2.50

Actual materials used = 250 kgs

34. The standard raw materials required for producing 100 units is 120 kgs. A standard price of 0.50 paise per kg is fixed. 2,40,000 units were produced during the period. Actual raw materials purchased were 3,00,000 kgs at a cost of Rs. 1,65,000. Calculate material cost variance.

35. Standard rate of wages per hour Rs 10.

Standard hours -300

Actual rate of wages per hour: Rs 12

Actual hours -200

Calculate (i) Labour Cost Variance

(ii) Labour rate variance

(iii) Labour total efficiency variance

36. From the data given below, calculate the material price variance, the material

usage variance and material mixture variance.

Consumption per 100 units of product

Material	Standard	Actual
A	40 units @ Rs.50 per unit	50 units @ Rs.50 per unit
B	60 units @ Rs.40 per unit	60 units @ Rs.45 per unit

37. From the following information of a product, calculate:

1. Material Cost Variance,
2. Material Price Variance,
3. Material Usage Variance
4. Material Mix Variance and
5. Material sub-usage Variance.

Material	Standard Quantity Kg.	Standard Price Rs.	Actual Quantity Kg.	Actual Price Rs.
X	20	5	24	4.00
Y	16	4	14	4.50
Z	12	3	10	3.25
	48		48	
	-----		-----	

38. Standard hours 20 per unit
 Standard rate - Rs. 5 per hour
 Actual hours - 20,500
 Actual rate per hour – Rs 4.80
 Actual production = 10,000 units
 Calculate
- i) Labour cost variance
 - ii) Labour rate variance
 - iii) Labour total efficiency.

39. From the following information calculate

- (i) variable overhead cost variance
 - (ii) Expenditure variance
 - (iii) Efficiency variance
- | | | |
|-----------------------------|---|------------|
| Actual variable overhead | : | Rs. 10,000 |
| Budgeted variable over head | : | Rs. 12,000 |
| Budgeted production | : | 500 units |
| Actual production | : | 450 units |
| Actual Hours | : | 200 |
| Standard Time for one Unit | : | 30 minutes |

40. The following information is received from the books of AB Co.

Normal overhead rate	:	Rs. 3
Actual hours operated	:	20,000
Allowed hours for actual production:		21,000
Allowed overheads for budgeted hours:		Rs. 70,000
Actual overheads	:	Rs. 72,000

Calculate:

- (i) Overhead Budget Variance (ii) Volume variance (iii) Efficiency Variance (iv) Capacity variance and (v) Total overhead cost variance.

Unit V

41. Explain the term Cost centre.
42. Explain the reporting needs of top level management.
43. A proper reporting system is essential for efficient management. Explain.
44. What do you understand by term 'Report to management'? Discuss briefly the matters you deal with while drafting a report to the management.
45. Explain the types of report.
46. Distinguish between Routine Report and Special Report.
47. Explain the term Profit centre.
48. What are the prerequisites of responsibility accounting?

Section D (12marks)

Unit I

Answer in about 400 words each

1. Explain the role of ratio analysis in the interpretation of financial statements.
2. With the help of the following ratios regarding Indus Films, draw the Balance Sheet of the Company for the year 2006.

Current Ratio		2.5
Liquidity Ratio		1.5
Net Working Capital	Rs. 3,00,000	
Stock Turnover Ratio (cost of sales/closing stock)		6 times
Gross profit Ratio		20%
Fixed Assets Turnover Ratio (on cost of sales)		2 times
Debt Collection period		2 months
Fixed Assets to Shareholders Net Worth		0.80
Reserve and Surplus to Capital		0.50

3. The summary of Balance Sheet data in respect of A . Ltd. and B. Ltd is as under:

	A . Ltd.	B. Ltd
	Rs.	Rs.
Buildings	1,00,000	4,50,000
Machinery	3,00,000	7,50,000
Share Capital	4,50,000	14,50,000
Retained Earnings	50,000	33,000
Debtors	1,15,000	1,60,000
Stocks	60,000	2,17,000
Cash	10,000	5,000

Prepaid Expenses	5,000	3,000
Creditors	91,000	1,00,000
Liability for Expenses	9,000	17,000
Preliminary for Expenses	10,000	15,000
Prepare Common- size Balance Sheets		

4. From the following Profit and Loss Accounts and Balance Sheets for the year ended 31st Dec 2003 and 2004, prepare comparative income statements and comparative Balance Sheets.

PROFIT AND LOSS ACCOUNT

	2003	2004		2003	2004
	Rs.	Rs.		Rs.	Rs.
To Cost of Sales	600	750	By Net Sales	800	1,000
To Administrative Expenses	20	20			
To Selling Expenses					
To Net Profit	30	40			
	150	190			
	800	1,000		800	1,000

BALANCE SHEETS

Liabilities	2003	2004	Assets	2003	2004
	Rs.	Rs.		Rs.	Rs.
Bills Payables	50	75	Cash	100	140
Sundry Creditors	150	200	Debtors	200	300
Tax Payable	100	150	Stock	200	300
6% Debentures	100	150	Land	100	100
10% Preference shares	300	300	Buildings	300	270
Equity Shares	400	400	Plant	300	270
Reserves	200	245	Furniture	100	140
	1,300	1,520		1,300	1,520

5. From the following profit and loss account and Balance Sheet, prepare a comparative income statement and a comparative Balance Sheet.

PROFIT AND LOSS ACCOUNT for the year ended 31st Dec., 2004

	2003	2004		2003	2004
	Rs.	Rs.		Rs.	Rs.
To cost of goods sold	500	750	By Sales	700	900
To Operating Expenses:					

Administrative					
Selling	20	20			
To Net Profit	30	40			
	150	200			
	700	900		700	900

Balance Sheet as on 31st Dec., 2004

	2003	2004		2003	2004
	Rs.	Rs.		Rs.	Rs.
Bills Payables	50	75	Cash	50	70
Tax Payable	100	150	Debtors	300	450
Creditors	150	200	Stock	100	200
15% Debentures	100	150	Land	100	120
12% Preference shares	200	200	Buildings	250	225
Equity Shares	300	300	Plant	200	180
Reserves	200	250	Furniture	100	80
	1,100	1,325		1,100	1,325

6. The following is the Balance Sheet of a company as on 31st March:

Liabilities	Rs.	Assets	Rs.
Share Capital	2,00,000	Land and Buildings	1,40,000
Profit & Loss Account	30,000	Plant and Machinery	3,50,000
General Reserve	40,000	Stock	2,00,000
12% Debentures	4,20,000	Sundry Debtors	1,00,000
Sundry Creditors	1,00,000	Bills Receivable	10,000
Bills Payable	50,000	Cash at Bank	40,000
	8,40,000		8,40,000

Calculate :

- 1) Current Ratio
- 2) Quick Ratio
- 3) Inventory to working Capital
- 4) Debt to Equity Ratio
- 5) Proprietary Ratio
- 6) Capital Gearing Ratio
- 7) Current Assets to Fixed Assets

7. With the following ratios and further information given below, prepare a Trading,

Profit and Loss Account and Balance Sheet.

Gross Profit Ratio	25%
Net Profit Ratio	20%
Stock Turnover Ratio	10
Net Profit/ Capital	1/5
Capital to Total Liabilities	1/2
Fixed Assets/ Capital	5/4
Fixed Assets/ Total Current Assets	5/7
Fixed Assets	Rs.10,00, 000
Current Assets	Rs. 1, 00,000

8. The following are the summarized statements of a firm for the year ended in 31st Dec2005 and a Balance Sheet of the company as on that date

Profit and Loss Account

Particulars	Rs.	Particulars	Rs.
To opening stock	19,900	By Sales	1,70,000
To Purchases	1,09,050	By Closing stock	29,800
To Carriage	2,850		
To Gross profit	68,000		
	1,99,800		1,99,800
To Office expenses	30,000	By Gross Profit	68,000
To Selling expenses	6,000	By Profit on sale of shares	1,200
To Financial expenses	3,000	By Interest on investments	600
To Loss on sale of an asset	800		
To Net profit	30,000		
	69,800		69,800

BALANCE SHEET

Liabilities	Rs.	Assets	Rs.
Capital:		Land and Building	30,000
4,000 shares of Rs.10 each	40,000	Plant	16,000
Reserves	18,000	Stock	28,000
P & L A/c	12,000	Debtors	14,000
Bank Overdraft	6,000	Bills Receivable	2,000
Creditors	6,000	Cash	6,000
Outstanding expenses	4,000		
	96,000		96,000

Calculate:

- Gross Profit Ratio
- Debt equity Ratio
- Liquidity Ratio
- Fixed assets turnover ratio
- Operating net profit ratio.

9 . Calculate trend percentages from the following data relating to Joe Ltd.

Year ended	31.3.03	31.3.04	31.3.05	31.3.06	31.3.07
------------	---------	---------	---------	---------	---------

Sales	2,00,000	2,20,000	3,00,000	4,00,000	5,00,000
Cost of goods sold	1,00,000	1,10,000	1,25,000	1,50,000	2,00,000
Office & Administrative exp	30,000	30,000	40,000	50,000	50,000
Selling & Distribution exp.	20,000	20,000	35,000	50,000	60,000
Net Profit	50,000	60,000	1,00,000	1,50,000	1,90,000

10. Prepare a Balance Sheet, from the following particulars.

Gross profit ratio	20%
Debtor's Turnover	6 times
Fixed assets to net worth	0.80
Reserves to capital	0.50
Current ratio	2.50
Liquid ratio	1.50
Net working capital	Rs. 3,00,000
Stock turnover ratio	6 times

Unit II

11. Define the term working capital. What factors would you take into consideration?

in estimating the Working capital needs of a concern. 12. Explain the importance of adequate working capital.

13. The following are the summarized Balance sheet of B Ltd as on 2001 and 2002.

	2001	2002		2001	2002
Share Capital	20,000	25,000	Cash	50	860
Reserve	5,000	6,000	Buildings	20,000	19,000
P & L a/c	3,050	3,060	plant	15,000	16,900
Long term loan	7,000	-	Stocks	10,000	7,400
Creditors	15,000	13,520	Debtors	8,000	6,420
provision for tax	3,000	3,500	Goodwill	-	500
	<u>53,050</u>	<u>51,080</u>		<u>53,050</u>	<u>51,080</u>

During the year:

- Assets of another company were purchased for a consideration of Rs,5000 payable in shares.
- The following assets were purchased; Stock Rs 2000 Plant Rs.800
- Depreciation written off on plant Rs. 1200
- Income tax provided Rs. 3300
- Loss on sale of plant Rs. 20 was written off to reserve.
- Dividend of Rs. 2,300 was paid.

Prepare a fund flow statement.

14. From the following particulars prepare a statement showing working capital

needed to finance a level of activity of 12,000,units of output per annum.

Analysis of selling price per unit.

	Rs
Raw materials	5
Labour	3
Over head	2
	10
Total cost	10
Profit	2
	12
Selling Price	12

Additional Information:

- i) Raw materials are to remain in store on an average—one month
- ii) Materials are in process – 2 months.
- iii) Finished goods are in stock – 3 months
- iv) Credit allowed to customers is -4 months.
- v) Credit allowed by suppliers is - 2 months

It may be assumed that production and overheads accrue evenly throughout the year.

15. Balance sheet of M/S Black and white as on 1-1-98 and 31-12-98 were as follows:

Liabilities	1-1-98	31-12-98	Assets	1-1-98	31-12-98
Creditors	40,000	44,000	Cash	10,000	7,000
Mr. Whites Loan	25,000	----	Debtors	30,000	50,000
Loan from. Bank	40,000	50,000	Stock	35,000	25,000
Capital	125000	153,000	Machinery	80,000	55,000
			Land	40,000	50,000
			Building	35,000	60,000
	2,30,000	2,47,000		2,30,000	2,47000

During the year machine costing Rs. 10,000 (accumulated depreciation Rs 3000) was sold for Rs 5,000. The provision for depreciation against machinery as on 1.1.98 Rs25, 000 and on 31.12.1998 Rs 40,000. Net profit for the year 1998 amounted to Rs 45,000.

You are required to prepare Fund Flow Statement.

16. From the following particulars, prepare a **Cash Flow Statementas per AS 3**

1 st Jan	31 st Dec	1 st Jan	31 st Dec		
Creditors	36,000	41,000	Cash	4,000	3,600
Mrs. A's Loan	-	20,000	Debtors	35,000	38,400
Bank Loan	30,000	25,000	Stock	25,000	22,000

Capital	1,48,000	1,49,000	Land	20,000	30,000
			Building	50,000	55,000
			Machinery	80,000	86,000
	-----			-----	
	2,14,000	2,35,000		2,14,000	235,000
	-----			-----	

During the year Mr. A (Proprietor) has drawn Rs. 26,000 for personal use. The provision for depreciation against machinery as on 1st January was Rs. 27,000 and as on 31st December Rs. 36,000.

17. From the following balance sheet calculate funds flow statement..

Liabilities	2005	2006	Assets	2005	2006
	Rs	Rs		Rs	Rs
Share capital	10000	15000	Buildings	10000	9500
Reserve	3000	3000	plant	8000	9000
P & L a/c	2000	2200	Stocks	7000	12000
6% Debentures	8000	8000	Investments	-	1000
Creditors	6500	5800	Good will	2000	1000
Provision for tax	500	1000	Debtors	3000	2500
	<u>30000</u>	<u>35000</u>		<u>30000</u>	<u>35000</u>

Additional information:-

- During the year dividend of Rs 1500 was paid.
- Depreciation written off on plant Rs 600.
- Profit on sale of plant Rs 200.

18. Balance sheet of ABC Ltd are given below:

Liabilities	2004	2005	Assets	2004	2005
Share capital	1,00,000	1,50,000	Building	1,00,000	90,000
Reserve	50,000	60,000	Machinery	1,00,000	1,19,000
Profit & Loss a/c	30,500	30,000	Stock	50,000	24,000
Bank loan	70,000	---	Debtors	75,000	63,200
Creditors	50,000	37 200	Cash	2,500	16,000
Provision for tax	32,000	35,000	Goodwill	5,000	----
	<u>3,32,500</u>	<u>3,12 200</u>		<u>3,32 500</u>	<u>3,12,200</u>

During the year ended 31st December 2005

- Dividend paid Rs 23,000
- Depreciation Written off:
Machinery Rs 14,000

- Buildings Rs 10,000
 iii) Income tax paid Rs 28,000
 Prepare i) Working capital statement ii) Fund flow statement

19. The following is the summarized income statement of ABC Ltd. For the year ended 31st March 2005.

Particulars	Rs.
Sales (Including cash sales Rs. 20,000)	1,60,000
Less: Operating Expenses excluding depreciation	<u>1,00,000</u>
	60,000
Less: Depreciation	<u>20,000</u>
Net Profit before Tax	40,000
Add: Extraordinary Income – gain on speculation	<u>10,000</u>
	50,000
Less: Provision for Tax at 40 %	<u>20,000</u>
Net Profit after Tax	<u>30,000</u>

The following additional data is also available for 2004 – 2005.

- Operating expenses include Loss on Sale of Furniture Rs. 4,000
- Tax paid during the year for 2003 – 2004 Rs. 18,000
- Current asset and liabilities at the end of 2003 – 2004 and 2004 – 2005 were as under:

	Rs.	Rs.	31.3.2005	31.3.2004
Debtors			16,000	12,000
Stock			13,000	14,000
Creditors			18,000	17,000s

You are required to ascertain Net cash flow from operating activities by:

- Direct Method
- Indirect Method

20. From the following particulars, prepare funds flow statement of Mr. X

RsRs	1.1.2008	31.12.2008
Assets		
Cash	5000	4000
Debtors	40,000	45,000
Stock	30,000	25,000
Land	30,000	40,000
Building	50,000	55,000
Machinery	70,000	80,000

Total	2,25,000	2,49,000
Capital and Liabilities		
Current Liabilities	35,000	40,000
Loan from Mrs. Suba	-	25,000
Bank Loan	40,000	30,000
Capital	1,50,000	1,54,000
Total	2,25,000	2,49,000

Unit III

21. What are the steps in the preparation of the Master Budget?
22. Explain the different types of budgets.
23. Prepare a cash budget of X & co for April, May and June 2009:
- 24.

Month	Sales Rs	Purchases Rs	Wages Rs	Expenses Rs
January	80,000	45,000	20,000	5,000
February	80,000	40,000	18,000	6,000
March	75,000	42,000	22,000	6,000
April	90,000	50,000	24,000	7,000
May	85,000	45,000	20,000	6,000
June	80,000	65,000	18,000	5,000

Additional Information:

- i) 10% of the purchase and 20% of sales are for cash.
- ii) The average collection period of the company is one month and the credit purchases are paid regularly after one month.
- iii) Wages are paid half monthly and the rent of Rs.500 included in expenses is paid after one month lag.
- iv) Cash balance on April 1, 2009 may be assumed to be Rs.15,000/

24. G Ltd .presents the following information as on 31st March 2009.

Sales	Rs 9,00,000
Direct material cost	25% of sales
Direct wages	Rs 80,000
Direct Expenses	Rs.70,000
Factory overheads:	
Supervisors Salary	Rs 9,000per month
Works manager	Rs.12,000 per month
Foreman	Rs.4000 per month

Stores and spares 2 % on sales
 Depreciation on machinery Rs. 35,000
 Light and power Rs 30,000
 Repairs and maintenance 3% of Plant and Machinery.
 Administration expenses Rs.30, 000 per year,
 Selling and distribution expenses Rs.20,000 per year.
 Value of Plant and Machinery Rs 7,00,000
Prepare a Master budget.

25. A company working at 50% capacity manufactures 10,000 units of a product. At 50% capacity the product cost is Rs.180 and sale price is Rs 200.The breakup cost is as below:

Cost per unit

Material Rs 100
 Wages 30
 Factory 30 (40% fixed)
 Administrative overheads 20 (50% fixed)

At 60% working raw material cost goes up by 2% and sale price falls by 2%.At 80% working the raw material cost increases by 5% and sale price decreases by same percentage i.e.,5%.

26. From the following forecasts of income and expenditure prepare a cash budget for three months commencing 1st June, when bank balance was Rs 1,00,000.

Sales	Purchases	wages	Factory	Admin.and selling Expenses	Expenses
Rs	Rs	Rs	Rs	Rs	Rs
April	80,000	41,000	5,600	3,900	10,000
May	76,500	40,500	5,400	4,200	14,000
June	78,500	38,500	5,400	5,100	15,000
July	90,000	37,000	4,800	5,100	17,000
August	95,000	35,000	4,700	6,000	13,000

A sales commission of 5% on sales, due two months after sales, is payable in addition to selling expenses. Plant valued at Rs 65,000 will be purchased and paid for in August, and the dividend for the last financial year of Rs 15,000 will be paid in July. Wages, factory expenses and selling expenses are payable in the following month. There is a two month credit period allowed to customers and received from suppliers.

27. From the information given below prepare flexible budget at 60% and 80% capacities:

Variable overheads:	At 75% capacity
	Rs.
Indirect Material	7,500
Indirect Labour	22,500
Semi- Variable overheads:	

Electricity (40% fixed)	37,500
Repairs & Maintenance (80% fixed)	3,750
Fixed overheads:	
Salaries	1,00,000
Insurance	5,000
Depreciation	25,000

28. From the following particulars prepare the Raw, Materials Purchase Budget for October 2004.

Materials(in units)

	A	B	C	D	E	F
Estimated stock on October 1,	16,000	6,000	24,000	2,000	14,000	28,000
Estimated stock on October 31,	20,000	8,000	28,000	4,000	16,000	32,000
Estimated consumption	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Standard Price per unit(paise)	25	05	15	10	20	30

29 Alaudeen Ltd plans to sell 1,08,000 units of a product in January 1998, 1,20,000 units in February, 1,32,000 units in March, 1,56,000 units in April and 1,38,000 units in May. At the beginning of the current year, there are 18,000 units of a product in stock. At the end of each month, the company plans to have an inventory equal to one-sixth of the sales for next month.

Prepare a production budget for the period January to April 1998, showing how many units must be produced in each month.

30. Prepare a Cash Budget for 4 months ending 31st December 2007 from the following information.

Months	Sales	Purchases	Wages	Manuf- exp	Admin –exp	selling- exp
Rs	Rs	Rs	Rs	Rs	Rs	Rs
July	1,50,000	40,000	17,000	10,000	11,000	4,000
August	1,70,000	44,000	19,000	12,000	13,000	5,000
September	2,00,000	59,000	20,000	13,000	10,000	6,000
October	1,80,000	51,000	21,000	15,000	14,000	7,000
November	1,90,000	55,000	22,000	16,000	15,000	4,000
December	2,20,000	60,000	24,000	18,000	17,000	9,000

Additional Information:

- i) Cash in hand on 1st September 2007 is Rs 55,000.
- ii) Land purchased for Rs 1, 40,000 in the month of November.
- iii) A dividend of Rs 65,000 payable in December.
- iv) Furniture worth Rs 15,000 to be purchased in October.
- v) Machinery worth Rs 1, 00,000 purchased on June 2007 and the payment is to be done on instalment basis at Rs 10,000 per month.
- vi) The creditors are allowed a credit of 2 months.
- vii) Lag in payment of manufacturing and selling expenses is ½ month.
- vii) Wages are paid on the 1st of next month.
- viii) The Customers are allowed a credit period of 2 months.
- ix) Lag in payment of administration expense is one month.

Unit IV

31. The standard labour component and the actual labour component and the actual labour component engaged in a week for a job are as under

	Skilled	Semi-skilled	Unskilled
a) Standard number of workers in the gang	32	12	6
b) Standard wage rate per hour (Rs)	3	2	1
c) Actual number of workers employed in the gang during the week	28	18	4
d) Actual wage rate per hour (Rs)	4	3	2

During the 40-hours working week, the gang produced 1,800 standard labour hours of work. Calculate the different labour variances.

32. Modern Toys Limited had budgeted the following sales for May 2008:

Toy A : 900Units at Rs 50 per unit

Toy B : 650Units at Rs 100 per unit

Toy C : 1200Units at Rs 75 per unit

As against this, the actual sales were;

Toy A : 1000Units at Rs 55 per unit

Toy B : 700Units at Rs 95 per unit

Toy C : 1100Units at Rs 78 per unit

The cost per unit of Toys A, B, and C was Rs 45, Rs 85 and Rs65 respectively.

Compute:

- i) Sales margin variance
- ii) Sales margin price variance
- iii) Sales margin volume variance

33. S.V.Ltd has furnished you the following data.

	Budget	Actual
No. Of working days	25	27
Production in units	20,000	22,000
Fixed overheads Rs	30,000	31,000

Budgeted fixed overhead rate is Rs 1.00 per hour. The actual hours worked were 31,5000.

Calculate the following variances:

- (i)Efficiency variance (ii) Capacity variance (iii) Calendar variance
- (iv) volume variance (v) Expenditure variance (vi) Total overhead

variance.

34 A gang of workers usually consist of 10 men, 5 women, and 5 boys, in a factory They are paid at standard hourly rates of Rs.1.25,Re.80 and Re .70respectively. In a normal working week of 40 hours the gang is expected to produce 1,000 units of output.

In a certain week, the gang consisted of 13 men, 4 women and 3 boys.

Actual wages were paid at the rates of Rs.1.20,Re.85 and Re .65 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced.

35. From the following particulars relating to these materials P,Q, and R used in a product

compute material variances.

Raw Material	Qty K.g.	Standard unit price Rs.	Total Rs	Qty unit	Actual price Rs.	Total Rs.
P	12	5	60	11	5	55
Q	8	8	64	9	9	81
R	<u>30</u>	2	<u>60</u>	<u>32</u>	2.50	<u>80</u>
	<u>50</u>		<u>184</u>	<u>52</u>		<u>216</u>
Less:						
Normal loss	4		-	16		
	<u>46</u>		<u>184</u>	<u>36</u>		<u>216</u>

36. From the following data for May 2009 of a factory, calculate.

- (i) Material cost variance (ii) Material price variance (iii) Material usage variance
(iv) Material mix variance (v) Material yield variance

Name of material	Standard Kg	Rate (Rs)	Kg.	Actual Rate (Rs)
X	8,000	1.05	7,500	1.20
Y	3,000	2.15	3,300	2.30
Z	2,000	3.30	2,400	3.50

37. Calculate: (i) Fixed Overheads Variance (ii) Expenditure Variance
(iii) Volume Variance (iv) Capacity Variance
(v) Efficiency Variance from the following data:

	Budget	Actual
Fixed Overheads for December	Rs. 20,000	Rs. 20,400
Units produced	10,000	10,400
Standard time for 1 unit 2hrs		
Actual Hours worked -20,200 hours		

38. Calculate different overhead variances and analyses their causes

	Budgeted	Actual
Fixed overhead costs	. 25,000	31,000
Hours	10,000	12,000
Output (in units)	1,000	1,200

39. ABC Ltd had budgeted the sales for December 1998.

- Product A 800 units @ Rs. 40 per unit
Product B 1000 units @ Rs. 60 per unit.

The actual sales were:

- Product A 900 units @ Rs. 45 per unit.
Product B 1100 units @ Rs. 70 per unit.

The cost per unit of A and B was Rs. 35 and Rs. 50 respectively. Calculate sales margin variance, sales margin price variance and sales margin quantity variance.

40. From the following information recommend the best sales mix:

Sales mix :

250 units of X and 250 units of Y
400 units of X and 100 units of Y
400 units of Y only.

Information :

Direct Materials : X - Rs. 8 per unit, Y- Rs.6 per unit

Direct Wages: X - Rs. 6 per unit, Y- Rs.4 per unit

Variable overhead - 150% of direct wages

Fixed Overheads – Rs.750

Selling Price : X – Rs.25 per unit Y – Rs.20 per unit

Unit V

41. What are the steps for effective reporting?
 42. What are the features of responsibility accounting?
 43. Discuss the importance of a proper system of reports
 44. What do you mean by MIS? What are its important elements?
 45. What are various kinds of reports? Why are they generally prepared by manufacturing enterprise for managerial control? What are the characteristics of a good reporting system.
 46. Explain the importance of proper system of reporting to the management. How the management accountant helps the management in this respect?
 47. What are the methods of Transfer pricing?
 48. What are the steps involved in responsibility accounting?
 49. What are the functions of Management Information System?
 50. Discuss the advantages and disadvantages of responsibility accounting.
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ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI
Modern Marketing - Sub. Code: 21PCOC12
Core-2 I.M.COM Semester –I
QUESTION BANK
(for those who joined in 2021 and after)

SECTION-A (1 MARK)

CHOOSE THE CORRECT ANSWER:

Unit I Modern Marketing:

1. _____ is also termed as “one-to-one marketing”
a) social marketing b) direct marketing c) online marketing **d) relationship marketing**
2. _____ is the process of building and maintaining profitable relationships with customers by delivering superior customer value and customer satisfaction.
a) social marketing b) online marketing **c) CRM** d) green marketing
3. Computer networks are used in _____ marketing.
a) social **b) online** c) relationship d) green
4. Routine decision behaviour is found in the cases of frequently purchased anditems.
a) low cost b) new c) unfamiliar d) existing
5. _____ marketing may be considered as non-profit marketing
a) social b) direct c) online d) relationship
6. _____ is also termed as “one-to-one marketing”
a) social b) direct c) online **d) relationship**
7. _____ is also termed as face- to-face or door -to- door selling
a) social **b) direct** c) online d) relationship
8. _____ are coin-operated machines which automatically sell merchandise without the aid of any sales assistants.
a) automatic teller machine **b) automated vending machines**
c) automatic mailing machine d) automated sending machine
9. _____ is the performance of marketing related activity by telephone.

21. _____ retailing organization works on co-operative principles.
 a) direct **b) co-operative** c) department d) hyper market
22. _____ is the granting of sole selling rights within a give geographical area.
a) retailing b) online marketing c) franchising d) super market
23. Super markets have a sales area of _____ square feet.
 a) below 10000 b) 10000-25000 c) 25000-50000 **d) above 50000**
24. _____ retailing uses the mail to get orders and also to facilitate the delivery.
a) mail order b) co-operative c) franchising d) super market
25. _____ is the use of advertising literature sent directly to the potential customer for the purpose of selling goods or services.
a) direct mail b) online mail c) indirect mail d) office mail
26. _____ supply goods and services for personal or household use by consumers via the internet or other electronic channels.
a) e-tailing b) retailing c) franchising d) super market
27. _____ are otherwise known as travelling shops.
 a) retail shops **b) mobile shops** c) whole sale shops d) off line shop
28. Theme park is an example for _____
a) service retailing b) whole sale c) franchising d) super market
29. EPOS refers to _____
 a) Electronic pricing offer service **b) Electronic point of sale system**
 c) Electronic promotion of system d) Electronic point of service
30. _____ consists of a series of bars that can be read by the laser scanner in addition to a human readable number.
 a) sensor coding **b) bar coding** c) system coding d) digital coding

Unit IV Services Marketing

31. _____ are the intangible activities which provide satisfaction to customers.
 a) goods **b) services** c) products d) commodities
32. _____ consists of products, price, promotion and distribution.
 a) promotion mix b) product mix **c) marketing mix** d) sales mix
33. Prices of public utility services are fixed by the _____.
 a) customer b) public c) trader **d) government**
34. The _____ cannot be separated from the person who sells it.
 a) product b) service **c) utility** d) advertisement
35. _____ is the back bone of service sector.
 a) personnel selling **b) advertisement** c) sales promotion d) publicity
36. _____ consists of the steps or procedures through which service is provided to customers.
a) service delivery process b) service concept
 c) service forms d) service offer
37. _____ customers repeat purchase transaction and refer to other customers.
 a) interested **b) satisfied** c) dissatisfied d) modern
38. Which of the following is not a service sector?
 a) hotel industry b) public utility c) telecom industry **d) retailing**
39. Which of the following is a service sector?
 a) wholesale b) retailing **c) tourism industry** d) direct marketing
40. Marketing of service can be successful only if the service product match with _____.
a) customer's view point b) behaviour c) attitude d) tastes

Unit V Marketing Research:

41. _____ is the systematic design, collection analysis and reporting of data and findings relevant to a specific marketing situations facing the company.

- a) **Marketing research** b) Market research c) External database d) Internal database

42. _____ is only a part of marketing research and covers a few aspects of marketing.

- a) Marketing research b) **Market research** c) External database d) Internal database

43. _____ is a part of marketing research.

- a) Marketing research b) **Market research** c) External database d) Internal database

44. Marketing research is the study of -----.

- a) Passive behaviour b) Buying behavior c) **Human behaviour** d) Social behavior

45. _____ are regularly scheduled reports produced and sold by marketing research firms.

- a) Syndicated services b) **Marketing information system**

- c) Decision support system d) Market research projects

46. _____ permits a decision maker to interact directly with data through a PC to answer specific questions.

- a) **Syndicated services** b) Marketing information system

- c) Decision support system d) Market research projects

47. _____ deals with the problems in sales, salesman, evaluation of sales method and incentives.

- a) **Sales research** b) Product research c) Packaging research d) Advertisement research

48. _____ relates to the product strength or weakness, product testing problems etc.

- a) Sales research b) **Product research** c) Packaging research d) Advertisement research

49. _____ is a part of product research.

- a) Sales research b) Product research c) **Packaging research** d) Advertisement research

50. The data collected for a purpose or for a particular problem in original is known as ____ .

- a) **Primary data** b) Random c) Secondary data d) Sampling

SECTION-B (2 MARKS)

UNIT-I

1. What is online marketing?
2. What is social marketing?
3. What is direct mail marketing?
4. Define CRM.
5. What is direct marketing?
6. What is telemarketing?
7. What is green marketing?
8. What is kiosk marketing?
9. What is catalogue marketing?
10. What is e-marketing?

UNIT-II

1. What is consumer behaviour?
2. Define the term consumerism.
3. What is known as internal motive?
4. What is patronage motive?
5. Who is prospective customer? Explain with example.
6. What is post purchase behaviour?
7. List out any five Acts supporting consumerism.
8. What is known as rational motives?
9. What do you mean by external motives?
10. What is emotional motive?

UNIT-III

1. What is retail marketing?
2. Mention any four reasons for retail marketing?
3. What is discount store?
4. What is departmental store?
5. What do you mean by hypermarkets?
6. What is franchising?
7. What is service retailing?
8. What is e-tailing?
9. What is segmentation retail strategy?
10. What is co-operative retailing?

UNIT-IV

1. What is service marketing?
2. Define the term service.
3. What are the 7 p's marketing mix in service marketing?
4. Mention the kinds of services.
5. Mention the distinctive features of services.
6. What is service forms?
7. What is differential pricing in service marketing?
8. What is diversionary pricing for services?
9. What is service quality?
10. What is service differentiation?

UNIT-V

1. What is market research?
2. What is sampling?
3. Define the term marketing research.
4. What is sales research?
5. What are the external source of data?
6. What is Packaging research?
7. What is product research?
8. What is export marketing research?
9. What are the internal source of data?
10. Mention the kinds of sampling.

SECTION-C (5 MARKS)

UNIT-I

1. Discuss in detail about the building and managing customer relation.
2. Explain the advantages of online marketing.
3. Explain briefly the reasons for recent growth in online marketing.
4. What are the special features of online marketing?
5. Briefly explain the reasons for recent growth in CRM.
6. Explain the advantages of direct marketing.
7. Distinguish between social marketing & green marketing.
8. Define relationship marketing. Why relationship marketing has become important?
9. Explain the merits & demerits of social marketing.
10. Explain the different forms of direct marketing.

UNIT-II

1. Discuss the importance of buying motives.
2. What are the benefits of consumerism.
3. Explain briefly the theories of buyer behaviour.
4. Explain the factors influencing the consumer buying behavior?
5. Explain about psychological theories of consumer buying behaviour?
6. Enumerate the socio-psychological theories.
7. Explain about the important buying motives influencing the ultimate buying behaviour.
8. Enumerate the consumer exploitation in India.
9. “Consumerism is an outcome of sufferings and exploitation of consumers”- support this statement.
10. Explain briefly about any five Acts supporting & safeguarding consumer rights.

UNIT-III

1. Enumerate the importance of developing and applying retail strategy.
2. Explain the pricing strategy for retailers.
3. Explain the main drives of retailing in India.
4. Explain the various functions of retailing.
5. Explain the various factors influencing the retail pricing decisions.
6. Describe the approaches to price the retail product.
7. ‘Channels of distribution enables to maintain a good retailer and customer relationship’- Elucidate.
8. Explain the various strategies adopted by organization for building customer relationship in retail marketing.
9. Enumerate the major problems encountered by the retail sector in India.
10. Discuss the challenges in retail marketing.

UNIT-IV

1. Explain the various classifications of services.
2. Explain the elements of marketing mix for services.
3. Explain the major reasons for the phenomenal growth in service marketing.
4. Explain the role of 7 p’s marketing mix in service marketing.
5. Explain the various strategies adopted by organization for building customer relationship in service marketing.
6. Explain the pricing strategy of service sector.
7. Enumerate the major problems encountered by the service sector in India.
8. Explain the role of promotion in service marketing.
9. ‘Services marketing requires an extended marketing mix’ –elucidate.
10. Discuss the challenges in service marketing.

UNIT-V

1. Enumerate the elements of marketing research.
2. What are the advantages and uses of marketing research?
3. What are the different sources of data?
4. Enumerate the various types of samples.
5. What is marketing research? Discuss its nature.
6. What are the various forms of experimental methods?
7. Enumerate the limitations of marketing research.
8. Write about the importance of marketing research?
9. What are the objectives of marketing research?
10. Discuss the scope of marketing research.

PART-D (10 MARKS)

UNIT-I

1. Discuss the major channels for direct marketing.
2. Briefly discuss the recent innovations in modern marketing.
3. Explain the features & importance of modern marketing.
4. Explain the major channels of direct marketing.
5. Explain the remarkable functions of online marketing.
6. Explain the various factors influencing the modern marketing.
7. Enumerate the merits & ill-effects of direct marketing.
8. Explain social marketing with four p's of marketing mix & explain it with an example.
9. Enumerate the major problems of modern marketing management in India.
10. What is CRM? Explain the new strategies for building relationship with customers.

UNIT-II

1. Explain briefly the Marshallian Model & also the factors influencing a buyer's behaviour according to this theory?
2. "The study of buyer behaviour is essential to understand what marketing is"- Explain the concept.
3. Explain briefly the consumer behaviour theories.
4. Enumerate the buying decision process in consumer behaviour.
5. Explain the evolution of consumerism.
6. Define the concept of buying behaviour? Why is it desirable to study it in marketing?
7. What do you mean by buying motives? Explain the importance of studying consumer behaviour in marketing.
8. Enumerate the major problems of consumers' exploitation in India.
9. How did consumerism originate? Enumerate the present scenario of consumerism in India.
10. What is meant by buying motives of consumers? Explain the various types of buying motives?

UNIT-III

1. Enumerate the importance of developing and applying retail strategy.
2. Explain the pricing strategy for retailers.
3. Explain the main drives of retailing in India.
4. Explain the various functions of retailing.
5. Explain the various factors influencing the retail pricing decisions.
6. Describe retail management activities.
7. 'Channels of distribution enables to maintain a good retailer and customer relationship'- Elucidate.
8. Explain the various strategies adopted by organization for building customer relationship in retail marketing.
9. Enumerate the major problems encountered by the retail sector in India.
10. Discuss the challenges in retail marketing.

UNIT-IV

1. Explain the various classifications of services.
2. Explain the elements of marketing mix for services.
3. Explain the major reasons for the phenomenal growth in service marketing.
4. Explain the role of 7 p's marketing mix in service marketing.
5. Explain the various strategies adopted by organization for building customer relationship in service marketing.
6. Explain the pricing strategy of service sector.
7. Enumerate the major problems encountered by the service sector in India.
8. Explain the role of promotion in service marketing.
9. 'Services marketing requires an extended marketing mix' –elucidate.
10. Discuss the challenges in service marketing.

UNIT-V

1. What are the various method of sampling?
2. Mention the various stages in the process of marketing research.
3. Explain market information system. What are the different sources for obtaining information for effective marketing management?
4. Discuss the various methods of collecting primary data.
5. Explain the various planning strategies adopted by organization for building customer relationship in marketing research.
6. Discuss the role of marketing research in decision making.
7. "Marketing research is a continuous process". Do you agree? Is it necessary to carry on marketing research to remain as leader in the market?
8. Enumerate the major problems encountered by the marketing research.
9. Discuss about the emerging issues in marketing research.
10. Explain the advantages and limitations of marketing research.

St. Mary's College (Autonomous) – Thoothukudi

Statistics for Research - Sub.code: 21PCOC13

Core-3 I M.Com Semester – I

Question Bank

Unit – I Probability and Theoretical Distribution:

- A probability is a number which ranges from _____
 - Zero to one
 - One to two
 - Two to three
 - Three to four
- The basic assumption underlying the classical theory is that the outcomes of a random experiment is _____
 - Less than one
 - Equal to one
 - Greater than one
 - Equally likely
- As per addition Theorem of probability, when A and B are mutually exclusive events _____
 - $P(A + B) = P(A) + P(B)$
 - $P(A+B) = P(A) \times P(B)$
 - $P(A+B) = P(A) + P(B) - P(AB)$
 - $P(A+B) = P(A + P(B)) \times P(AB)$
- The parameter of the Poisson distribution is _____
 - 'p'
 - 'P'
 - 'm'
 - 'S'
- The result of a random experiment is called an _____
 - Outcome
 - Event
 - Probability
 - Non-Event
- The probability of a given event is an expression of _____ of an event.
 - Chance of occurrence
 - Acceptance
 - Rejection
 - modification
- The probability of occurrence of an event is _____
 - $P(A) = \frac{\text{No.of favourable cases}}{\text{Total no.of equally likely cases}}$
 - $P(A) = \frac{\text{No.of unfavourable cases}}{\text{Total no.of equally likely cases}}$
 - $P(A) = \frac{\text{Total no.of cases}}{\text{no.of favourable cases}}$
 - $P(A) = \frac{\text{Total No.of cases}}{\text{no.of unfavourable cases}}$
- The probability of non-occurrence of an event is _____
 - $P(\bar{A}) = \frac{\text{No.of favourable cases}}{\text{Total no.of equally likely cases}}$
 - $P(\bar{A}) = \frac{\text{No.of unfavourable cases}}{\text{Total no.of equally likely cases}}$
 - $P(\bar{A}) = \frac{\text{Total no.of cases}}{\text{no.of favourable cases}}$
 - $P(\bar{A}) = \frac{\text{Total No.of cases}}{\text{no.of unfavourable cases}}$
- Two events are said to be mutually exclusive when both _____ happen simultaneously in a single trail.
 - can
 - cannot
 - may
 - may not

10. As per multiplication theorem of probability when A & B are independent events

- _____
- a) $P(A \text{ and } B) = P(A) + P(B)$
 - b) $P(A \text{ and } B) = P(A) \times P(B)$
 - c) $P(A \text{ and } B) = P(A) + P(B) - P(AB)$
 - d) $P(A \text{ and } B) = P(A) + P(B) \times P(AB)$

Ans: 1. (a) 2. (d) 3. (a) 4.(c) 5.(a) 6. (a) 7. (a) 8.(b) 9. (b) 10.(b)

Unit - II - Tests of Hypotheses

1. Type I error is an error committed when one _____
 - a) Reject a null hypothesis which is true
 - b) Accept a null hypothesis which is false
 - c) Reject a null hypothesis which is false
 - d) Accept a null hypothesis which is true
 2. Type II error is an error committed when one _____
 - a) Reject a null hypothesis which is true
 - b) Accept a null hypothesis which is false
 - c) Reject a null hypothesis which is false
 - d) Accept a null hypothesis which is true
 3. A statistical measure computed from population data is known as _____
 - a) Parameter
 - b) Statistic
 - c) Sample
 - d) hypothesis
 4. The 't' - test ,may be applied when the sample size is _____
 - a) Less than 10
 - b) less than 20
 - c) less than 30
 - d) less than 40
 5. A single value of a statistic that is used to approximate a population parameter is called a _____
 - a) Point estimate
 - b) Interval estimate
 - c) Continuous estimate
 - d) Sequence estimate
 6. In case the number of frequencies put in cells in a contingency table, the degrees of freedom will be _____
 - a) $n - 1$
 - b) $n - 3$
 - c) $n - 2$
 - d) $(c-1)(r-1)$
 7. The standard deviation of the sampling distribution is called _____
 - a) Standard error
 - b) Quartile deviation
 - c) Mean deviation
 - d) Normal deviation
 8. In the binomial distribution the probability of success in each trial _____
 - a) Remain constant
 - b) Varies positively
 - c) Varies negatively
 - d) Varies proportionately
 9. The _____ asserts that there is no real difference in the sample and the population.
 - a) Null hypothesis
 - b) Alternate hypotheses
 - c) Type - I error
 - d) Type - II error
 10. To test the significance for large samples one can use _____
 - a) 'Z' - test
 - b) 't' test
 - c) 'F' test
 - d) X^2 - test
- Ans: 1. (a) 2. (b) 3. (a) 4.(c) 5.(a) 6. (d) 7. (a) 8.(a) 9. (a) 10.(a)**

Unit - III - Non - Parametric Test and Analysis of Variances:

1. The sum of the observed and expected frequency is always equal to _____

- a) Upper & lower b) Normal c) Upper d) Lower
8. Which of the following is not a commonly used control charts?
 a) \bar{x} - chart b) R – chart c) C – chart d) Z – chart
9. The various techniques used for SQC are _____
 a) process control b) product control
 c) Acceptance sampling d) All of the above
10. The process is said to be out of control if any _____ values fall outside the control limits.
 a) Three b) Five c) One d) All
- Ans: 1. (a) 2. (b) 3. (b) 4.(a) 5.(a) 6. (d) 7. (a) 8.(d) 9. (d) 10.(c)**

Unit- V -Decision Theory

- 1 The decision theory deals with the selection of an act which is _____ among the given alternatives.
 a) Best b) Least c) Highest d) Worst
- 2.The quantitative techniques used in analyzing a decision situation is called _____
 a) SQC b) Statistical decision theory
 c) Parametric Tests d) Non-parametric tests
3. In decision theory outcome refers to _____
 a) Act b) States of nature
 c) Act and each of the states of nature d) Pay – off
4. In decision theory pay – off refers to _____
 a) Act b) States of nature
 c) Outcome d) Monetary gain or loss from each of the outcomes
5. The difference between profit actually derived from a certain decision and that which would have been derived from the best of the event is called _____
 a) Pay – off b) Out comes c) Opportunity loss d) Utility
6. In case of certain business situations the decisions are based on _____ are considered
 a) Pay – off b) Events c) Outcomes d) Utility
7. In case of uncertain business situations the decisions are based on _____ are considered
 a) Acts only b) Events only
 c) Outcomes only d) Outcomes with their respective probability
8. The structure of a decision process is called a _____
 a) Decision tree analysis b) SQC c) Decision theory d) Variance analysis
9. The important criteria to select an optimal decision is _____
 a) Maximin principle b) Minimax principle
 c) Baye’s principle d) All of the above
10. The _____ analysis is an important tool in complicated kinds of decision problems.
 a) Decision Tree b) Variance c) SQC d) Decision Theory
- Ans: 1. (a) 2. (b) 3. (d) 4.(d) 5.(b) 6. (c) 7. (d) 8.(a) 9. (d) 10.(d)**

Section –B (2 Marks)

Answer in about 50 words each:

Unit 1

1. Define the term probability.
2. What is Binominal distribution?
3. What is Poisson distribution?
4. What is Normal distribution?
5. What are events?
6. What are independent events?
7. What are dependent events?
8. What are composite events?
9. What are simple events?
10. What are mutually exclusive events?

Unit -II

1. What are null and alternate hypotheses?
2. What are Type I and Type II Errors?
3. What is sampling theory?
4. What is level of significance?
5. What are one and two tailed tests?
6. What is a hypothesis?
7. What is a parameter?
8. What is a test statistic?
9. What is estimation?
10. What are point and interval estimation?

Unit -III

1. What is χ^2 – test?
2. State the advantages of ANOVA?
3. What is test of goodness of fit?
4. What is sign test ?
5. What is Yate's correction?
6. What is "F"-test?
7. What is "ANOVA"?
8. Draw a proforma ANOVA table.
9. State the advantages of χ^2 – test.
10. State the characteristics of χ^2 – test.
11. What is Rank-sum test ?

Unit -IV

1. What is SQC?
2. State the advantages of SQC.
3. State the advantages of control charts.
4. What are defective charts?
5. What is process control?
6. What is product control?

7. What are control charts?
8. What are mean charts?
9. What are range charts?
10. What is acceptance sampling?

Unit –V

1. What is pay-off?
2. What is utility?
3. What is opportunity loss?
4. What is outcome?
5. What is decision tree analysis?
6. What is decision frame work?
7. What are events?
8. What are states of nature?
9. What are decisions?
10. What is EVPI?

Section –C (6 Marks)

Unit-I

1. A problem in statistics is given to five students A, B, C, D and E. Their chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$. What is the probability that the problem will be solved?
2. The probability that a contractor will get a plumbing contract is $\frac{2}{3}$ and the probability that he will not get an electric contract is $\frac{5}{9}$. If the probability of getting at least one contract is $\frac{4}{5}$, what is the probability that he will get both the contracts?
3. One card is drawn from a standard pack of 52. What is the probability that it is either King or a Queen?
4. A ball is drawn at random from a box containing 6 red balls, 4 white balls and 5 blue balls. Determine the probability that it is:
 - i) Red
 - ii) White
 - iii) Blue
 - iv) Not red
 - v) Red or White.
5. Find the probability of drawing a queen, a king and a knave in that order from a pack of cards in three consecutive draws, the cards drawn not being replaced.
6. A Bag contains 6 white, 4 red and 10 black balls. Two balls are drawn at random. Find the probability that they will both be black.
7. Three groups of workers contain 3 men and one woman, 2 men and 2 women, and 1 man and 3 women respectively. One worker is selected at random from each group. What is the probability that the group selected consists of 1 man and 2 women

8. A bag contains 8 white and 4 red balls. Five balls are drawn at random. What is the probability that 2 of them are red and 3 white?
- 9.. What is the probability that the leap year, selected at random, will contain 53 Sundays?
10. A Bag contains 30 balls numbered for 1 to 30. One ball is drawn at random. Find the probability that the number of the ball drawn will be a multiple of
 - a) 5 or 7 and
 - b) 3 or 7.

Unit-11

1. An IQ test was administered to 5 persons before and after they were trained. The results are given below

Candidates	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after the training programme.

2. In a sample of 600 men from a certain city, 450 men are found to be smokers. In another sample of 900 from another city 450 are found to be smokers. Do the data indicate that the two cities are significantly different with respect to prevalence of smoking habit among men?
3. A group of 5 patients treated with medicine 'A' weigh 42, 39, 48, 60 and 41 kgs; second group of 7 patients from the same hospital treated with medicine 'B' weigh 38,42,56,64,68,69 and 62 kgs. Do you agree with the claim that medicine 'B' increases the weight significantly?
4. A certain stimulus administered to each of the 12 patients resulted in the following increase of blood pressure. 5 , 2, 8, -1, 3, 0 , -2 ,1, 5, 0, 4 and 6 .
Can it be concluded that the stimulus will, in general be accompanied by an increase in blood pressure?
5. Prices of shares of a company on the different days in a month were found to be 66, 65, 69, 70, 69, 71, 70, 63, 64 and 68
Discuss whether the mean price of the shares in the month is 65
6. Electric bulbs manufactured by X and Y companies gave the following results:

	X. Co	Y. Co
No. of bulbs used	100	100
Mean life in hours	1300	1248
Standard deviation in hours	82	93

 Using standard error of the difference between means, state whether there is any significant difference in the mean life of the two makes.
7. In two large populations there are 30% and 25% respectively of curly haired

people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?

8. A random sample of 16 items from a normal population showed a mean of 53 and a sum of squares of deviation from this mean equal to 150. Obtain 95% and 99% confidence limits of mean of the population.
9. Before an increase in excise duty on tea, 400 people out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 people were tea drinkers in a sample of 600 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea.
10. 12 Students were given intensive coaching and 5 tests were conducted in a month. The scores of tests 1 and 5 are given below. Do the scores from tests 1 to 5 show an improvement?

Marks in test-1	50	42	51	26	35	42	60	41	70	55	62	38
Marks in test-5	62	40	61	35	30	52	68	51	84	63	72	50

Unit-III

1. From the data given below about the treatment of 250 patients suffering from a disease, state whether the new treatment is superior to the conventional treatment:

Treatment	No. of patients		
	Favorable	Not favorable	
Total			
New	140	30	170
Conventional	60	20	80
Total	200	50	250

2. 1,000 students at college level are graded according to their I.Q. and their economic conditions. Use chi – square test to find out whether there is any association between economic condition and the level of I.Q.

Economic conditions	I.Q		
	High	Medium	Low
Total			
Rich	160	300	140
600			
Poor	140	100	160
400			
Total	300	400	300
1,000			

3. 200 digits are chosen at random from a set of tables. The frequencies of the digits are as follows:

Digits	:	0	1	2	3	4	5	6	7	8	9
Frequency	:	18	19	23	21	16	25	22	20	21	15

Use the chi – square test to find out whether the frequencies are equally distributed in the table from which they were chosen.

4. A set of 5 coins is tossed 3,200 times, and the number of heads appearing each time is noted. The results are given below:

No. of heads	0	1	2	3	4	5
Frequency	80	570	1,100	900	500	50

Test the hypothesis that the coins are unbiased.

5. The figures given below are (a) the theoretical frequencies of a distribution, and (b) the frequencies of the normal distribution having the same mean, standard deviation and the total frequencies as in (a):

(a)	1	5	20	28	42	22	15	5	2
(b)	1	6	18	25	40	25	18	6	1

Apply the χ^2 test of goodness of fit.

6. A sample analysis of examination result of 500 students was made. It was found that 220 students had failed, 170 had secured a third class, 90 were placed in second class and 20 got a first class. Are these figures commensurate with the general examination result which is in the ratio of 4 : 3 : 2 : 1 for the various categories respectively (the table value of χ^2 for 3 d.f. at 5% level of significance is 7.81)?

7. 1,000 students at college level were graded according to their I.Q. and the economic conditions of their homes. Use χ^2 test to find out whether there is any association between economic condition at home and I.Q.

Economic Condition	I.Q.		Total
	High	Low	
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

Given for $v = 1$, $\chi^2_{0.05} = 3.84$.

8. 4 coins were tossed 160 times and the following results were obtained:

No of heads	:	0	1	2	3	4
Observed frequency	:	17	52	54	31	6

Under the assumption that coins are balanced, find the expected frequencies of getting 0, 1, 2, 3, or 4 heads and test the goodness of fit.

9. The demand for a particular spare part in a factory was found to vary from day to day. In a sample study the following information was obtained:

Days:	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
No of parts						

Demanded: 1,124 1,125 1,110 1,120 1,126 1,115
 Test the hypothesis that the number of parts demanded does not depend on the day of the week.

(The table value of χ^2 for 5 d.f. at 5% level of significance is 11.07).

10. A milk producers union wishes to test whether the preference pattern of consumers for its products is dependent on income levels. A random sample of 500 individuals gives the following data:

Income	Product preferred		
	Product A	Product B	Product C
Low	170	30	80
Medium	50	25	60
High	20	10	55

Can you conclude that the preference patterns are independent of income levels?

11. Test – the hypothesis of no difference between ages of male and female employees of a certain company using the Mann – Whitney ‘U’ test for the sample data below at 10% level of significance.

Male	31	25	38	33	42	40	44	26	43	35
Female:	44	30	34	47	35	32	35	47	48	34

12. Use the sign test to see if there is a difference between the number of days until collection of an account receivable before and after a new collection policy. Use 5% level of significance.

Before:	30	28	34	35	40	42	33	38	34	45	28	27	25	41	36
After :	32	29	33	32	37	43	40	41	37	44	27	33	30	38	36

Unit-1V

1) The following data refers to visual defects found in the inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defective in samples of 100. Represent the first ten sample results in the chart you prepare:

Sample No	1	2	3	4	5	6	7	8	9	10
Total										
No. of Defectives	2	1	1	3	2	3	4	2	2	0

2) Draw the mean and range charts and comment on the state of control of the

Process (Given $A_2 = 0.58$, $D_3 = 0$ and $D_4 = 2.115$)

Sample No:	1	2	3	4	5	6	7	8	9	10
X	15	17	15	18	17	14	18	15	17	16
R:	7	7	4	9	8	7	12	4	11	5

3. A plant produces rolls of paper. The number of defects disclosed by the inspection of 20 rolls are as follows:

12, 6, 18, 4, 5, 2, 4, 7, 12, 14, 8, 11, 14, 21, 21, 10, 12, 9, 13, 10.

Comment on the state of control using C – chart.

4. 20 Tape recorders were examined for quality control test. The number of defects for each tape recorded are given below:

2, 4, 3, 1, 1, 2, 5, 3, 6, 7, 3, 1, 4, 2, 3, 1, 6, 4, 1, 1.

Prepare a C – chart. What conclusions do you draw from it?

5. Construct mean and range chart for the following data:

Sample Number	Observation		
1	32	37	42
2	28	32	40
3	39	52	28
4	50	42	31
5	42	45	34
6	50	29	21
7	44	52	35
8	22	35	44

(Given: for $n = 3$, $A_3 = 1.023$, $D_3 = 0$, $D_4 = 2.575$)

6. The following data refer to visual defects found in the inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defective in samples of 100. Represent the first ten sample results in the chart you prepare.

Sample No	1	2	3	4	5	6	7	8	9	10	Total
No. of Defectives	2	1	1	3	23	4	2	2	2	0	20

7. A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Below are given relevant data:

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and the control limits for mean chart and then comment on the state of control.

8. Ten samples each of size 5 are drawn at regular intervals from a manufacturing process. The sample means and their ranges (R) are given below:

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	49	45	48	53	39	47	46	39	51	45
Range	7	5	7	9	5	8	8	6	7	6

Calculate the control limits in respect of mean chart and range chart. (You are given: $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.115$) Comment on the state of control.

9. Samples of 100 tubes are drawn randomly from the output of a process that produces several thousand units daily. Sample items are inspected and defective tubes are rejected. The results of 15 sample are shown below:

Sample No.	No of defective tubes	Sample No.	No. of defective tubes
1	8	9	10
2	10	10	13
3	13	11	18
4	9	12	15
5	8	13	12
6	10	14	14
7	14	15	9
8	6		

On the basis of information given above prepare a control chart for fraction defective. What conclusion do you draw from the control chart?

10. In a certain sampling inspection, the number of defectives found in 10 samples of 100 each

are given below:

16, 18, 11, 18, 21, 10, 20, 18, 17 and 21.

Do these indicate that quality characteristic under inspection is under statistical control?

11. Each of 20 lots of rubber belts contains 2000 belts. Numbers of defectives found are 410,420,324,332,292,310,282,300,320,296,392,432,294,324,220,400,258,226,460,280 belts

Calculate control limits for fraction defective chart and give your conclusion.

Unit-V

1. Calculate the opportunity loss tables from the following pay off table

Action	Pay of table			
	Events			
	E1	E2	E3	E4
A1	50	300	-150	50
A2	400	0	100	0
A3	-50	200	0	100
A4	0	300	300	0

2. A bakery produces a certain type of special item at a total average cost of Rs. 3 and sells it at a price of Rs. 5. This item is produced over the weekend and is sold during the following week; such item being produced but not sold during a week's time are totally spoiled and have to be thrown away. According to past experience the weekly

demand for these items is never less than 78 or greater than 80. You are required to formulate action space, pay off table and loss table.

3. A businessman wants to construct a hotel. He usually builds 25, 50 or 100 beds hotel, depending on whether anticipated demand is low, medium or high. The businessman has to find out net profits which are expressed in the table below and the prior distribution regarding the states of nature which is given in the next table.

PAYOFF TABLE

Action Status Of nature	A ₁ Build 25 – beds hotel	A ₂ Build 50 – beds hotel	A ₃ Build 100 – beds hotel
$\theta =$ low demand	20,000	- 10,000	- 30,000
$\theta =$ Medium demand	25,000	30,000	- 5,000
$\theta =$ High demand	30,000	50,000	60,000

PRIOR DISTRIBUTION

States of nature = demand	θ_1	θ_2	θ_3	Total
Prior probabilities (θ_i)	0.2	0.3	0.5	1.00

- a) Compute EP, EPPI and EVPI.
 - b) A research firm agrees to conduct a survey for Rs. 8,000 for a businessman and provides him with information regarding the states of nature. Should the survey be conducted?
4. The marketing department of the company worked out the payoffs in teams of yearly net profits for each of the strategies for these events (expected sales). This is represented in the following table:

State of nature strategies	Payoffs (in Rs.)		
	N ₁	N ₂	N ₃
S ₁	7,00,000	3,00,000	1,50,000
S ₂	5,00,000	4,50,000	0
S ₃	3,00,000	3,00,000	3,00,000

Which strategy should the executive concerned choose on the basis of

- a) Maximum Criterion..
- b) Maximax Criterion.
- c) Minimax Regret Criterion.

d) Laplace Criterion.

5. A group of students raises money each year by selling souvenirs outside the stadium after a cricket match between teams A and B. They can buy any of three different types of souvenirs from a supplier. Their sales are mostly dependent on which team wins the match. A conditional pay – off table is as under:

Type of souvenirs

	I	II	III
Team A wins	Rs. 1,200	Rs. 800	Rs. 300
Team B wins	Rs. 250	Rs. 700	Rs. 1,000

i) Construct the opportunity loss table

ii) Which type of souvenir should the student buy if probability of team A's winning is 0.6?

6. A newspaper distributor assigns probabilities to the demand to the magazine as follows

Copies demanded	1	2	3	4
Probability	0.4	0.3	0.2	0.1

A copy of the magazine sells for Rs. 7 costs Rs. 6. What can be the maximum possible Expected Monetary Value (EMV) if the distributor can return unsold copies for Rs. 5 each?

7. A decision matrix with cost data in (Rs.'000') is given below:

Status of nature				
Alternatives	S ₁	S ₂	S ₃	S ₄
A ₁	1	3	8	5
A ₂	2	5	4	7
A ₃	2	6	6	3
A ₄	6	8	3	5

Find the cost alternative using:

i) Maximin Criterion..

ii) Maximax Criterion.

iii) Minimax Regret Criterion.

8. The marketing department of the company worked out the payoff in terms of yearly new profits for each of the strategies for three events (expected sales). This is represented in the following table:

Status of nature / strategies	Payoff (in '000 Rs.)		
	P ₁	P ₂	P ₃
S ₁	700	300	150
S ₂	500	450	100

4. The Managing Committee of Vaishalli Welfare Association formed a sub – committee of 5 Persons to look into electricity problems. Profiles of the 5 persons are:

- a) Male Age 40
- b) Male age 43
- c) Female age 38
- d) Female age 27
- e) Male age 65

If a chairperson has to be selected from this, what is the probability that he would be either female or over 30 years?

5. An article manufactured by a company consists of two parts A and B. in the process of manufacture of part A, 9 out of 100 are likely to be defective. Similarly 5 out of 100 are likely to be defective in the manufacture of part B. Calculate the probability that the assembled part will not be defective.

6. The probability that a contractor will get a plumbing contract is $\frac{2}{3}$ and the probability that he will not get an electric contract is $\frac{5}{9}$. If the probability of getting at least one contract is $\frac{4}{5}$, what is the probability that he will get both the contracts.

7. The personal department of a company has records which show the following analysis of its 200 engineers:

Age (Years)	Bachelor's degree Only	Master's degree	Total
Under 30	90	10	100
30 to 40	20	30	50
Over 40	40	10	50
Total	150	50	200

If one engineer is selected at random from the company, find:

- a) The probability that he has only a bachelor's degree;
- b) The probability that he has a master's degree given that he is over 40;
- c) The probability that he is under 30 given that he has only a bachelor's degree.

8. In a Certain town, males and females form 50 percent of the population. It is known that 20 percent of the males and 5 percent of the females are unemployed. A research student studying the employment situation selects unemployed persons at random. What is the probability that the person selected is (a) male, (b) female?

9. A Bag contains 5 white and 8 red balls. Two drawings of 3 balls are made such that

- a) The balls are replaced before the second trail, and
- b) The balls are not replaced before the second trail

Find the probability that the first drawings will give 3 white and the second 3 red balls in each case.

10. The data for the promotion status and academic qualification regarding 100 employees of a company is as follows:

Total	Academic qualification	
	MBA	Non - MBA
Promotional status		

Promoted	12	48
60		
Not promoted	18	22
40		
Total	30	70
100		

At random one employee is picked up. What is the probability that

- i) He is an MBA
- ii) He is promoted
- iii) He is promoted given that he is an MBA, and
- iv) He is an MBA given that he is not promoted?

Unit -11

1. A group of 5 patients treated with medicine 'A' weigh 42, 39, 48, 60 and 41 kgs; second group of 7 patients from the same hospital treated with medicine 'B' weigh 38,42,56,64,68,69 and 62 kgs. Do you agree with the claim that medicine 'B' increases the weight significantly?

2. Prices of shares of a company on the different days in a month were found to be 66, 65, 69, 70, 69, 71, 70, 63,64 and 68

Discuss whether the mean price of the shares in the month is 65.

3. Electric bulbs manufactured by X and Y companies gave the following results

	X. Co	Y. Co
No. of bulbs used	100	100
Mean life in hours	1300	1248
Standard deviation in hours	82	93

Using standard error of the difference between means, state whether there is any significant difference in the mean life of the two makes.

4. An IQ test was administered to 5 persons before and after they were trained. The results are given below

Candidates	I	II	III	IV	V
IQ before training	110	120	123	132	125
IQ after training	120	118	125	136	121

Test whether there is any change in IQ after the training programme.

5. In a sample of 600 men from a certain city, 450 men are found to be smokers. In another

sample of 900 from another city 450 are found to be smokers. Do the data indicate that the two cities are significantly different with respect to prevalence of smoking habit among men?

6. A certain stimulus administered to each of the 12 patients resulted in the following increase of blood pressure.

5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4 and 6. Can it be concluded that the stimulus will, in general be accompanied by an increase in blood pressure?

7. In two large populations there are 30% and 25% respectively of curly haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations?
8. A random sample of 16 items from a normal population showed a mean of 53 and a sum of squares of deviation from this mean equal to 150. Obtain 95% and 99% confidence limits of mean of the population.
9. Before an increase in excise duty on tea, 400 people out of a sample of 500 persons were found to be tea drinkers. After an increase in duty, 400 people were tea drinkers in a sample of 600 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea.
10. In a sample of 600 men from a certain city, 450 men are found to be smokers. In a sample of 900 from another city 450 are found to be smokers. Do the data indicate that the two cities are significantly different with respect to prevalence of smoking habit among men?

Unit -111

1. The following data represents the number of units of production per day turned out by 5 different workers using 4 different types of machines:

		Machine type			
		A	B	C	D
Workers	1	44	38	47	36
	2	46	40	52	43
	3	34	36	44	32
	4	43	38	46	33
	5	38	42	49	39

- a) Test whether the mean productivity is the same for the different machine types.
 b) Test whether the 5 men differ with respect to mean productivity.

2. The following data represents the number of units of production per day turned out by 4 different workers using 4 different types of machines:

Workers	Machine type			
	A	B	C	D
1	40	36	45	30
2	38	42	50	41
3	36	30	48	35
4	46	47	52	44

- a) Test whether the mean productivity is the same for the different machine types.
 b) Test whether the 4 men differ with respect to mean productivity.

3. The distribution of typing mistakes committed by a typist is given below. Assuming a Poisson model find out the expected frequencies and test the goodness of fit.

Mistakes per page:	0	1	2	3	4	5
No. of page	142	156	69	27	5	1

4. A survey of 320 families with 5 children each revealed the following distribution.

No. of boys	5	4	3	2	1	0
No. of girls	0	1	2	3	4	5
No. of families	14	56	110	88	40	12

Is the result consistent with the hypothesis that male and female births are equally probable?

5. 1,000 students at college level were graded according to their I.Q. and the economic conditions of their homes. Use χ^2 test to find out whether there is any association between economic condition at home and I.Q.

Economic Condition	I.Q.		Total
	High	Low	
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

Given for $v = 1$, $\chi^2_{0.05} = 3.84$.

6. The following figures related to the number of units sold in five different areas by four salesmen:

Area	Number of units			
	A	B	C	D
1	80	100	95	70
2	82	110	90	75
3	88	105	100	82
4	85	115	105	88
5	75	90	80	65

Is there a significant difference in the efficiency of these salesmen?

7. 4 coins were tossed 160 times and the following results were obtained:

No of heads	:	0	1	2	3	4
Observed frequency	:	17	52	54	31	6

Under the assumption that coins are balanced, find the expected frequencies of getting 0, 1, 2, 3, or 4 heads and test the goodness of fit.

8. From the adult male population of seven large cities random samples of married and unmarried men as given below were taken. Can it be said that there is a significant variation among the people from different cities in the tendency to marry?

City	A	B	C	D	E	F	G	Total
Married	170	285	165	106	153	125	146	1,150
Unmarried	40	125	35	37	55	35	33	360
Total	210	410	200	143	208	160	179	1,510

(Given for $v = 6$, $\chi^2_{0.05} = 12.6$)

9. A set of 5 coins is tossed 3,200 times, and the number of heads appearing each time is noted. The results are given below:

No. of heads	0	1	2	3	4	5
Frequency	80	570	1,100	900	500	50

Test the hypothesis that the coins are unbiased.

10. A tea company appoints four salesmen A, B, C and D and observes their sales in three seasons – summer, winter, and monsoon. The figures (in lakhs) are given in the following table:

Seasons	Salesmen				Season's Total
	A	B	C	D	
Summer	36	36	21	35	128
Winter	28	29	31	32	120
Monsoon	26	28	29	29	112
Salesmen's Totals	90	93	81	96	360

i) Do the salesmen significantly differ in performance?

ii) Is there significant difference between the seasons?

Unit-1V

1. The following data refers to visual defects found during the inspection of the first 10 samples of size 50 each from a lot of two – wheelers manufactured by an automobile company:

Sample Number:	1	2	3	4	5	6	7	8	9	10
No of defectives:	4	3	2	3	4	4	4	1	3	2

Draw the 'P' chart to show that the fraction defectives are under control.

2. A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Given below are relevant data:

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	15	17	15	18	17	14	18	15	17	16
Range	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and the control limits for mean chart and then comment on the state of control.

3. Ten samples each of size 5 are drawn at regular intervals from a manufacturing process. The sample means and their ranges (R) are given below:

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	49	45	48	53	39	47	46	39	51	45
Range	7	5	7	9	5	8	8	6	7	6

Calculate the control limits in respect of mean chart and range chart. (Given: $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.115$) Comment on the state of control.

4. The following data refers to visual defects found in the inspection of the first 10 samples of size 100. Use the data to obtain upper and lower control limits for percentage defective in samples of 100. Represent the first ten sample results in the chart you prepare:

Sample No	1	2	3	4	5	6	7	8	9	10
Total No. of Defectives	2	1	1	3	2	3	4	2	2	0

5. The following data provides the values of sample mean \bar{X} and the range R for the samples of size 5 each. Calculate the values for central line and control limits for mean – chart and range chart and determine whether the process is in control.

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	11.2	11.8	10.8	11.6	11.0	9.6	10.4	9.6	10.6	10.0
Range (R)	7	4	8	5	7	4	8	4	7	9

(Conversion factors for $n = 5$ are $A_2 = 0.577$, $D_3 = 0$ and $D_4 = 2.115$).

6. Construct mean and range chart for the following data:

Sample Number		Observation	
1	32	37	42
2	28	32	40
3	39	52	28
4	50	42	31
5	42	45	34
6	50	29	21
7	44	52	35
8	22	35	44

(Given: for $n = 3$, $A_2 = 1.023$, $D_3 = 0$, $D_4 = 2.115$)

7. Samples of 100 tubes are drawn randomly from the output of a process that produces several thousand units daily. Sample items are inspected for quickly and defective tubes and rejected. The results of 15 sample are shown below:

Sample No.	No of defective tubes	Sample No.	No. of defective tubes
1	8	9	10
2	10	10	13
3	13	11	18
4	9	12	15
5	8	13	12
6	10	14	14
7	14	15	9
8	6		

On the basis of information given below prepare a control chart from fraction defective. What conclusion do you draw from the control chart?

8. The following tables gives the number of defects in carpets manufactured:

Carpet serial No.	1	2	3	4	5	6	7	8	9	10
No. of defects	3	4	5	6	3	3	5	3	6	2

Determine the central line and control limits for C – chart.

9. Samples of 100 tubes are drawn randomly from the output of a process that produces several thousand units daily. Sample items are inspected for quickly and defective tubes and rejected. The results of 15 sample are shown below:

Sample No.	No of defective tubes	Sample No.	No. of defective tubes
1	8	9	10
2	10	10	13
3	13	11	18
4	9	12	15
5	8	13	12
6	10	14	14
7	14	15	9
8	6		

On the basis of information given below prepare a control chart from fraction defective. What conclusion do you draw from the control chart?

10. In a certain sampling inspection, the number of defectives found in 10 samples of 100 each are as given below:

16, 18, 11, 18, 21, 10, 20, 18, 17 and 21.

Do these indicate that quality characteristic under inspection is under statistical control?

11. A company's trainees are randomly assigned to groups who are taught a certain industrial inspection procedure by three different methods. At the end of the instructing period they are tested for inspection performance quality. The following are their scores.

Method A: 80 83 79 85 90 68

Method B: 82 84 60 72 86 67 91

Method C: 93 65 77 78 88.

Use the 'H' test to determine at 5% level of significance whether the three methods are equally effective.

Unit-V

1. A management is faced with the problem of choosing one of the three products for manufacturing. The probability matrix after market research for the 3 products as follows:

States of nature / Acts	Good	Fair	Poor
product – A	0.75	0.15	0.1
Product – B	0.60	0.3	0.1
Product – C	0.50	0.3	0.2

States of nature / Acts	Profit in Rs		
	Good	Fair	Poor
product – A	35,000	15,000	5,000
Product – B	50,000	20,000	-3,000
Product – C	60,000	30,000	20,000

Calculate expected value of the choice of alternatives and advise the management.

2. A bakery produces a certain type of special item at a total average cost of Rs. 3 and sells it at a price of Rs. 5. This item is produced over the weekend and is sold during the following week; such item being produced but not sold during a week's time are totally spoiled and have to be thrown away. According to past experience the weekly demand for these items is never less than 78 or greater than 80. You are required to formulate action space, pay off table and loss table.

3. A businessman wants to construct a hotel. He usually builds 25, 50 or 100 beds hotel, depending on whether anticipated demand is low, medium or high. The businessman has to find out net profits which are expressed in the table below and the prior distribution regarding the states of nature which is given in the next table.

PAYOFF TABLE

Action \ Status Of nature	A ₁ Build 25 – beds hotel	A ₂ Build 50 – beds hotel	A ₃ Build 100 – beds hotel
θ = low demand	20,000	- 10,000	- 30,000
θ = Medium demand	25,000	30,000	- 5,000

θ = High demand	30,000	50,000	60,000
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PRIOR DISTRIBUTION

States of nature = demand	θ_1	θ_2	θ_3	Total
Prior probabilities (θ_i)	0.2	0.3	0.5	1.00

- a) Compute EP, EPPI and EVPI.
- b) A research firm agrees to conduct a survey for Rs. 8,000 for a businessman and provides him with information regarding the states of nature. Should the survey be conducted?

4. The marketing department of the company worked out the payoffs in terms of yearly net profits for each of the strategies for the events (expected sales). This is represented in the following table:

State of nature strategies	Payoffs (in Rs.)		
	N ₁	N ₂	N ₃
S ₁	7,00,000	3,00,000	1,50,000
S ₂	5,00,000	4,50,000	0
S ₃	3,00,000	3,00,000	3,00,000

Which strategy should the executive concerned choose on the basis of

- a) Maximin Criterion..
- b) Maximax Criterion.
- c) Minimax Regret Criterion.
- d) Laplace Criterion.

5. A management is faced with the problem of choosing one of three products for manufacturing. The potential demand for each product may turn out to be good, moderate or poor. The probabilities for each of the state of nature were estimated as follows:

Nature of Demand

Products	Good	Moderate	Poor
X	0.70	0.20	0.10
Y	0.50	0.30	0.20
Z	0.40	0.50	0.10

The estimated profit or loss under the three states may be taken as:

X	30,000	20,000	10,000
Y	60,000	30,000	20,000
Z	40,000	10,000	- 15,000

(loss)

Prepare the expected value table and advise the management about the choice of product.

6. A group of students raises money each year by selling souvenirs outside the stadium after a cricket match between teams A and B. They can buy any of three different types of souvenirs from a supplier. Their sales are mostly dependent on which team wins the match. A conditional pay – off table is as under:

Type of souvenirs

	I	II	III
Team A wins	Rs. 1,200	Rs. 800	Rs. 300
Team B wins	Rs. 250	Rs. 700	Rs. 1,000

i) Construct the opportunity loss table

ii) Which type of souvenir should the student buy if probability of team A's winning is 0.6?

7. A newspaper distributor assigns probabilities to the demand to the magazine as follows

Copies demanded	1	2	3	4
Probability	0.4	0.3	0.2	0.1

A copy of the magazine sells for Rs. 7 costs Rs. 6. What can be the maximum possible Expected Monetary Value (EMV) if the distributor can return unsold copies for Rs. 5 each?

8. A milkman buys milk at Rs. 5 per liter and sells for Rs. 5.50 per liter. Unsold milk has to be thrown away. The daily demand has the following probability distribution.

Demand (liters):	46	48	50	52	54
Probability :	0.01	0.30	0.06	0.10	
	0.20				

Demand (liters):	56	58	60	62	64
Probability :	0.25	0.15	0.10	0.05	
	0.05				

If each day's demand is independent of previous day's demand. How many liters should be ordered every day so as to maximise the profits?

9. A decision matrix with cost data (Rs. '000') is given below:

States of nature				
Alternatives	S ₁	S ₂	S ₃	S ₄
A ₁	1	3	8	5
A ₂	2	5	4	7
A ₃	2	6	6	3
A ₄	6	8	3	5

Find the cost alternative using:

i) Maximin Criterion..

ii) Maximax Criterion.

iii) Minimax Regret Criterion.

10. The marketing department of the company worked out the payoff in terms of yearly new profits for each of the strategies for three events (expected sales). This is represented in the following table:

Status of nature / strategies	Payoff (in '000 Rs.)		
	P ₁	P ₂	P ₃
S ₁	700	300	150
S ₂	500	450	100
S ₃	300	300	300

Which strategy should the executive concern choose on the basis of?

- i) Maximin Criterion.
 - ii) Maximax Criterion.
 - iii) Minimax Regret Criterion.
-

Question Bank

Section A (One mark)

Choose the correct answer

UNIT-I

1. -----is the commercial exploitation of invention.
a) **Innovation** b) Invention c) Organization d) Planning
2. The executive turned entrepreneurs are called
a) Entrepreneurs b) **Intrapreneurs** c) Problem solver d) Risk taker
3. -----is a distinct factor of production that contributes to the economic development
a) **Entrepreneur** b) Entrepreneurship c) Production d) Labor
4. ----- is one of the social factors motivating entrepreneurs
a) **Social mobility** b) Need for achievement c) Raw material d) Market
5. -----is the economic factor motivating entrepreneurs
a) Family business b) Raw material c) Social mobility d) **Need for achievement**
6. -----'s status is self-employed
a) Manager b) Executive c) **Entrepreneur** d) Intrapreneur
7. -----is the commercial exploitation of invention.
a) **Innovation** b) Invention c) Organization d) Planning
8. -----is the Risk taker?
a) **Entrepreneur** b) Manager c) Executives d) Employee
9. Entrepreneur who copies the methods of successful innovations of an entrepreneur is
a) Innovative b) **Imitative** c) Fabian d) Drone
10. From the following, types of entrepreneur are:
a) Innovating entrepreneur b) Initiative entrepreneur c) Drone entrepreneur d) **All of above**
11. _____ entrepreneurs introduces new goods
a) **Innovative** b) Imitative c) Drone d) Fabian
12. -----entrepreneurs become entrepreneurs on account of the circumstances
a) Technologist b) Inheritance c) **Forced** d) Adoptive
13. _____ entrepreneurs refuse to adopt opportunities
a) **Drone** b) Fabian c) Imitative d) Innovative
14. _____ entrepreneurs are with great caution and skepticism
a) Drone b) **Fabian** c) Imitative d) Innovative
15. -----is the entrepreneur who acts as the change agent
a) **Innovator** b) Imitator c) Drone d) Fabian

UNIT-II

16. From the following which one is not classification of entrepreneurs according to the types of business?
a) Wholesale trade b) Retail trade c) Exporter d) **Rural entrepreneur**
17. Industries started in rural areas are called _____ entrepreneurship
a) Urban b) **Rural** c) First generation d) Institutional
18. Training is imparted to the needy rural entrepreneur by _____ level of NGOs
a) **Primary** b) Secondary c) Intermediate d) Grass root
19. Agro based industry is one of the _____ industries
a) **Rural** b) Urban c) Large d) Small
20. Industries started in rural areas are called
a) Urban entrepreneurship b) **Rural entrepreneurship**
c) First generation entrepreneurship d) Institutional entrepreneurship

21. One of the peculiar problems of women entrepreneurship is -----
a) **Family ties** b) Non co-operation c) Lack of awareness d) Lack of knowledge
22. ----- is the institutional arrangement to promote women entrepreneurship
a) WTO b) WHO c) TIIC d) **FICCI**
23. Women in our male dominated society are considered to be an -----
a) 'abla' b) uneducated c) **inefficient** d) risk takers
24. The objective of ___ assistance is to encourage the women entrepreneur to adopt bar code certification
a) Marketing b) Financial c) Building awareness d) **Technical**
25. An enterprise controlled by women having 51% financial interest and giving 51% employment generated to women is called ____
a) Rural entrepreneurship b) **Women entrepreneurship**
c) Entrepise d) Organisation
26. Women entrepreneurs have to strike a balance between their business and family because they have ____
a) **Family ties** b) Limited mobility c) Illiteracy d) Low-risk bearing ability
27. 5% additional capital subsidy on the value of eligible plant and machinery is available for units set up by
a) **Women** b) Rural people c) Urban people d) Unemployed
28. A women entrepreneur faces _____ problems
a) Marketing b) Financial c) Social d) **All of the above**
29. MSME contributes _____ of the country's GDP
a) **8%** b) 10% c) 9% d) 15%
30. MSME Act was passed in the year _____
a) **2006** b) 2016 c) 2004 d) 2008

UNIT-III

31. Causation oriented projects comes under -----classification
a) quantifiable b) sectorial c) **techno-economic** d) financial institutions
32. Construction phase is one of the stages in----
a) **project life cycle** b) project identification c) project formulation d) project appraisal
33. -----is one of the steps involved in starting new industries
a) **Preparation of project report** b) Manufacturing c) Marketing d) Designing
34. -----one of the major source of business ideas
a) **Trade fair** b) Rural industries c) Books d) Advertisement
35. EDP is meant for developing ----- entrepreneurs
a) **first generation** b) innovative c) imitative d) drone
36. Proposal involving capital investment is called-----
a) **project** b) business c) service d) survey
37. Irrigation and power sector comes under ----- classification of project
a) **sectoral** b) techno-economic c) quantifiable d) financial institutions
38. ----- helps in locating possible business opportunities for investment
a) Project classification b) **Project identification** c) Formulation d) Project report
39. The evaluation process of proposed projects or group of projects is known as
a) Project Analysis b) **Project selection** c) Project Appraisal d) Project report
40. _____ presupposes commitment to tasks to be performed with well-defined objectives, schedules and budget.
a) Plan b) **Project** c) Schedule d) Proposal
50. Projects concerned with industrial development, power generation, and mineral development will be considered as _____ project.
a) **Quantifiable** b) Sectoral c) Techno-economic d) Feasibility project

51. _____ is concerned with the collection, compilation and analysis of economic data for the eventual purpose of locating possible opportunities for investment.
 a) Project selection b) Project evaluation c) **Project identification** d) Project segmentation
52. Every project has _____ basic dimensions.
 a) One b) Two c) **Three** d) Four
53. What are the 3 basic dimensions of a project?
 a) Input, output and process b) Input, output and materials
 c) **Input, output and social cost and benefits** d) Input, output and features
54. _____ is an important element in the project planning cycle.
 a) **Project objective** b) Project idea c) Project identification d) Project selection

UNIT-IV

55. _____ bank provides finance for joint ventures in overseas
 a) IDBI b) IFCI c) **EXIM** d) SIDBI
56. -----is one of the export commercial documents
 a) Legal b) Duty draw back c) GR form d) Air way bill
57. After goods are loaded on board vessel the captain of ship issues a receipt know as -----
 a) Export promotion copy b) Letter credit
 c) Clean on board bill d) Mate receipt
58. GSP certificate of origin is one of the documents required by -----
 a) Importing country b) Exporting country c) Manufacturer d) Shipping company
59. Export to all countries by parcel post, except when on value payable or “cash on delivery” basis should be declared on P ____ forms
 a) PP b) VP c) EP d) GR
60. ____ is the person who execute the B/E
 a) Exporter b) importer c) Drawer d) Payee
61. The beneficiary in the cash of letter of credit is ____
 a) Importer b) Opener c) Banker d) Seller
62. ____ form is prepared in triplicate for export of computer software
 a) PP b) VP c) EP d) SOFTEX
63. Invoice made out on a specified form prescribed by the customs authority of the importing country is ____ invoice
 a) consular b) certified c) customs d) Origin
64. Taxation benefit under 80 HHE for EOU is with respect to
 a) industries in Free Trade Zones b) tour operator
 c) rehabilitation d) **computer software**
65. License required to replenish raw-materials components etc is called -----
 a) **REP license** b) CCS c) EOU d) DGTD

UNIT V

66. -----is the assistance provided to the first generation or technical entrepreneurs
 a) seed capital b) term loan
 c) rehabilitation allowance d) investment allowance
67. ----- is the taxation benefit available upto 5yrs from the commencement of production
 a) depreciation allowance b) tax holiday
 c) development rebate d) rehabilitation
68. ----- is the assistance provided by IDBI to the first generation entrepreneurs to meet the promoter’s contribution
 a) Seed capital b) Term loan c) Grant d) Incentive
69. ____ is the programme under taken by ITCOT towards rural development
 a) RIP b) EDP c) FDP d) Training

70. ___ is a tract of land subdivided and developed according to a plan for the use of community of industrial enterprises
 a) Industrial estate b) Clusters c) Factory shed d) EPZ
71. IFCI provides _____
 a) **Direct financing** b) Indirect financing
 c) Agency service d) Nodal agency service
72. Institutional agencies grant financial assistance to small scale industries for _____
 a) Participation in equity capital only b) Acquisition of fixed Asset
 c) Working capital Assistance **d) All the above**
73. The head office of SIDBI is situated in _____
 a) **Lucknow** b) Delhi c) Mumbai d) Chennai
74. SIDBI stands for _____.
 a) Small Institutions Development Bank of India.
 b) **Small Industries Development Bank of India.**
 c) Small Industries Derivatives Bank of India.
 d) Small Industries Development Bureau of India.
75. SIDBI was set up in the year _____.
 a) 1987 b) 1988 c) **1989** d) 1990
76. SIDBI was set up as a subsidiary of _____.
 a) **IDBI** b) IFCI c) ICICI d) NABARD

Section B- (Two marks)

UNIT-I

1. Define entrepreneurship.
2. Who is a Drone entrepreneur?
3. Who is a Fabian entrepreneur?
4. What are the classifications of entrepreneurial functions?
5. Who is an intrapreneur?
6. Distinguish Entrepreneur from Intrapreneur.
7. Mention the various types of entrepreneurs.
8. Mention the qualities of an entrepreneur
9. Who is a social entrepreneur?
10. Who is a imitative entrepreneur?

UNIT-II

11. State the need for rural entrepreneurship?
12. Define rural entrepreneurship.
13. Write a note on need for rural entrepreneurship?
14. Discuss the pull factors.
15. Discuss the push factors.
16. Women are no longer an' abla'-justify.
17. State any two advantages and disadvantages of Women Entrepreneurship.
18. Define Women entrepreneurship
19. List any two problems faced by women entrepreneur.
20. What are MSMEs?

UNIT-III

21. What is a business idea?
22. What is a project?
23. What is meant by project report?
24. What is project identification?
25. State the objectives of the project.

26. What is project life cycle?
27. What are quantifiable projects?
28. Give the sectorial classification.
29. What are welfare projects?
30. What is project Appraisal?

UNIT-IV

31. What is an airway bill?
32. What is bill of lading?
33. What are the three types of shipping bills?
34. Write a note on GR form.
35. Write a note on duty drawback.
36. What is meant by REP license?
37. Name the documents to be submitted for booking railway yard.
38. What is certificate of origin?
39. Why is a clearing and forwarding agent appointed by the exporter?
40. What are Star-trading houses?

UNIT-V

41. State the objectives of SIDBI.
42. What are incentives?
43. Explain Seed Capital Assistance?
44. What are the objectives of giving subsidies?
45. What are subsidies?
46. What are industrial estates?
47. What is DIC?
48. What is NAYE?
49. Give meaning of institutional support for entrepreneurs.
50. What do you mean by concessions?

Section C- (Five marks)

UNIT-I

1. Define entrepreneurship and explain its main characteristics.
2. Innovation is the hallmark of entrepreneurship." Discuss critically
3. What are the functions of an entrepreneur?
4. Mention any four factors that motivate people to become entrepreneurs.
5. What are entrepreneurial ambitions?
6. List the need of entrepreneurship development
7. Distinguish between Fabian entrepreneurs and Drone entrepreneurs
8. State the differences between an entrepreneur and a manager.
9. State the basic qualities of entrepreneurs.
10. Entrepreneurial competency or trait- Discuss.

UNIT-II

11. Discuss the need for and problems of rural entrepreneurs.
12. Elucidate the potential for development of rural entrepreneurs.
13. Elaborate the concept of Women Entrepreneurship.
14. Write in detail the functions of Women Entrepreneurship.
15. What are the problems faced by Women Entrepreneurs?
16. Explain in detail the trend in the development of Women Entrepreneurship.
17. Write in detail the financial assistance that is given for a Woman Entrepreneur.
18. What is the marketing assistance provided for Women Entrepreneurs?
19. Explain the meaning and need for Women Entrepreneurs.
20. Write the procedure to set up MSME?

UNIT-III

21. State the sources of business ideas.
22. Explain project classification.
23. Explain project life cycle.
24. What is the importance of project report?
25. What are the main contents of project report?
26. Elucidate the specimen form of project report.
27. Explain the process of project identification.
28. How do you identify the project?
29. How to we select the project?
30. What are the categories of project?

UNIT-IV

31. Mention the main export incentives available in India
32. Discuss the procedure involved in getting customs clearance.
33. Write short notes on the following
 - a) Bill of Lading
 - b) Bill of Exchange
34. Write short notes on the following
 - a) Letter of credit
 - b) Duty Drawback
35. Discuss the types of export assistance documents.
36. Discuss the major documents needed by the importing countries.
37. Explain Export Promotion Assistance from SIDO.
38. Explain about the arguments for and against SEZ.
39. State briefly the major constraints faced by small scale units in the exports
40. Discuss the Trade development authority.

UNIT-V

41. What new initiatives SIDBI has taken for the development of MSME sector?
42. Describe the various services rendered by SIPCOT?
43. Elucidate the functions of NAYE.
44. Discuss the need for and problems of incentives.
45. Elucidate the functions of NPC.
46. Bring out the incentives available to Export-oriented units.
47. Elucidate the functions of DIC.
48. What are industrial estates? Explain its advantages.
49. What do you mean by SISI? Describe its functions.
50. Describe the various services rendered by ITCOT?

SECTION-D (Ten marks)

UNIT-I

1. Discuss the main functions of an entrepreneur.
2. State and explain different types of entrepreneurs with examples.
3. "Innovative entrepreneurs are also revolutionary in nature and are important in underdeveloped countries". In the statement discuss their relevance in the Indian context.
4. Explain the important traits required to be a successful entrepreneur. Give examples.
5. Explain the role of entrepreneur in the economic development of a nation.
6. What are the factors influencing entrepreneurial growth?
7. Explain Entrepreneur as a risk-bearer, an organizer and an innovator.
8. Elucidate the economic factors motivating entrepreneurs.
9. Define entrepreneurship and discuss its role in the economic development of a country.
10. Discuss the functions of entrepreneurship?

UNIT-II

11. Explain the problems and prospects of Rural Entrepreneurship.
12. Explain the functions and role of Women Entrepreneurs.
13. Explain the functions and role of Women Entrepreneurs and the steps involved in the development of Women Entrepreneurship.
14. What are the financial and marketing assistance provided for Women Entrepreneurs?
15. Give an account of growth of women entrepreneurs in India.
16. "The greatest problem of women entrepreneurs is that they are women". Discuss.
17. What problems are faced by women entrepreneurs in establishing and developing their enterprises?
18. Discuss the measures taken by the Government of India to promote women entrepreneurship in India.
19. Discuss the opportunity of MSME.
20. Define MSME. How does the new definition differ from the old one?

UNIT-III

21. Explain in detail about project identification.
22. What are the sources for Business Ideas?
23. Elaborate the contents of Project report.
24. Draw a specimen form of Project Report.
25. Elucidate the scope of a project report.
26. What is the process of project identification?
27. Discuss the classification of a project.
28. Explain Project life cycle.
29. Describe need for project formulation.
30. Inspect and write the characteristics of project report

UNIT-IV

31. Bring out the problems and potentials of exports from small-scale enterprises.
32. Discuss the major documents needed by the importing country.
33. Discuss the process involved in processing an export order.
34. Make a flow chart of processing of an export order up to the shipment stage.
35. Elucidate the commercial documents and the documents needed by the importing countries.
36. Discuss the measures taken by the government to promote exports.
37. Elucidate the export incentives.
38. Discuss briefly the regulatory and documents needed by the importing country.
39. Elucidate the procedure for export right from the appointment of clearing and forwarding agents to the claiming of export incentives.
40. Elucidate the institutional set up for export assistance.

UNIT-V

41. What new initiatives SIDBI has taken for the development of MSME sector?
42. Describe the various services rendered by SIPCOT?
43. Elucidate the functions of NAYE.
44. Discuss the need for and problems of incentives.
45. Elaborate District Industries Centre's (DIC).
46. Bring out the incentives available to Export-oriented units.
47. Elucidate the functions of DIC.
48. What are industrial estates? Explain its advantages.
49. What do you mean by SISI? Describe its functions.
50. Describe the various services rendered by ITCOT?

St. Mary's College (Autonomous), Thoothukudi
QUESTION BANK - 2021-23
Core V Managerial Economics Sub. Code: 21PCOC15
M.com I Semester
(for those who joined in 2021 and after)

SECTION A (1 mark)

Choose the correct answer.

UNIT I

1. When available resources are allocated among the alternative options, such that the marginal productivity gains from various activities are equal, it is called ----- principle.
(a) discounting **(b) equi-marginal** (c) opportunity (d) incremental
2. The aggregate of individual demands for a product is called ----- demand.
(a) joint **(b) market** (c) individual (d) derived
3. Slope of the demand curve is -----.
(a) positive (b) negative (c) infinite (d) zero
4. Law of ----- states that as the quantity consumed goes on increasing, the utility derived from each successive unit goes on diminishing.
(a) demand **(b) diminishing marginal utility** (c) cardinal utility (d) total utility
5. The desire of a person, usually the rich one to own an exclusive or unique product is called ----- good.
(a) Giffen **(b) Snob** (c) producer (d) Bandwagon
6. Demand of an individual is conditioned by the consumption of others. It is called ----- effect.
(a) income (b) substitution **(c) Veblen** (d) Bandwagon
7. Steel, wool and electricity are examples for ----- demand.
(a) joint (b) composite **(c) derived** (d) durable goods demand
8. Selecting the best out of available options with the objective of maximizing gains from the given resources is -----.
(a) social science **(b) optimizing behavior** (c) micro economics (d) macro economics
9. Application of economic theory in management is called -----.
(a) micro economics **(b) managerial economics** (c) macro economics
(d) applied economics
10. Pen and ink is an example for ----- demand.
(a) composite **(b) joint** (c) derived (d) durable goods demand
11. The quantity demanded of Pepsi has decreased. The best explanation for this is that:
a. The price of Pepsi increased.
b. Pepsi consumers had an increase in income.
c. Pepsi's advertising is not as effective as in the past.
d. The price of Coca Cola has increased.
12. Demand curves are derived while holding constant:

- a. Income, tastes, and the price of other goods.
 - b. Tastes and the price of other goods.
 - c. Income and tastes.
 - d. Income, tastes, and the price of the good.**
- 13 When the decrease in the price of one good causes the demand for another good to decrease, the goods are:
- a. Normal
 - b. Inferior
 - c. Substitutes**
 - d. Complements
14. Suppose the demand for good Z goes up when the price of good Y goes down. We can say that goods Z and Y are:
- a. Substitutes.
 - b. Complements.**
 - c. Unrelated goods.
 - d. Perfect substitutes.
15. If the demand for coffee decreases as income decreases, coffee is:
- a. An inferior good.
 - b. A normal good.**
 - c. A complementary good.
 - d. A substitute good.
16. Which of the following will NOT cause a shift in the demand curve for compact discs?
- a. A change in the price of pre-recorded cassette tapes.
 - b. A change in income.
 - c. A change in the price of compact discs.**
 - d. A change in wealth.
17. When excess demand occurs in an unregulated market, there is a tendency for:
- a. Quantity supplied to decrease.
 - b. Quantity demanded to increase.
 - c. Price to rise.**
 - d. Price to fall.
18. Market equilibrium exists when _____ at the prevailing price.
- a. quantity demanded is less than quantity supplied
 - b. quantity supplied is greater than quantity demanded
 - c. quantity demanded equals quantity supplied**
 - d. quantity demanded is greater than quantity supplied
19. A movement along the demand curve to the left may be caused by:
- a. A decrease in supply.**
 - b. A rise in the price of inputs.
 - c. A fall in the number of substitute goods.
 - d. A rise in income.
20. The quantity demanded of a product rises whenever
- (a) The product's price falls.**
 - (b) Incomes increase.
 - (c) Consumer tastes and preferences change
 - (d) The prices of substitute goods rise.
21. The equilibrium quantity must fall when
- (a) There is a decrease in demand.
 - (b) There is a decrease in supply.
 - (c) There is an increase in price.
 - (d) There is an increase in demand and supply**
- demand and supply**
22. The demand curve will shift to the left for most consumer goods when
- (a) Incomes decrease.
 - (b) The prices of substitutes fall.
 - (c) The prices of complements increase
 - (d) All of the above.**
23. Producer goods, also called intermediate goods, in economics, goods manufactured and used in further manufacturing, processing, or resale.
- (a) True**
 - (b) False
24. Consumer goods are alternately called final goods, and the second term makes more sense in understanding the concept.
- (a) True**
 - (b) False
25. GDP stands for
- a. Gross Domestic Product**
 - b. Gross Deistic Product
 - c. Gross dynamic product
 - d. All of these
26. GNP stands for

- (a) rent of ability
- (c) risk theory of profit

- (b) income due to dynamic economy**
- (d) residual return to uncertainty

UNIT III

1. ----- the degree of competition, ----- the firm's degree of freedom in pricing decision.
 - (a) higher , higher
 - (b) higher, lower**
 - (c) lower, lower
 - (d) lower, higher
2. An absolute power of a firm to produce and sell a product that has no close substitute is called ----- .
 - (a) perfect competition
 - (b) monopoly**
 - (c) oligopoly
 - (d) none of the above.
3. Cost plus pricing is also known as -----pricing.
 - (a) transfer
 - (b) full cost**
 - (c) multiple product
 - (d) penetration
4. In a firm profit is maximum at the level of output where ----- .
 - (a) $TC = MC$
 - (b) $MR = MC$**
 - (c) $TC = MR$
 - (d) $AC = MC$
5. When there is large number of firms selling homogenous products, the market structure is called ----- .
 - (a) monopolistic competition
 - (b) perfect competition**
 - (c) monopoly
 - (d) oligopoly
6. Under perfect competition, the degree of competition is close to ----- .
 - (a) zero
 - (b) one**
 - (c) less than one
 - (d) more than one
7. In monopolistic competition the firms have some discretion in setting the price and are done by ----- .
 - (a) producer
 - (b) cartels
 - (c) demand force
 - (d) supply force
8. When firms accept the price determined by the market forces of demand and supply they are called as ----- .
 - (a) cartels
 - (b) price takers**
 - (c) price makers
 - (d) market price
9. If a firm uses its discretion to fix a price ----- the ruling price ,it will not be able to sell its product.
 - (a) equal
 - (b) above**
 - (c) below
 - (d) none of the above
10. Under ----- the degree of competition is quite low and has control over price.
 - (a) monopolistic competition
 - (b) oligopoly
 - (c) perfect competition**
 - (d) monopoly
11. Which of the following cannot be classed as a market structure?
 - a) Oligopoly.
 - b) Perfect competition.
 - c) **Communism.**
 - d) Monopolistic competition.
12. Income and population are two variables that can be used in _____ segmentation:
 - a) psychographic
 - b) demographic**
 - c) lifestyle
 - d) behavioural
13. Strong exchange rates can:
 - a) help estimate consumer purchasing power.

- b) help predict change in lifestyle across Europe.
- c) predict the evolution of sales for particular brands.
- d) drive imports to become cheaper.**

14. BERI stands for:

- a) Business Economic Risk Index.
- b) Business Economic Rating International.
- c) Business Education Rating Indicator.
- d) Business Environment Risk Index.**

15. The size and liquidity requirements are based on the minimum invest ability requirements for the MSCI Global Standard Indices.

(a) True (b) False

16. Oligopoly is a market structure in which a small number of firms account for the whole industry's output.

(a) True (b) False

17. The number of firms and product differentiation are extremely crucial in determining the nature of competition in a market.

(a) True (b) False

18. Type of market structure represented by the constant returns to scale (CRS) technology includes

- a) Monopolistic competition
- b) Oligopoly
- c) Duopoly
- d) Perfect competition**

19. In industries in which there are scale economies, the variety of goods that a country can produce is constrained by

- a) the fixed cost
- b) the size of the labor force
- c) the marginal cost
- d) the size of the market**

20. A monopoly firm engaged in international trade but enjoying a protected home market will

- a) equate marginal costs with foreign marginal revenues.
- b) equate marginal costs with marginal revenues in both domestic and foreign markets**
- c) equate average costs in local and foreign markets
- d) none of the above

21. Minimum efficient scale of production in relation to the overall industry output and market requirement sometimes play a major role in shaping the market structure.

(a) True (b) False

22. Price and output decisions of firms that want to maximize profits always depend on costs.

(a) True (b) False

23. Which of the following is NOT a financial objective of pricing?

- a) Corporate growth.**
- b) Return on investment.
- c) Profit maximization.

- d) None of these
24. Which of the following is NOT a marketing objective?
- Cash flow.**
 - Positioning.
 - Volume sales.
 - None of these
25. Setting a price below that of the competition is called:
- Skimming.
 - Penetration pricing.**
 - Competitive pricing.
 - None of these
26. Which of the following is NOT a reason for cutting prices?
- Capacity utilisation.
 - Increasing profit margins.**
 - Market defence.
 - None of these
27. Which of the following is NOT a reason for increasing prices?
- Cost pressures.
 - Price comparison.**
 - Curbing demand.
 - None of these
28. The costs that depend on output in the short run are:
- both total variable costs and total costs.
 - total costs only.
 - total fixed cost only.
 - total variable costs only**
29. A firm will shut down in the short run if:
- fixed costs exceed revenues.**
 - total costs exceed revenues.
 - it is suffering a loss.
 - variable costs exceed revenues.
30. In the long run, every cost is variable cost. In this period, all costs ever incurred by the firm must be recovered.
- (a) True (b) False

UNIT IV

- To fight depression, ----- tax and ----- public expenditure.
 - decrease, decrease
 - decrease, increase**
 - increase, increase
 - increase, decrease
- is the sale and purchase of government bonds, treasury bills etc. to and from the public.
 - statutory reserve ratio
 - open market operation**
 - moral suasion
 - financial operation
- In India there are ----- break-ups of the national economy for estimating the national income.
 - 18
 - 15
 - 20
 - 13

- (c) LIFO costing assumption
 - (d) Periodic inventory method
2. Inflation is:
- (a) **an increase in the overall price level.**
 - (b) an increase in the overall level of economic activity.
 - (c) a decrease in the overall level of economic activity.
 - (d) a decrease in the overall price level.
3. Aggregate supply is the total amount:
- (a) produced by the government.
 - (b) **of goods and services produced in an economy.**
 - (c) of labour supplied by all households.
 - (d) of products produced by a given industry.
4. The value of a dollar does not stay constant when there is inflation.
- (a) **True**
 - (b) False
5. The inflation rate in India was recorded at 7.23% in.....
- (a) April of 2009
 - (b) April of 2010
 - (c) April of 2011
 - (d) **April of 2012**
6. The function of money that helps assess the opportunity cost of an activity is money's use as a
- (a) medium of exchange.
 - (b) store of value.
 - (c) **unit of account.**
 - (d) store of debt.
7. An official measure of money in the United States is M1, which consists of the sum of
- (a) currency plus traveler's checks.
 - (b) currency plus checkable deposits.
 - (c) **currency plus traveler's checks plus checkable deposits.**
 - (d) currency plus traveler's checks plus time deposits.
8. Implies no trade-off between unemployment and inflation.
- (a) GDP deflator
 - (b) Shoe leather' costs
 - (c) **Long-run Phillips curve**
 - (d) 'Menu' costs
9. The inflation rate is used to calculate the real interest rate, as well as real increases in wages.
- (a) **True**
 - (b) False
10. The quantity of money in the United States.
- (a) The State Department controls

- (b) The Department of Treasury controls
(c) The Federal Reserve System controls
 (d) Commercial banks control
11. There are broadly ___ ways of controlling inflation in an economy.
 (a) **2** (b) 3 (c) 4 (d) 5
12. The balance of payments of a country is said to be in equilibrium when the demand for foreign exchange is exactly equivalent to the supply of it.
 (a) **True** (b) False
13. A general decline in prices is often caused by a reduction in the supply of.....
 (a) money or debit
(b) money or credit
 (c) money
 (d) None of these
14. The opportunity cost of holding money is the
 (a) inflation rate minus the nominal interest rate.
 (b) nominal interest rate.
(c) real interest rate.
 (d) unemployment rate.
15. If the Fed is worried about inflation and wants to raise the interest rate, it
 (a) increases the demand for money.
 (b) increases the supply of money.
 (c) decreases the demand for money.
(d) decreases the supply of money.
16. The circular flow of goods and incomes shows the relationship between:
 (a) income and money.
 (b) goods and services.
(c) firms and households.
 (d) wages and salaries.
17. Fiscal measures to control inflation include taxation, government expenditure and public borrowings.
 (a) **True** (b) False
18. The inflation rate is used to calculate the real interest rate, as well as real increases in wages.
 (a) **True** (b) False
19. Bank Rate is the rate at which the RBI provides loans to _____
 a) Public Sector Undertakings
b) Commercial Banks
 c) Private Corporate Sector
 d) Non – banking Financial Institutions
20. When the supply for money increases and the demand for money reduces, there will be ___
 a) A fall in the level of prices

b) A decrease in the rate of interest

- c) An increase in the rate of interest
- d) A fall in the level of demand

21. If the interest rate decrease in an economy, it will _____

- a) Decrease the investment expenditure in the economy
- b) Increase the loan repayment by the government

c) Increase the consumption expenditure in the economy

- d) Increase the total savings in the economy

22. The cost of bank credit is determined on the basis of base rate and all bank loans are given at a rate equal to or higher than the base rate. Of the following, who determines this base rate?

- a) RBI
- b) Ministry of Finance
- c) Market force of supply and demand for credit

d) the bank concerned

23. Following is the relation between MC and AC of lending, which of the following is correct?

- a) AC of lending is higher than MC of lending

b) For the first borrowing, AC and MC of lending are equal

- c) AC of lending is lower than MC of lending
- d) MC of lending has no effect on AC of lending

24. When the RBI announces an increase in the CRR, what does it mean?

- a) **The commercial bank has less money to lend**
- b) The commercial bank has more money to lend
- c) The union Govt. has less money to lend
- d) The union Govt. has more money to lend

25. Which one of the following is not an instrument of selective credit control in India?

- a) Regulation of consumer credit
- b) Rationing of Credit
- c) Margin Requirement
- d) Reserve ratios**

26. Which agency has the foremost role in regulation of banking sector in India?

- a) RBI**
- b) Union Finance Commission
- c) Ministry of Finance
- d) Ministry of Commerce

27. Which of the following guidelines by the RBI does not hamper the profitability of commercial banks in India?

- a) CRR
- b) SLR
- c) Margin Requirements
- d) Bank Rate**

28. The banks are required to maintain a certain ratio between their liquid assets and total deposits. This ratio is called_____

- a) CRR
- b) SLR**
- c) CAR
- d) CLR

29. What is the implication of high bank rate in the economy?

- a) the most of credit charged by the banks to corporate borrowers reduces

b) Bank starts lending at high rates to various types of borrowers

- c) The demand for credit increases on account of rise in bank rate.
- d) Commercial banks start borrowing more money from RBI

30. The accounting period of RBI is _____

- a) Jan to Dec
- b) April to March
- c) July to June**
- d) Oct to Sept

31. Lending to which of the following sectors is not a part of priority sector lending?

- a) SSIs
- b) Housing for Poor
- c) Allied Activities to Agriculture
- d) Iron & Steel Industry**

32. To finance its deficit, the government prefers borrowing from the public over the RBI. What can be the best reason for this?

- a) Rate of interest charged by RBI is higher
 b) The Govt. has to return the sum to RBI with in a fixed period of time
c) Public borrowing does not affect the money supply in the market
 d) It increases the sale of Govt. bonds
33. Which of the following situations occurs during the period when borrowers and lenders expect inflation?
a) The nominal rate of interest exceeds the real rate of interest
 b) The real rate of interest exceeds the nominal rate of interest
 c) the nominal rate of interest equals the real rate of interest
 d) nominal and real rate of interest become zero.
34. Monetary base is _____
 a) the cash issued under the authority of the central bank
 b) the money whose real value exceeds its nominal value
c) currency with public and deposits maintained by commercial banks with RBI
 d) None of the above
35. Sterilization by RBI is carried through _____
a) Open market operation b) Reduction in Bank Rate
 c) Deficit financing operation d) Reduction in SLR
36. Which of the following is not included in the reserve money?
 a) currency in circulation b) bankers deposits with RBI
 c) Govt. deposits with RBI **d) Demand deposit with banks**
37. What is bank rate?
 a) rate on deposits given by commercial banks
 b) rate charged by banks on loans and advances
 c) rate payable on bonds
d) rate at which the RBI discounts the bills of exchange.
38. _____ refers to freer flow of goods and services, capital and labour, technology and finance between nations. (Globalisation)
39. Find the odd one out:
 a) EU b) NAFTA c) WTO d) ASEAN
40. Due to globalization, the most important factor that figures in competing with rival firms in both domestic and foreign markets is _____
a) Price Competition b) Market Capture c) Supply and Demand
 d) Environmental challenges
41. Saving of time and wealth is possible :
 (a) In barter exchange system
 (b) In monetary system
 (c) In cash transactions
(d) In cashless transactions
42. Which of the following will be called cashless transaction?
 (a) Cash payment
(b) Payment by cheque
 (c) Payment through only big denomination notes
 (d) Payment by coins
43. Which technique is not used in online payment ?
(a) NIGS
 (b) NEFT
 (c) RTGS
 (d) IMPS

44. Which of the following does not need internet facility in digital payment ?
- (a) Internet banking
 - (b) E-wallet
 - (c) Swipe card
 - (d) USSD technique**
45. The name of digital payment app promoted by government of India is :
- (a) Digital app
 - (b) Bharat app
 - (c) Bhim app**
 - (d) Payment app
46. Which of the following is used traditionally for cashless payment ?
- (a) E wallet
 - (b) Internet banking
 - (c) Cheque or draft**
 - (d) Debit/credit card
47. Medium of cashless transaction is :
- (a) Payment through internet banking
 - (b) Payment through swipe machine
 - (c) Payment through ATM machine
 - (d) All of these**
48. Name of App issued by government of India :
- (a) E-wallet
 - (b) BHIM**
 - (c) Amazon
 - (d) Axis pay
49. By which technique cashless transaction is possible without using smart phone ?
- (a) USSD**
 - (b) BHIM
 - (c) Micro ATMs
 - (d) All of these
50. Benefit(s) of cashless transaction is/are :
- (a) Saving time and money
 - (b) Freedom from keeping cash
 - (c) Increase in Revenue
 - (d) All of these**
51. When did the government ban ₹ 1000 and ₹ 500 notes by demonetisation ?
- (a) 9th November 2016**
 - (b) 12th November 2016
 - (c) 9th November 2015
 - (d) 12th November 2015
52. How much money has the government spent on promoting digital transactions and cashless transaction ?
- (a) ₹ 100 crore
 - (b) ₹ 50 crore
 - (c) ₹ 94 crore**
 - (d) ₹ 60 crore

Section B (2 marks)

UNIT I

1. Give the meaning and definition of managerial economics.
2. What are the objectives of demand analysis?
3. State the features of the demand curve.
4. State any two differences between economics & managerial economics.
5. Define the term demand.
6. What is demand forecasting?
7. What is autonomous demand?
8. State any two features of managerial economics.
9. Write a note on the Opportunity cost concept.
10. What is meant by demand function, demand schedule and demand curve?
11. Write a note on the discounting principle.
12. Write a note on total utility and marginal utility..

UNIT II

1. What are implicit & explicit costs?
2. Define profit
3. Write a note on first and second order conditions of profit maximization.
4. Define accounting profit.
5. Mention two concepts of profit.
6. Distinguish between accounting profit and economic profit.
7. What is the most plausible objective of business firms?
8. What is profit forecasting?
9. What are the alternative objectives of the firm?
10. Write a note on profit as the reward for risk taking and innovation.
11. What are the objectives of business?
12. State the constraints for any business firm.

UNIT III

1. What is price discrimination?
2. What are the features of monopoly?
3. Distinguish between *firm* and *industry*.
4. What is the breakeven point?
5. What is transfer pricing?
6. Mention any four features of perfect competition.
7. What are the characteristics of pure monopoly?
8. Write a note on cost plus method of pricing.
9. Why is a firm under perfect competition a price taker and not a price maker?
10. What are the various types of price discrimination?
11. What determines market structure?
12. What are the types of market?
13. State the characteristics of perfect competition.
14. What do you mean by competitive bidding?
15. Define 'Dual Pricing'.

UNIT IV

1. What do you mean by business cycles?

2. What are the two phases in a business cycle?
3. List the various phases of the trade cycle.
4. How is private business affected during different phases?
5. What is the 'turning point' in the business cycles?
6. What is meant by 'Fiscal Policy'?
7. Define 'Counter –Cyclical Fiscal Policy'.
8. What are the objectives of stabilization policy?
9. Write a short note on 'Economic Stabilization Policies'
10. What do you mean by 'monetary policy'?
11. Define GNP.
12. Define GDP.
13. What is the objective of monetary policy?
14. What are the traditional measures of monetary control?
15. Mention the components of national income.
16. What is National Income?
17. What are the features of prosperity in a trade cycle?
18. Define NNP.
19. What are the accounting identities at market price?
20. How will you calculate national income under the income method?

UNIT V

1. Define 'Fiscal Policy'
2. What are the objectives of Fiscal Policy?
3. Write a note on Indian Taxation Policy
4. What is meant by monetary policy?
5. Differentiate between monetary and fiscal policy
6. What is an open market operation?
7. What are the limitations of instruments of monetary policy?
8. What is meant by 'time-lag'?
9. Write down any four mediums of cashless transactions.
10. Write a short note on the utility of cashless transactions.
11. Define E-commerce.
12. What precautions should be taken while performing digital transactions?
13. Write any four limitations of cashless transactions.
14. Write two mediums of cashless transactions.
15. Write four benefits of cashless transactions.

Section C (6 marks)

UNIT I

1. What are the main reasons for change in demand?
2. State the significance of managerial economics. Is managerial economics a positive or normative science?
3. Explain why the demand curve slopes downward?
4. Explain the characteristics of managerial economics.
5. Explain the scope of managerial economics.
6. Explain the different types of demand.
7. Discuss the role of demand analysis in management.

8. Describe Law of demand. Why does the demand curve slopes downward?
9. Explain the fundamental concepts / principles of Managerial economics.
10. Discuss the duties & responsibilities of a managerial economist.

UNIT II

1. Explain the objectives of a modern firm.
2. What are the problems involved in setting a profit policy?
3. Explain the first and the second order condition of profit maximization.
4. Explain the following statements:
 - (i) Profit is the rent for exceptional ability of an entrepreneur. (Walker)
 - (ii) Profit arises only in a dynamic world. (J.B. Clark)
5. Distinguish between accounting profit & pure profit.
6. What are the considerations in aiming at a reasonable profit target? What standards are used in determining a reasonable profit?
7. Explain the principles of profit maximization.
8. Explain the different concepts and types of profit.
9. Discuss Baumol's sales maximization hypothesis.
10. Discuss Marris's growth model of a firm and managerial utility maximization model.

UNIT III

1. Describe the features of perfect competition.
2. Define price discrimination. State the essential conditions of price discrimination
3. Discuss various pricing methods.
4. Explain the types of market structures.
5. Discuss the pricing decisions under different market structures.
6. What are the necessary conditions for price discrimination? Why do monopoly firms adopt discriminatory pricing policy?
7. Explain pricing in the life-cycle of a product.
8. How is the price determined for a new product?
9. How pricing decisions are taken for established products?
10. Distinguish between skimming price and penetration pricing policies.

UNIT IV

1. Explain the terms:
 - (i) Gross national product
 - (ii) Net national product
2. What are the concepts used in national income?
3. What are the monetary measures adopted by the central bank?
4. Explain the objectives of monetary policy.
5. Discuss how national income is computed?
6. What are the different phases of a business cycle?
7. What is a trade cycle? What is the need for controlling it?
8. Explain the concept and objectives of stabilization policies.
9. Distinguish between net product method and factor income method. Which of these methods followed in India?
10. Explain pure monetary theory and Schumpeter's innovation theory of business cycle.

11. Write about national income in India.

UNIT V

1. State the various recommendations made by different committees in the parliament.
2. Describe the instruments of monetary policy.
3. Distinguish between quantitative and selective measures of monetary control.
4. How does the time-lag affect the effectiveness of monetary policy?
5. Write short notes on :
(i) E-wallet (ii) USSD (iii) AEPS (iv) NEFT
6. Why are developing economies encouraging cashless transactions?
7. What is the importance of cashless transactions?
8. Explain the precautions that should be taken while dealing in digital transactions.
9. Explain the relevance of cashless transactions in the context of India.
10. Write a brief note on i) Inflation ii) Deflation

Section D (12 marks)

UNIT I

1. Explain the economic concepts applied to business analysis.
2. Discuss the scope and use of managerial economics in business decision making.
3. Discuss the factors influencing market demand in detail.
4. Explain the types & determinants of demand.
5. Describe the various methods of demand forecasting.
6. Trace the role & responsibilities of a managerial economist.
7. Write a note on managerial economics. Distinguish between traditional economics and managerial economics.
8. Discuss the salient features and significance of managerial economics.
9. Explain why the demand curve slopes downward? Are there any exceptions to the law of demand?
10. Discuss the nature and scope of managerial economics. What are the other related disciplines?

UNIT II

1. Why do firms in general aim at a reasonable profit rather than pursuing other goals? What are the standards of reasonable profit?
2. Summarize the problems involved in setting a profit policy for a firm.
3. What is the most plausible objective of business firms? What is the controversy on profit maximisation hypothesis? How will you react to the controversy?
4. Explain critically profit maximization as the objective of business firms. What are the alternative objectives of business firms?
5. Profit maximization remains the most important objective of business firms in spite of multiplicity of alternative business objectives suggested by the modern economists.
Comment
6. Illustrate the different concepts of profit.
7. Discuss the main objectives of the firm in a modern economy.
8. Discuss why profit maximization is not the sole aim of a business firm. Outline Baumol's model of sales maximization.
9. Discuss the management theories of the firm.
10. Explain Baumol's theory of sales revenue maximization. In what way is this theory superior to the conventional theory based on the profit maximization hypothesis?

UNIT III

1. Explain the process of determination of price and output under conditions of perfect competition.
2. Explain the price policy to be adopted in relation to new products.
3. Discuss monopoly market structure.
4. Explain the various pricing methods.
5. Distinguish between skimming price and penetration pricing policies. Which of these policies is relevant in pricing a new product under different competitive conditions in the market?
6. Explain how price is determined under perfect competition.
7. What factors determine the market structure? How does the market structure affect pricing decision of a firm?
8. What is the life-cycle of a product? What kind of pricing strategy is adopted over the life-cycle of the product?
9. What is competitive bidding? Describe the technique of competitive bidding of price under conditions of uncertainty.
10. Explain the various degrees of price discrimination.

UNIT IV

1. What is meant by the business cycle? What are the different phases of a business cycle?
2. Describe the main functions of fiscal and monetary policies. Which policy is more effective in controlling trade cycles in a developing country?
3. Explain in detail the economic stabilization policies.
4. Explain the concepts of national income.
5. Explain the traditional instruments through which central bank carries out monetary policies.
6. Explain the concept of national income with reference to GNP.
7. Discuss the various methods of measuring national income. How is a method chosen for measuring national income?
8. Distinguish between net product method and factor income method. Which of these methods followed in India?
9. Explain pure monetary theory and Schumpeter's innovation theory of business cycle.
10. Explain the instruments of monetary policy.

UNIT V

1. Explain the basic functions of taxation policy
2. Describe the effects of taxation on savings.
3. What are the factors that determine the effectiveness of monetary policy? Explain
4. Explain the working mechanism of monetary policy.
5. What is a cashless transaction? Mention its major mediums in detail.
6. Write the meaning of cashless transaction, while discussing its advantages in detail. Write down its limitations.
7. Explain and illustrate quantitative measures of monetary control.
8. Describe quantitative methods of monetary control.
9. Describe the role of fiscal policy in stabilising the economy of a country.
10. Write and explain the government policies on foreign capital and foreign collaborations in India.

ST. MARY'S COLLEGE, (Autonomous), THOOTHUKUDI
I M.Com II Semester
Core 1 ORGANISATIONAL BEHAVIOUR Sub. Code: 21PCOC21
QUESTION BANK

Section A (1 mark)

Choose the correct answer

Unit I

1. _____ provides the resources with which people work and also affect the tasks that they perform
a) **Technology** b) People c) Structure d) Environment
2. OB is essentially _____ to study human behaviour at work
a) a normative science b) **an interdisciplinary approach** c) an applied science
d) a total system approach
3. _____ programmes lead to employee dependence on the organization.
a) Entertainment b) Sports c) **Welfare** d) Cultural
4. In _____ model the managerial orientation is dictatorial.
a) Democratic b) **Autocratic** c) Supportive d) Cognitive
5. The ever increasing concern for quality products and services has given genesis to today's buzzword:
a) **total quality management** b) total effective quality c) total improved quality
d) total quantity management
6. _____ refers to biological factors.
a) **Heredity** b) Environment c) Culture d) Attitude
7. _____ avoid social contacts and interaction.
a) **Introverts** b) Extrovert c) Ambivert d) Judging
8. OB applies _____ approach towards people working in an organisation.
a) **humanistic** b) feministic c) sarcastic d) exhaustive
9. The discipline that has had the greatest influence on the field of OB is _____.
a) sociology b) **psychology** c) physiology d) anthropology
10. Anthropology is the study of _____ to learn about human and their activities.
a) individuals b) groups c) **societies** d) teams

Unit II

1. Giving meaning to the environment around us is called as _____.
a) attitude b) personality c) **perception** d) learning
2. Drawing a general impression about an individual based on a single trait is _____.
a) **halo effect** b) interpretation c) grouping d) closure
3. Summated rating scale was experimented by _____.
a) **Likert** b) Guttman c) Thurstone d) Heider
4. The language we speak, the communication devices we use are the result of _____ learning.
a) **Verbal** b) Non verbal c) Motor d) Concept

5. Social learning is also called as _____ learning
 a) Cognitive b) Observational c) Operant d) **Observational**
6. The social learning theory was proposed by _____.
 a) Robert Sternberg b) Charles Spearman c) **Albert Bandura** d) Feldman
7. The _____ is one that unconditionally, naturally, and automatically triggers a response.
 a) Conditioned Stimuli b) **Unconditioned Stimuli** c) Conditioned Response d) Unconditioned Response
8. The learning of all types of motor skills may be included in _____ type of learning.
 a) Verbal b) Non verbal c) **Motor** d) Concept
9. _____ is a component of a competency to do a certain kind of work at a certain level, which can also be considered talent.
 a) Attitude b) **Aptitude** c) Altitude d) Intelligence
10. _____ needs refer to the desire to establish, maintain and develop inter-personal relations.
 a) **Relatedness** b) Existence c) Growth d) Maturity

Unit III

1. _____ may be defined as an inner state of our mind that activates and direct our behavior.
 a) attitudes b) personality c) **motive** d) morale
2. _____ be defined very simple as the willingness to exert efforts towards the accomplishment of his/her goal.
 a) values b) **motivation** c) motive d) morale
3. _____ leads to self-confidence, strength and capability of being useful in the organization.
 a) **esteem needs** b) safety needs c) social needs d) physiological needs
4. The term self-actualisation was coined by _____.
 a) Maslow b) Urwick c) **Kurt Goldstein** d) Ouchi
5. The term management by objectives was first coined by _____.
 a) **Peter Drucker** b) Sangeeta Jain c) David C. McClelland's d) Kurt Goldstein
6. _____ theory focuses on three needs viz., achievement, power and affiliation.
 a) Maslow's need hierarchical b) **David McClelland's Three-Need**
 c) Adam's Equity d) Vroom's expectancy
7. An _____ has a motivational power.
 a) monetary b) status c) self-actualisation d) **incentives**
8. _____ is a composite attitude of various individuals employed by an organization.
 a) motivation b) values c) motive d) **morale**
9. _____ is a process of influencing group activities towards the achievement of set goals.
 a) **Leadership** b) Goal setting c) Decision making d) Controlling
10. Free rein leadership is also known as _____.
 a) Democratic b) **Laissez Faire** c) Autocratic d) Bureaucratic

Unit IV

1. A _____ is a collection of people who interact with each other, know one another and work together to achieve a common objective.
a) **Group** b) society c) community d) race
2. Group _____ is influenced by norms, cohesion, role, conflict and decision making.
a) **Behaviour** b) Attitude c) Perception d) Awareness
3. When workers doing similar type of work meet voluntarily to discuss their problems, it is called _____
a) Culture circle b) Group circle c) **Quality circle** d) Problem circle
4. Brain storming, Delphi technique and consensus mapping are the techniques developed to improve group _____.
a) Norms b) cohesion c) role d) **decision making**
5. _____ is a process of influencing group activities towards the achievement of set goals.
a) **Leadership** b) Goal setting c) Decision making d) Controlling
6. Group _____ is the attractiveness of members towards the group.
a) Structure b) Behaviour c) **Cohesiveness** d) Norms
7. Free rein leadership is also known as _____.
a) Democratic b) **Laissez Faire** c) Autocratic d) Bureaucratic
8. The group formed by the organisation to achieve the organisational goals are called as _____ groups.
a) project b) **formal** c) task d) command
9. _____ is a technique in which an attempt is made to arrive at a decision by pooling the ideas together generated by several task sub-groups.
a) **Consensus Mapping** b) Delphi Technique c) Nominal Technique d) Brain Storming
10. _____ theory of group formation is based on three elements viz., activities, interaction and sentiments.
a) **Homan's** b) Balance c) Exchange d) Kruskal's

Unit V

1. Organizational change can be defined as the _____ in structure, technology or people in an organization.
a) **alteration** b) Performance c) fixation d) uniformity
2. _____ of behaviour is set to guide the organizational members as to how much work to do.
a) Rules b) Procedures c) **Standards** d) Programmes
3. _____ is a state of mind in which a person considers his/her interest first on a priority basis.
a) Collectivism b) **Individualism** c) Positivism d) Optimism
4. _____ is a small group of five to ten workers voluntarily performing quality control activities.
a) **Quality Circle** b) Quality Team c) Group control d) Team control
5. _____ refers to the existence of different levels of power in operation.
a) Power Level b) **Power Distance** c) Power Quality d) Authority
6. Variations in _____ across cultures affect employee behaviour at work.
a) work b) **motivation** c) politics d) economy

7. _____ is learnt through stories, rituals, symbols and language.
a) **Culture** b) Value c) Technology d) Protection
8. The _____ effect means one change triggers off a series of related changes.
a) Halo b) **Domino** c) Related d) Internal
9. _____ changes occur when forces compel organization to implement change without delay.
a) Proactive b) **Reactive** c) Planned d) Systematic
10. _____ is the final step in the change process.
a) **Refreezing** b) Unfreezing c) Resistance d) Acceptance

Section B (2 marks)

Answer in 50 words

Unit I

1. What is OB?
2. Define OB.
3. What is environment?
4. What is the scope of OB?
5. What is scientific management?
6. What is industrial revolution?
7. Define personality.
8. What is personality?
9. Distinguish between judging type and perceptive type.
10. What is introvert personality?
11. What is extrovert personality?

Unit II

1. What is perception?
2. What is stereotyping?
3. What is halo effect?
4. What is impression management?
5. What is attitude?
6. What are the salient features of attitudes?
7. Bring out the difference between attitudes and values?
8. Define learning.
9. What is a stimulus?
10. Mention the learning theories.

Unit III

1. Define motivation
2. What is leadership?
3. What are the three classical theories of motivation?
4. What is role conflict?
5. What is the role of motivation?
6. Write a note on self-managed team.
7. What are the styles of leadership?

8. What is autocratic leadership?
9. Define managerial grid.
10. What is leadership and who is a leader?

Unit IV

1. Define group.
2. What are the types of group?
3. Define conflict.
4. What is group decision making?
5. What is team building?
6. What is formal or informal group?
7. Define group development.
8. What are group roles?
9. What is group behavior?
10. What is group decision making?

Unit V

1. What is organizational change?
2. What is the major factor of organizational change?
3. What is Internal and external factor?
4. Define organizational development.
5. What is the role of organization?
6. What do you mean by organization characteristics?
7. Define planned change.
8. Define resistance to change.
9. What is managing change?
10. Define organizational effectiveness.

Section – C (6 marks)

Answer in 200 words

Unit I

1. What are the key elements OB?
2. Explain the nature and scope of OB.
3. What are the contributing disciplines to OB?
4. Explain the different models of OB.
5. What is personality? What are its major determinants?
6. Explain the Sigmund Freud's four stages of personality.
7. Explain Ericson's eight life stages of personality.
8. Explain the types of personality.
9. Explain Autocratic and Custodial Model.
10. Explain Supportive and Collegial Model.

Unit II

1. What are factors affecting perception?
2. What is perception? How to improve the perception?
3. How does sensation differ from perception?
4. What is learning? What are its determinants?
5. Explain the types of personalities.
6. Explain the personality attributes that influence organizational behaviour.
7. Explain the types of attitude.
8. What are the determinants of learning?
9. Explain the classical and operand learning and state its difference.
10. Explain Cognitive Theory and Social Learning Theory.

Unit III

1. What is motivation? Why is it a critical issue of interest to managers in organisation?
2. Explain the Maslow's hierarchy of needs theory.
3. Explain the different motivational models.
4. Briefly explain the functions of leadership.
5. Explain the autocratic leadership and participative leadership.
6. Write a short note on trait theories of leadership.
7. Discuss the implications of theory X and theory Y.
8. Describe 'Managerial grid'.
9. What are the limitations of two-factor theory?
10. Is everyone cut out to be a leader? Explain.

Unit IV

1. What is group? What are the types of groups?
2. What is a group role? What are the types of group roles?
3. Write a short note on group decision making.
4. What is the team building process?
5. Enumerate the types of team building.
6. Write a short note on group formation and development.
7. Write a short note on group development.
8. Distinguish between formal groups and informal groups.
9. Write a short note on conflict.
10. Write the differences between group and team.

Unit V

1. Define a group and bring out its characteristics.
2. Write a short note on organizational change.
3. Explain the reasons of organizations change.
4. Define planned change and explain the need for planned change?
5. Explain the three different stage of planned change?
6. What is group role? What is its significance in an organization?

7. Write a short note on managing resistance to change.
8. “A leader is developed and not born.” Do you agree? Explain with reasons.
9. Write a short note on organizational effectiveness.
10. Elucidate the approach to organizational effectiveness.

Section – D (12 marks)

Answer in 500 words

Unit I

1. Enumerate the nature and scope of organizational behaviour.
2. Discuss how OB is an interdisciplinary subject.
3. Explain the statement “People influence organisation, and organisations influence people”
4. What are the challenges faced by management?
5. What are the various models of organization behaviour?
6. Describe the origin and development of organisational behaviour in historical perspective.
7. Explain briefly the theories of personality.
8. Explain Erickson’s eight life stages.
9. Define personality; critically examine the Freudian stages of personality development.
10. How does the study of personality help in understanding OB?

Unit II

1. Explain the perceptual process.
2. Enumerate the factors affecting perception and attempts to improve it.
3. What is perception? Why does perception fail?
4. Discuss how attitudes are formed?
5. How do you measure attitude?
6. Explain the theories of attitude.
7. Discuss how an understanding of attitudes is useful for the study of OB?
8. Discuss the learning theories.
9. Define the term learning. What is its impact on employee behaviour?
10. Describe how various principles of learning might be used in a training programme.

Unit III

1. Discuss the classical theories of Herzberg’s two factor theory of motivation.
2. Explain the theory X and theory Y.
3. Critically examine the leadership styles.
4. Distinguish between motivation and leadership.
5. What do you understand by leadership styles? Describe the main styles of leadership.
6. Do you agree the motivation gives more effective to organization?
7. Examine the leadership styles followed by Indian managers. Can you suggest a right style?
8. Discuss the concept of managerial grid and explain the elements of leadership.
9. At what level in Maslow’s hierarchy of needs are you living? Are you basically satisfied at this level?
10. Does leadership make any difference to the effectiveness of an organisation?

Unit IV

1. Discuss the group behavior and explain the advantages of group behavior.
2. Define group and explain the types of groups.
3. What are the types of group roles? Discuss.
4. Discuss the advantages and disadvantages of group decision making.
5. Discuss the team building and explain the aspects of team building.
6. Explain the characteristics of group formation and development.
7. Define group development and the stages of group development.
8. Explain why people join groups?
9. Why is it important for managers to be familiar with the concepts of group behaviour?
10. How to make team more effective?

Unit V

1. What is organisational change? Describe the characteristics of change.
2. Discuss the types of organizational change.
3. Explain the process of change.
4. Explain the models of OD.
5. Discuss the OD interventions and Intervention techniques.
6. Elaborate the approach to organisational effectiveness.
7. Describe the three factors that influence organizational effectiveness.
8. Define organizational development and explain the characteristics of OD.
9. Why organisational development is undertaken by organisation?
10. Can organisations prevent resistance to change? If so, how?

Section-A (1 mark)

Unit-I- Introduction to Financial management & Time value of Money:

Choose the correct answer:

1. _____refers to the management of flow of funds in the firm.
a) Profit maximization **b) Financial management** c) Fund flow d) Cash flow
2. _____ is accountable to the top level management for flow of funds in the firm.
a) Finance manager b) Production manager c) Marketing manager d) Personnel manager
3. _____ is the yard stick on the basis of which efficiency of a business can be evaluated.
a) Sales **b) Profit** c) Economic welfare d) Production
4. _____ is the life blood and nerve centre of a business.
a) Profit maximization b) Wealth maximization **c) Finance** d) Sales maximisation
5. Ensuring-----is the objective of financial management.
a) Fair return to shareholders b) Maximum operational efficiency c) Financial discipline
d) All the above.
6. The scope of financial management is confined to _____ of funds
a) allocation b) raising c) application **d) All the above**
7. -----is the official mainly concerned with managing the firm's funds.
a) Manager b) Director c) Secretary **d) Treasurer**
8. The main objective of Financial Management is-----
a) maximization of profits b) maximization of shareholder's wealth
c) ensuring financial discipline in the organization d) customer satisfaction
9. Financial Management helps in-----
a) the estimation of total requirement of funds & monitoring effective deployment of funds in fixed assets & working capital b) long term planning of company's activities.
c) profit planning for the organization. d) product development.
10. In his traditional role the finance manager is responsible for-----
a) arrangement & efficient utilization of funds b) arrangement of financial resources
c) acquiring capital assets for the organization d) avoid the need to raise fresh equity.
11. _____ refers to ascertainment of future value of present money.
a) Compounding b) Multiple compounding
c) Present value of a lump sum d) Compounding value of annuity
12. _____ is an infinite series of periodic cash flows which grow at a constant rate.
a) Doubling b) Multiple compounding c) Compounding **d) Perpetuity**
13. Process of finding out the present value of a future sum is known as _____
a) Multiple compounding technique b) Compounding technique
c) Sinking fund technique **d) Discounting technique.**
14. ----- number of years constantly, instead of a single cash flow.
a) Compound value of an annuity b) Effective rate of interest
c) Doubling period d) Discounting
15. Compound value of money can be calculated as _____
a) $A = P(1+i)^n$ b) $A = P/n$ c) $A = P/i$ d) $A = PxI$
16. _____ results in the occurrence of cash flows of the same amount every year, for a stream of uniform periodic cash flows.
a) Annuity b) Present value c) Compound value **d) Perpetuity**
17. Time preference for money prevails because-----

a) goods will become dearer after a time period **b) the worth of money in hand is more valuable than that the same amount when received after a particular period.** c) money

facilitates purchase of necessary amenities in time. d) the investments are for the future periods.

18. Multiple Compounding period means-----

a) there are number of years for which money is compounded b) interest is paid many time at same rate. **c) interest is compounded more than once in a year.** d) interest received remains constant.

19. Compounding technique is-----

a) same as discounting technique b) slightly different from discounting technique:

c) exactly opposite of discounting technique d) present value technique

20. Risk and Return have -----

a) direct relationship b) inverse relationship c) no relationship d) none of the above **Ans: 1(b) 2.(a)**

3.(b) 4.(c) 5.(d) 6.(d) 7.(d) 8.(c) 9.(a) 10. (a)

11.(a) 12.(d) 13.(d) 14.(a) 15.(a) 16.(d) 17.(b) 18.(c) 19.(c) 20. (a)

Unit-II Risk Management:

1. The term ----- refers to the risk on account of pattern of Debt- Equity mix of a company.

a) Business Risk **b) Financial Risk** c) Marketing Risk d) Speculative Risk .

2. In case of Risk , the chance of future loss -----

a) can be foreseen b) cannot be foreseen c) cannot be foreseen better than under uncertainty d) can be foreseen better than under uncertainty.

3. In case of Uncertainty , the chance of future loss -----

a) can be foreseen b) **cannot be foreseen** c) cannot be foreseen better than under risk d) can be foreseen better than under risk.

4. Risk can be managed by -----

a) prevention b) retention c) hedging d) **all of the above**

5. The term income has a -----meaning as compared to the term profit.

a) **more specific** b) less specific c) definite d) synonymous

6. Which of the following term/terms used to record income or earnings of a business?

a) EBIT b) EBT c) EAT d) **All of the above**

7. The commonly used techniques to analyze risk –return relationship are-----

a) standard deviation b) probability distribution c) coefficient of variation d) **All of the above**

8. The relationship between risk and return is-----in nature.

a) direct b) inverse c) no relationship d) proportionate

9. Which of the following are the commonly used risk return decision area?

a) Capital budgeting b) Working Capital management c) Cost of capital d) **All of the above**

10. -----risks are those affecting group of people or society at large.

a) **Fundamental** b) Particular c) Static d) Dynamic

Unit-III Startup Financing and Leasing:

1. -----is a lease that transfers substantially all the risk and rewards incident to the ownership of an asset

a) **Finance lease** b) Operating lease c) Leveraged lease d) Sale and Lease back lease

2. -----lease is also termed as “Close-end Lease”.

a) **Finance lease** b) Operating lease c) Leveraged lease d) Sale and Lease back lease

3. -----lease is also termed as “Open -end Lease”.

a) Finance lease b) **Operating lease** c) Leveraged lease d) Sale and Lease back lease

4. Capital Lease is a long term arrangement which is -----during its primary lease period.

a) revocable b) **irrevocable** c) partly revocable d) none of the above

5. ----- is an arrangement where a firm sells an asset to another person who in turn leases it back to the firm.
a) Finance lease b) Operating lease c) Leveraged lease d) **Sale and Lease back lease**
6. In case of -----ownership of the asset is transferred to the buyer when he pays the last instalment.
a) **Hire Purchase** b) Instalment Purchase c) Leasing d) Sale and Lease back lease
7. A lease agreement grants lessee the right to -----
a) own the asset b) **use the asset** c) own and use the asset d) hypothecate the asset
8. A "Sale and Lease back" lease is suitable for a lessee having -----.
a) **liquidity crisis** b) surplus funds c) high profits d) high reserves
9. An asset leased under a finance lease should be disclosed in the balance sheet of the lessor on -----
a) asset side b) liabilities side c) **both sides** d) none of the above.
10. -----is the effective system for financing capital equipment.
a) Hire Purchase b) Instalment Purchase c) Leasing d) **All the above**

Unit-IV Cash, Receivables and Inventory Management:

1. That portion of a firm's current assets which is financed by long term funds is called _____.
a) **Net working capital** b) Gross working capital c) Working capital d) Fixed capital
2. The firm's investment in total current or circulating assets is called _____.
a) Net working capital b) **Gross working capital** c) Working capital d) Fixed capital
3. _____ refers to that minimum amount of investment in all current assets which is required at all times to carryout minimum level of business activities.
a) **Permanent working capital** b) Temporary working capital
c) Working capital d) Fixed capital
4. That portion of working capital which keeps on fluctuating from time to time on the basis of business activities is called _____.
a) Permanent working capital b) **Temporary working capital** c) Net working capital
d)Gross working capital
5. In finance, "working capital" means the same thing as _____.
a)Total assets. b) fixed assets c) current assets
d)**current assets minus current liabilities.**
6. Net working capital refers to _____.
a)Total assets minus fixed assets. b)**Current assets minus current liabilities.** c)Current assets minus inventories. d)Current assets.
7. Permanent working capital _____.
a)Varies with seasonal needs. b)includes fixed assets. c)includes accounts payable.
d)**is the amount of current assets required to meet a firm's long-term minimum needs.**
8. Inventory management means management of _____.
a) Raw materials b) Work in progress c) Finished goods d) **All (a) (b) and (c)**
9. The commonly used Inventory control techniques are _____.
a) Economic Order Quantity b) ABC –Analysis
c) Inventory Turnover ratio d) **All of the above**
10. The size of the order which yields maximum economy in purchasing any item of inventory is called _____.
a) Re-order level b) **EOQ**

c) Inventory Turnover Ratio d) Optimum production Quantity

Ans: 1.(a) 2.(b) 3.(a) 4.(b) 5.(d) 6.(b) 7.(d) 8. (d) 9. (d) 10.(b)

Unit-V Multi National Capital Budgeting:

1. Cut-off rate means----- of return below which project proposals can not be accepted.
a) **Minimum rate** b) Normal rate c) Average rate d) Maximum rate.
2. While evaluating capital investment proposals the time value of money is considered in case of -----

a) Pay-back method b) **Discounted cash flow method** c) Accounting rate of return method d) Cut-off period method.
3. The return after the cut-off period is not considered in case of -----
a) **Pay-back method** b) Discounted cash flow method c) Accounting rate of return method d) Internal rate of return method.
4. Depreciation is included in costs in case of-----
a) Pay-back method b) Discounted cash flow method c) **Accounting rate of return** method d) Internal rate of return method.
5. The cash inflows on account of operations are presumed to have been reinvested at the cut-off rate in case of-----
a) Pay-back method b) **Discounted cash flow method** c) Accounting rate of return method d) Cut-off period method.
6. A capital proposal whose acceptance depends on the acceptance of one or more other proposals is called a -----
a) Independent proposal b) **Dependent proposal** c) Mutually exclusive proposal d) Direct proposal.
7. Capital budget is not a -----
a) Capital expenditure budget b) Capital project budget c) **Master budget** d) Capital investment budget.
8. The ratio of the total present value of future cash inflows and total present value of future cash outflows is known as -----
a) NPV b) IRR c) ARR d) **Profitability Index.**
9. NPV=-----
a) Cash inflows – Cash outflows b) Cash outflows – Cash inflows c) **PV of cash inflows – PV of cash outflows** d) PV of cash outflows – PV of cash inflows
10. -----is that rate at which the sum of discounted cash inflows equals the sum of discounted cash outflows.
a) Cut-off rate b) Average c) Accounting rate of return d) **Internal rate of return.**

Ans:1. a 2. b 3. a 4. c 5. b 6. b 7. c 8. d 9.c 10. d

Section --B (2 Marks)

Answer the following in about 50 words.

Unit-I

1. What is financial management?
2. What are the main objectives of financial management?
3. What is business finance?
4. What is financial forecasting?
5. What are the subsidiary functions of finance management?

6. Write the traditional approach to the scope of financial management.
7. Write the modern approach to the scope financial management.
8. What are the other objectives of financial management?
9. Distinguish between financial management and cost accounting.
10. Distinguish between financial management and financial accounting.
11. What is Time value of money?
12. What is perpetuity?.
14. State the present value and compound value concept of measuring money value.
15. Give formula to calculate amount under compounding of interest over 'N' years.
16. Give formula to calculate amount under multiple compounding periods interest.
17. Give formula to calculate present value of a Perpetual Annuity.

Unit-II

1. Write a note on Business Risk.
2. Write a note on Uncertainty.
3. Differentiate between Risk and Uncertainty.
4. Briefly state the relationship between Risk and Return.
5. Differentiate between Financial and Non financial risks with appropriate examples.
6. Differentiate between Static and Dynamic Risk.
7. Write a note on Pure and Speculative risks.
8. Write a note on Hedging currency risk.
9. Briefly state the different methods of risk management.
10. What is Risk Management?

Unit-III

1. Briefly state the advantages of Leasing.
2. Write a short note on Capital lease.
3. Write a short note on Operating lease.
4. Briefly state the disadvantages of Leasing.
5. What is "sale and leaseback" lease agreement?
6. Write a note on startup finance.
7. List out the sources of startup finance.
8. What is Venture Capital?
9. Who are Angel Investors?
10. What is Bootstrapping?

Unit-IV

1. What is Working Capital?
2. Write a short note on Cash cycle.
3. What is Economic Order Quantity?
4. Write a short note on ABC Analysis.
5. State the need for Working Capital.
6. What is Net Working Capital?
7. Write a short note on Inventory Management.
8. List out the important ratios commonly used to measure the efficiency of working capital.
9. Write a short note on Cash Management.
10. What is Inventory Turnover Ratio?

Unit-V

1. What is capital expenditure budget?
2. What is NPV?
3. Why capital expenditure decisions are given more importance?
4. What is Internal Rate of Return?
5. What is Capital rationing?
6. What are mutually exclusive events?
7. What are dependent proposals?
8. What are independent proposals?
9. State the objectives of capital expenditure budget?
10. What is cut-off point?
11. What is pay back period?

Section C (5 Marks)

Answer the following questions in about 300 words.

Unit –I

1. Write a short note on the emerging role of financial manager.
2. Write the importance of business finance.
3. Explain the scope of business finance.
4. What are the objectives of financial management?
5. Find out the present value of annuity of Rs.5000 over five years where discounted at 10%.
6. If an investor expects a perpetual sum of Rs 800 annually from his investment, what is the present value of this perpetuity, if his time preference or discount rate is 10%.
7. Rs 10,000 invested at 10% compounded annually for 3 years. Calculate the compounded value after three years.
8. Mr X intends to have a return of Rs 5000 per annum for perpetuity . The discount rate is 20%, calculate the present value of this perpetuity.
9. Mr.X invest Rs 50,000 ,Rs70,000 ,Rs 80,000 at the beginning of each year. Calculate compound value at the end of 3 years compounded annually ,when interest charged at 10% p.a.
10. Find out the present value of annuity of Rs. 20,000 over 3 years discounted at 20%.
- 11 . Calculate the present value of Rs 8,000 per year forever .
 - (i) Assuming an interest rate of 8%.
 - (ii) Assuming an interest rate of 10%
12. X,Y,Z pays 12% compound interest quarterly . If Rs 10,000 are deposited quarterly Initially, how much should it grow at the end of 5 years.
13. How will you calculate the Compound value of a sum after (i) 3 years. (ii) n years Explain with the help of practical examples

Unit-II

Qn.No--1 to 7 –Essay Type Pg:No A.75 &A. 76. Financial Mgt- S.N Maheshwari.

8. A firm is considering two alternative proposals for the next summer.
 - i) purchasing and selling air – conditioners.
 - ii) purchasing and selling rain – coats.From the following details identify the alternative which would be most profitable

for the firm.

Air conditioners			Rain coats		
Weather	Probability	Net Return	Weather	Probability	Net Return
Hot summer	0.2	Rs.60,000	Wet summer	0.2	Rs.80,000
Normal summer	0.55	Rs.40,000	Normal summer	0.6	Rs.30,000
Cool summer	0.25	Rs.(10,000)	Dry summer	0.2	Rs.20,000

(OR)

9. A Ltd has a choice between three projects X,Y,Z. The following information has been estimated.

Projects	Market Demand (Profit '000)		
	D1	D2	D3
X	190	50	15
Y	200	160	110
Z	150	140	140

Probabilities : D1= 0.6 D2= 0.2 D3= 0.2

Which project should be undertaken if decision is made by expected value approach?

10. A businessman wants to construct a hotel. He usually builds 25, 50 or 100 beds hotel, depending on whether anticipated demand is low, medium or high. The businessman has to find out net profits which are expressed in the table below and the prior distribution regarding the states of nature which is given in the next table.

PAYOFF TABLE

Action	A ₁	A ₂	A ₃
Build	Build	Build	Build
Status Of nature	25 – beds hotel	50 – beds hotel	100 – beds hotel
$\theta =$ low demand	20,000	- 10,000	- 30,000
$\theta =$ Medium demand	25,000	30,000	- 5,000
$\theta =$ High demand	30,000	50,000	60,000

PRIOR DISTRIBUTION

States of nature = demand	θ_1	θ_2	θ_3	Total
Prior probabilities (θ_i)	0.2	0.3	0.5	1.00

Compute expected return and expected return under perfect information and advise the management about the choice of alternatives.

Unit-III

Qn.No--1 to 7 –Essay Type Pg:No E.101, Financial Mgt- S.N Maheshwari.

Unit-IV Working Capital Management

1. Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	-10,000 kg.
Order placing costs per order	- Rs. 50
Cost per kg. of raw materials	-Rs. 2
Storage costs	- 8% on average inventory.

2. From the following data, calculate (a) Safety stock (b) Re-order Quantity (c) Maximum level in respect of material 'A'.

Economic Order Quantity	500 units
Lead time	3 weeks
Weekly usage	50 units
Weeks of safety stock desired by the firm	-2

3. Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year.

Consumption of materials per annum	-3,000 kg.
Order placing costs per order	- Rs. 9
Cost per kg. of raw materials	-Rs. 6
Storage costs	- 10% on average inventory.

4. Determine the Economic Order Quantity from the following information:

Consumption of materials per annum	-40,000 kg.
Order placing costs per order	- Rs.480.
Cost per kg. of raw materials	-Rs. 16.
Storage costs	- 15% on average inventory.

5. Calculate the material turnover ratio from the following details. Also determine the fast moving material.

Particulars	Material X	Material Y
	(Rs.)	(Rs.)
Opening stock	25,000	87,500
Closing stock	15,000	62,500
Purchases	1, 90,000	1,25,000

6. A firm has 5 different levels in its inventory. The relevant details are given. Suggest a breakdown of the items in to A, B and C classifications:

Item No.	Average inventory	Average cost per unit
	(No. of units)	(Rs.)
1	20,000	60
2	10,000	100
3	32,000	11
4	28,000	10
5	60,000	3.40

7. From the following information; estimate the net working capital requirement of a company

	Cost per unit (Rs.)
Raw materials	400
Direct labour	150
Overheads (excluding depreciation)	300
Total cost	850
Additional information:	
Selling price	1000 per unit
Output	52,000 units
Raw materials in stock	Average 4 weeks
Work – in – progress (assumed 50% completion stage with full material consumption)	Average-2weeks
Finished goods in stock	Average- 4 weeks
Credit allowed by suppliers	Average -4 weeks
Credit allowed to debtors	Average- 8 weeks
Cash at Bank is expected to be:	Rs.50,000

Assume that production is sustained at an even pace during the 52 weeks of the year. All sales are on credit basis.

8. A firm is engaged in large scale consumer retailing. From the following details forecast their working capital requirement.

Projected annual sales- Rs.65,00,000

Percentage of Net profit on Cost of sales -25%

- Average credit period allowed to Debtors -10 weeks
- Average credit period allowed by Creditors -4 weeks
- Average stock carrying (in terms of sales requirement) -8 weeks
- Add 10% to computed figures to allow for contingencies.

9. Prepare an estimate of working capital requirement from the following information of a trading concern.

- Projected annual sales 10,000 units
- Selling price Rs. 10 per unit
- Percentage of net profit on sales 20%
- Average credit period allowed to customers- 8 Weeks
- Average credit period allowed by suppliers- 4 Weeks
- Average stock holding in terms of sales requirements- 12 Weeks
- Allow 10% for contingencies.

10. From the following information, estimate the net working capital requirement of a company.

	Cost per unit (Rs.)
Raw materials	50
Direct labour	30
Overheads (excluding depreciation)	20
Total cost	100
Additional information:	
Selling price	120 per unit
Profit	20 per unit
Output	12,000 units
Raw materials in stock	Average – 1 month
Work – in – progress (assumed 50% completion stage with full material consumption)	Average- 2months
Finished goods in stock	Average – 3 months
Credit allowed by suppliers	Average - 2months
Credit allowed to debtors	Average - 4months

Unit-V

1 . From the following information, calculate NPV of the two projects and suggest which of the two projects should be accepted assuming a discount of 10%

Particulars	Project X	Project Y
Initial Investment	20,000	20,000
Estimated Life	5 yrs	5 yrs
Scrap value	1,000	2,000
Their profits before depreciation but after taxes are as follows,		
Year	Project X	Project Y
1	5,000	20,000
2	10,000	10,000
3	10,000	5,000
4	3,000	3,000
5	2,000	2,000

2. ABC Ltd. has given the following possible cash inflows together with their

associated probabilities for two of their projects X and Y out of which one they wish to undertake. Both the projects will require an equal investment of Rs. 50,000 each. Give your considered opinion about the selection of the project.

Possible event	Project- X		Project- Y	
	Cash inflows	Probability	Cash inflows	Probability
A	Rs. 40,000	.10	Rs.1,20,000	.10
B	Rs. 50,000	.20	Rs.1,00,000	.15
C	Rs. 60,000	.40	Rs.80,000	.50
D	Rs. 70,000	.20	Rs.60,000	.15
E	Rs. 80,000	.10	Rs.40,000	.10

3. A project is estimated to cost Rs. 16,200. It is expected to have a life of 3 years and generate cash inflows of Rs.8,000, Rs. 7,000, and Rs.6,000 respectively. Calculate Internal rate of return.
4. Pay-off Ltd is producing articles mostly by manual labour and is considering to Replace it by a new machine. There are two alternative models M and N of the new machine. Prepare a statement of profitability from the following information and suggest which project is financially preferable under Pay back period method.

	Machine M	Machine N
Estimated life of machine	4 yrs	5 years
Cost of machine	Rs. 9,000	Rs. 18,000
Estimated savings in scrap	500	800
Estimated savings in direct wages	6,000	8,000
Additional cost of maintenance	800	1,000
Additional cost of supervision	1,200	1,800

Ignore taxation.

5. A company intends to replace an old machine with a new machine. From the following information determine the net cash required for such replacement.

Receipts	Rs
Cost of old machine	50,000
Life of the old machine	5 yrs
Depreciation according to S.L.M	
Remaining useful life	2 yrs
Cost of the new machine	70,000
Installation charges	10,000
Amount realized on sale of old machine	25,000
Additional working capital required	5,000

Income tax	50%
Capital gains tax	30%
Investment allowance	20%

6. A project cost Rs. 16,000 and is expected to generate cash inflows of Rs. 4,000 each for 5 years. Calculate the Internal rate of return.

7. Project X initially costs Rs. 25,000. It generates the following cash flows.

Year	Cash inflows
1	Rs. 9,000
2	8,000
3	7,000
4	6,000
5	5,000

Taking cut-off rate as 10% suggest whether the project should be accepted or not.

8. A project needs an investment of Rs. 1, 38,500. The cost of capital 12%. The net cash inflows are as under.

Year	Rs
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000

Calculate the I.R.R. and suggest whether the project should be accepted or not.

9. A project costs Rs. 20,00,000 and yields annually a profit of Rs. 3,00,000 after depreciation @ 12.5% but before tax at 50%. Calculate the pay back period.

10. ABC Ltd. is proposing to take up a project which will need an investment of Rs. 40,000. The income before depreciation and tax is estimated as follows:

Year	Rs.
1	10,000
2	12,000
3	14,000
4	16,000
5	20,000

Depreciation is to be charged according to S.L.M. Tax rate is 50%. Calculate the A.R.R.

Section D (10 Marks)

Answer the following questions in about 500 words.

Unit -I

1. Explain the relationship between financial management and other areas of management.
2. Enumerate the scope of Business Finance.
3. Explain the role of finance manager in the changing scenario.
4. Elucidate the objectives of Business Finance.
5. Explain the meaning and importance of Valuation concept. How does valuation concept helps in decision making.
6. Explain the relevance of Time value of money in financial decisions.
7. P is considering an investment opportunity which will give him cash flows of Rs 10,000, Rs. 15,000, Rs. 8,000, Rs. 11,000, and Rs. 4,000 respectively at the end of each of the next 5Years. You are required to find out the present value of these cash inflows if his time Preference rate is 10%.
8. For the following cases, calculate the amount of money at the end of deposit period.

Case	Initial amount	Interest Rate(%)	No.of Years (n)	Compounding period (months)
1	4000	8	4	3
2	2000	10	5	6
3	1000	11	10	12

9. Exactly ten years from now Milanna will start receiving a pension of Rs 5,000 a year
The payment will continue for 16 years. How much is the pension worth now. If
Milanna's time preference rate is 10%.
10. For each of the following cases ,calculate the sum of the total amount generated by the annuity deposit given by the specified rates of interest and number of years:

Case	Amount of deposit	Interest Rate	Numbers of years
P	2000	10	5
Q	1000	12	10
R	5000	8	4
S	6000	14	12

Unit-II

1. Blossoms Ltd. is considering three alternative plans for its immediate expansion programme. There budgeted revenues and probabilities along with other relevant data are given below.

(Rs. in lakhs)

	Plan 1	Plan II	Plan III
Budgeted revenue with probabilities:			
High	30(.3)	24(.2)	50(.2)
Medium	20(.3)	20(.7)	25(.5)
Low	5(.4)	15(.1)	0(.3)
Variable cost as % of revenue	60%	75%	70%
Initial investment	25	20	24
Life in years	8	8	8

The company's cost of capital is 12%, the income tax rate is 40%. Investment in promotional programmes will be amortised by S.L.M. The present value of an annuity of Re.1 at 12% for 8 years is 4.9676. Based on the above figures make a detailed analysis and find out which of the promotional plans is expected to be the most profitable?

2. The Hypothetical Co. Ltd. has given the following possible cash inflows together with their associated probabilities for two of their projects X and Y out of which one they wish to undertake. Both the projects will require an equal investment of Rs. 50,000 each. Give your considered opinion about the selection of the project.

Possible event	Project- X		Project- Y	
	Cash inflows	Probability	Cash inflows	Probability
A	Rs. 40,000	.10	Rs.1,20,000	.10
B	Rs. 50,000	.20	Rs.1,00,000	.15
C	Rs. 60,000	.40	Rs.80,000	.50
D	Rs. 70,000	.20	Rs.60,000	.15
E	Rs. 80,000	.10	Rs.40,000	.10

3. A management is faced with the problem of choosing one of the three products for manufacturing. The probability matrix after market research for the 3 products are as follows:

	Good	Fair	Poor
product – A	0.75	0.15	0.1
Product – B	0.60	0.3	0.1

Product – C	0.50	0.3	0.2
-------------	------	-----	-----

Profit in Rs.

	Good	Fair	Poor
Product – A	35,000	15,000	5,000
Product – B	50,000	20,000	-3,000
Product – C	60,000	30,000	20,000

Calculate expected value of the choice of alternatives and advise the management regarding the selection of the product.

5. Illustration -6.1- Pg:No :-D.303- Financial Mgt- S.N Maheshwari.
6. Illustration- 6.2- Pg:No :-D.304- Financial Mgt- S.N Maheshwari.
7. Illustration -6.3 - Pg:No :-D-305- Financial Mgt- S.N Maheshwari.
8. Illustration -6.4 - Pg:No :-D-305- Financial Mgt- S.N Maheshwari.
9. Illustration -6.5 - Pg:No :-D-306- Financial Mgt- S.N Maheshwari.
10. Illustration -6.7. - Pg:No :-D-309- Financial Mgt- S.N Maheshwari.

Unit-III

1. ABC Ltd. a leasing company, has been approached by a customer intending to write a five years lease on an asset costing Rs. 10,00,000 and having estimated salvage value of Rs.1,00,000 thereafter. The company has a after tax required rate of return of 10% and its tax rate is 50%. It provides depreciation @ 33 1/3% on WDV of the asset. What lease rental will provide the company its after tax required rate of return?

2. Welse Ltd. is faced with a decision to purchase or acquire on lease a mini car. The cost of the mini car is Rs. 1,26,965. It has a life of 5 years. The mini car can be obtained on lease by paying equal lease rentals annually. The leasing company desires a return of 10% on the gross value of the asset. Welse Ltd. can also obtain 100% finance from its regular banking channel. The rate of interest will be 15% p.a. and the loan will be paid in five annual equal instalments, inclusive of interest. The effective tax rate of the company is 40%. For the purpose of taxation it is to be assumed that the asset will be written off over a period of 5 years on a straight line basis.

Advise the company about the method of acquiring the car.

3. Fair Finance, a leasing company, has been approached by a customer intending to acquire a machine whose Cash Down price is Rs. 3 crores. The customer, in order to leverage his tax position, has requested a quote for a three-year lease with rental payable at the end of each year but in a diminishing manner such that they are in the ratio of 3 : 2 : 1.

Depreciation can be assumed to be on straight line basis and Fair Finance's marginal tax rate is 35%. The target rate of return for Fair Finance on the transaction is 10%.

Calculate the lease rents to be quoted for the lease for three years.

5. Illustration -4.3- Pg:No :-E.88- Financial Mgt- S.N Maheshwari.
6. Illustration -4.2- Pg:No :-E.90- Financial Mgt- S.N Maheshwari.

7. Illustration -4.5- Pg:No :-E.95- Financial Mgt- S.N Maheshwari.

8. Discuss the methods for evaluating the leasing proposal.

9. Lease Financing has proved its unique adoptability to various financial problems-Discuss.

10. Explain the concept of Leasing. Also states its advantages and limitations.

Unit-IV

1. Prepare an estimate of working capital requirement from the following information of a trading concern.

Projected annual sales 10,000 units

Selling price Rs. 10 per unit

Percentage of net profit on sales 20%

Average credit period allowed to customers 8 Weeks

Average credit period allowed by suppliers 4 Weeks

Average stock holding in terms of sales requirements 12 Weeks

Allow 10% for contingencies.

2. The board of directors of Aravind mills limited request you to prepare a statement showing the working capital requirements for a level of activity of 30,000 units of output for the year.

The cost structure for the company's product for the above mentioned activity level is given below.

Cost per Unit:	(Rs.)
Raw materials	20
Direct labour	5
Overheads	15
Total	40
Profit	10
Selling price	50

(a) Past experience indicates that raw materials are held in stock, on an average for 2 months.

(b) Work in progress (100% complete in regard to materials and 50% for labour and overheads) will be half a month's production.

(c) Finished goods are in stock on an average for 1 month.

(d) Credit allowed to suppliers: 1 month.

(e) Credit allowed to debtors: 2 months.

(f) A minimum cash balance of Rs 25,000 is expected to be maintained.

Prepare a statement of working capital requirements.

3. Illustration -7.9- Pg:No :-D-362- Financial Mgt- S.N Maheshwari.

4. Illustration -7.12- Pg:No :-D-373- Financial Mgt- S.N Maheshwari.

5. Illustration -7.13- Pg:No :-D-374- Financial Mgt- S.N Maheshwari.

6. Illustration -7.14- Pg:No :-D-376- Financial Mgt- S.N Maheshwari.

7. Illustration -7.14- Pg:No :-D-376- Financial Mgt- S.N Maheshwari.

8. Illustration—7.1 , Pg.No D 331. Financial Mgt- S.N Maheshwari.

9. V.S.M. Ltd. is engaged in large scale retail business. From the following information you are required to forecast their working capital requirements.

Projected Annual Sales Rs. 130 lakhs

Percentage of net profit on cost of sales 25%

Average credit period allowed to debtors 8 weeks.

Average credit period allowed by creditors 4 weeks.

Average stock carrying 8 weeks (in terms of sales requirements).

Add : 10% to computed figures to allow for contingencies.

10. XYZ Ltd. currently has annual credit sales of Rs. 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is Rs. 1,50,000 . The firm is required to give a return of 25% on the investment in new accounts receivable. The company's variable costs are 70% of the selling price. Given the following information, which is the better option?

	Present Policy	Option -1	Option -11
Annual credit sales	Rs.50,00,000	Rs.60,00,000	67.50,000
Accounts receivable turnover ratio	4 times	3 times	2.4 times
Bad debts losses	Rs.1, 50,000	Rs.3,00,000	Rs. 4,50,000

Unit-V

1. A firm can make investment in either of the following two projects. The firm anticipates its cost of capital to be 10% and the net (after tax) cash flows of the projects for 5 years are as follows;

(Figures in Rs.'000)

Year	0	1	2	3	4	5
Project- A	(500)	85	200	240	220	70

Project- B (500) 480 100 70 30 20

Calculate the NPV and IRR of the projects and state with reasons which project you would recommend.

2. A Ltd company is considering investing in a project requiring a capital outlay of

Rs. 2,00,000. Forecast for annual income after depreciation but before tax is as follows.

Year	Rs.
1	1,00,000
2	1,00,000
3	80,000
4	80,000
5	40,000

Depreciation may be taken as 20% on original cost and taxation at 50% of net income.

Evaluate the project according to

- Pay back period method
- NPV method by taking cost of capital as 10%
- IRR method and
- ARR method

3. A company is considering two mutually exclusive projects. Both require an initial investment of Rs. 50,000 each and have a life of 5 years. The cost of capital of the company is 10% and tax rate is 50%. The depreciation is charged on S.L.M. The estimated net cash flows (before depreciation and tax) of the two projects are as follows.

Year	Project A	Project B
1	20,000	30,000
2	22,000	27,000
3	28,000	22,000
4	25,000	25,000
5	30,000	20,000

Which project should be accepted as per NPV and IRR methods?

4. The Phillips Corporation which has a 50% tax rate and a 10% after tax cost of capital, is evaluating a project which will cost Rs.1,00,000 and will require an increase in the level of inventories and receivables of Rs.50,000 over its effective life. The project will generate additional sales of Rs.1,00,000 and will require cash expenses of Rs.30,000 in each year of its 5 year life. It will be depreciated on a straight line basis .Calculate Net Present Value and Internal Rate of Return.

5. X Ltd. has currently under examination of a project which will yield the following returns over a period of time.

Year	Gross Yield (Rs.)
1	80,000
2	80,000

3	90,000
4	90,000
5	75,000

Cost of the machinery to be installed works out to Rs.2,00,000 and the machine is to be depreciated at 20% WDV basis. Income –tax rate is 50% .If the cost of capital is 11% ,would you recommend accepting the project under IRR method.

6. A firm whose cost of capital is 10% is considering two mutually exclusive projects X and Y, the details of which are:

	Year	Project X	Project Y
Cash inflows	1	10,000	50,000
	2	20,000	40,000
	3	30,000	20,000
	4	45,000	10,000
	5	60,000	10,000

Which project should be accepted as per NPV and IRR methods?

7. The Alpha Co. Ltd. is considering the purchase of a new machine. Two alternatives (A&B) have been suggested, each having an initial investment of Rs.4,00,000 and requiring Rs. 20,000 as additional working capital at the end of I st year. Earnings after taxation are expected to be as follows:

Year	Cash inflows	
	Machine A	Machine B
1	Rs. 40,000	1,20,000
2	1,20,000	1,60,000
3	1,60,000	2,00,000
4	2,40,000	1,20,000
5	1,60,000	80,000

The company has a target of return on capital of 10% and on this basis, compare the profitability of the machines and suggest which alternative is financially preferable.

8. A choice is to be made between two competing projects which require an equal investment of Rs. 50,000 and are expected to generate net cash inflows as under:

Cash inflows	Project I	Project II
Year 1	Rs. 25,000	Rs .10,000
2	15,000	12,000
3	10,000	18,000
4	Nil	25,000
5	12,000	8,000
6	6,000	4,000

The cost of capital of the company is 10%. Evaluate the projects under NPV and IRR methods.

9. The management of a company has two alternative projects under consideration. Project A requires a capital outlay of Rs. 1,20,000 but project B needs Rs. 1,80,000. Both are estimated to provide a cash flow for five years. A Rs. 40,000 per year and B Rs. 58,000 per year. The cost of capital is 10% show which of the two projects is preferable from the view point of (i) NPV and (ii) IRR.

10. A firm whose cost of capital is 10% considering two mutually exclusive projects X and Y. The details of which are:

	Project X	Project Y
Investment	Rs. 70,000	Rs. 70,000
Cash flows: Year		
1	10,000	50,000
2	20,000	40,000
3	30,000	20,000
4	45,000	10,000
5	60,000	10,000

Compute the NPV at 10%, profitability Index and IRR for the two projects.

ST.MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI
Core 3 I M.Com – II SEMESTER Sub. Code: 21PCOC23
Business Environment
Question Bank
(for those who joined in June 2021)

SECTION A

1 Mark

UNIT I

1. -----environment is also called task environment
a) **Micro** b) Macro c) External d) Business
2. ----- analysis reveals the organization's strengths, weaknesses and the opportunities and threats in the environment
a) **SWOT** b) Strategic Analysis c) Competitor d) Structural
3. Customer is one of the factors in the----- environment
a) **Micro** b) Macro c) Internal d) General
4. -----is one of the macro factors of business environment
a) **Political** b) Vision And Mission c) Competitors d) Employees
5. Technology is one of the factors in the -----environment.
a) **Macro** b) Micro c) Internal d) Task
6. ----- is the first step in the process of environmental analysis
a) **Scanning** b) Forecasting c) Monitoring d) Assessment
7. ----- is one of the services availed in search and scanning
a) **Clipping** b) Financing c) Hiring d) Leasing
8. -----environment consists larger societal forces
a) Micro b) Task c) Internal d) **Macro**
9. ----- is the last step in the process of environmental analysis
a) Scanning b) Forecasting c) Monitoring d) **Assessment**
10. Public is one of the factors in the -----environment.
a) Macro b) **Micro** c) External d) Internal

UNIT II

1. -----is one of the economic policies that regulates the cost and availability of credit.
a) Fiscal b) **Monetary** c) Trade d) Industrial
2. Large projects financed by a group of financial institutions is known as-----
a) Long Term Finance b) Short Term c) Credits d) **Consortium Financing**
3. Public corporation is also known as-----
a) **Statutory Corporation** b) Departments c) Holding Companies
d) Financial Corporation
4. The economic reform was brought about by the----- industrial policy
a) 1948 b) 1956 c) 1972 d) **1991**
5. Development banks are also known as-----
a) **DFIS** b) SFCS c) AFIS d) SFIS
6. The contribution of different sectors towards economy is referred to as-----
a) Economic Policy b) Economic System c) **Structure of Economy**
d) Economic Condition
7. A company in which government holds more than 50% of shares is known as-----
a) **Government Company** b) Department Form c) Statutory Corporation
d) Holding Company

8. ----- economies one which are in transition from centralized economic system to free market economy
a) Developing b) **Transition** c) Developed d) Socialist
9. ----- policy brought about the economic reform
a) **Industrial Policy 1991** b) Trade c) Monetary d) Fiscal
10. Classification of economy is based on Per Capita-----
a) **GDP** b) GNP c) GNI d) PPP

UNIT III

1. ----- is one of the roles played by the government to regulate the business
a) **Planning** b) Observation c) Controlling d) Monitoring
2. ----- is one of the 3 political institutions.
a) **Judiciary** b) SEBI c) Development Banks
d) Export Development Authorities.
3. The union & states can legislate on matters in the ----- list.
a) **Concurrent List** b) Union List c) State List d) Central List
4. ----- is one of the responsibilities of business to government.
a) **Tax Payment** b) Legislature c) Execution d) Provision of Infrastructure
5. ----- is one of the government responsibilities to the business.
a) Execution of Government Contracts b) Providing Information
c) Assisting the Government d) **Infrastructure**
6. ----- determines the manner in which the work of the Executives has to be fulfilled.
a) Executive b) **Judiciary** c) Legislature d) Socialist Law
7. ----- supreme power is vested in the people
a) **Democracy** b) Totalitarianism c) Executive d) Legislature
8. ----- is the other name for Government
a) **Executive** b) Judiciary c) Legislature d) Socialist Law
9. There are ----- basic legal systems prevailing around the world
a) three b) **four** c) two d) five
10. Codified legal system is otherwise known as ----- law
a) Civil b) Common c) Islamic d) Marxist

UNIT IV

1. ----- is one of the elements of culture
a) **Knowledge & Beliefs** b) Education & Persuasion c) Code Of Ethics
d) Society
2. ----- refers to the manner in which the social system or an individual fits into the physical & social environment
a) Cultural Shock b) **Cultural Adaptation** c) Cultural Transmission d) Cultural Lag
3. The companies which are slightly a shade better than Indifferent category are called ----- companies
a) **Anti-Social** b) Indifferent c) Peripheral d) Socially Oriented
4. ----- is one of the factors affecting social orientation.
a) **Competitors** b) Social Responsibility Models c) Economics d) Society
5. Business is an integral part of the -----
a) Political System b) **Social System** c) Social Audit
d) Entrepreneurial Development
6. Delay in accepting modern culture is termed as.....
a) Cultural delay b) Cultural gap c) Cultural diversity d) **Cultural lag**

7. Which among the following is a claimant of social responsibility of business?
a) Shareholders b) Consumers c) Local community d) **All the above**
8. -----is a tool for evaluating how satisfactory a company has discharged its social responsibilities.
a) **Social Audit** b) Internal Check c) Company audit d) Internal audit
9. ----- is the process of learning
a) **Education** b) Beliefs c) Values d) Attitudes
10. The ----- primary institutions are found among all human groups
a) three b) four c) two d) **five**

UNIT V

1. ----- is the risk faced by the industries due to technology advances
a) Appreciation b) **Obsolescence** c) Depreciation d) Rehabilitation
2. ----- is one of the sources of technological dynamics.
a) **Demand Conditions** b) Technology c) Business d) Social System
3. Innovative drive of the company give greater importance to -----
a) Innovative Potential b) **R&D** c) Technical Facility d) Government Policy
4. Technological leader is also called -----.
a) Second Mover b) **First Mover** c) Technological Follower d) Competitor
5. Technological environment includes -----
a) advances in production technology b) advances in information technology
c) popularity of e –banking d) **all of the above**
6. What does the technological environment consist of?
a) Proven research b) Creation of new knowledge
c) **Creation of new knowledge and application of that knowledge**
d) The management of technology
7. Inconsistent results are generated by the _____ relationship.
a) Technology and structure b) Technology and complexity
c) Technology and formalisation d) **Technology – Centralization**
8. Which technology links clients on both the input and output side of the organisation?
a) Long - linked Technology b) **Mediating Technology**
c) Intensive Technology d) None of the above
9. Technology can be divided into what two categories?
a) Electronic and non-electronic b) Powered and unpowered
c) **Products and processes** d) Hardware and software
10. Firms that are not positioned to develop specific technologies would turn to which of the following to help them develop those specific technologies?
a) Globalization b) Time compression
c) **Technology integration** d) Increase in R&D expenditures

SECTION –B

2 Marks

UNIT I

1. What is meant by environmental scanning?
2. What is macro environment?
3. What is internal environment?
4. Define business environment.
5. State the objectives of environmental analysis.
6. What is SWOT analysis?
7. What is micro environment?
8. What is environmental forecasting?
9. What is environmental scanning?
10. What is micro environment?

UNIT II

1. What is monetary policy?
2. What is an economic system?
3. What is economic reform?
4. What are five year plans?
5. What is the need for economic planning?
6. What is economic environment?
7. List any eight Development banks of India
8. What is Fiscal Policy?
9. What is Industrial Policy?
10. Define the Industries Development and Regulation Act.

UNIT III

1. What is legislature?
2. What is an executive?
3. What is a judiciary?
4. What is judicial activism?
5. What is political environment?
6. What is the role of government as a regulator?
7. What is democracy?
8. What is totalitarianism?
9. What is Islamic Law?
10. What is common Law?

UNIT IV

1. What is meant by pressure group?
2. What is socio-cultural environment?
3. State any two social responsibilities of business towards community.
4. What is cultural adaptation?
5. What is culture?
6. What is social responsibility?
7. What is Attitude?

8. What do you mean by Beliefs?
9. What are social values?
10. List the social institutions.

UNIT V

1. What is Technology?
2. What is Innovation?
3. What is technological environment?
4. What is product innovation?
5. What is process innovation?
6. List the sources of technological dynamics.
7. Why technological policy of the government is important?
8. What is transfer of technology?
9. What is appropriate technology?
10. What is technology adaptation?

SECTION –C

5 Marks

UNIT I

Answer the following in about 200 words

1. What are the features of business environment?
2. State the techniques of environmental analysis.
3. Elucidate internal environment.
4. Explain the strategic management process.
5. Explain the step in environmental analysis.
6. Explain the techniques of environmental forecasting
7. Discuss the demographic environment.
8. Bring out the factors in micro environment..
9. Explain the importance of studying business environment.
10. Discuss the modern classification of business environment.

UNIT II

1. Discuss the classification of economy on the basis of per capita income.
2. Elucidate economic system.
3. State the importance of monetary policy.
4. Discuss the importance of fiscal policy.
5. Elucidate the objectives of economic planning.
6. Discuss the different types of economic policies.
7. Bring out the contribution of PSUs, towards economic development.
8. State the different forms of organization of PSUs.
9. Discuss the relevance of developments banks to Indian business
10. Discuss the economic factors influencing business

UNIT III

1. What is political environment?
2. Discuss the responsibilities of business to Government.
3. Discuss the responsibilities of Government to business.
4. Discuss the economic roles of government.
5. Describe the Civil law.
6. Bring out the significance of Socialist Law.
7. Explain the term Legislature
8. What are the judicial powers?
9. Discuss the impact of Executive on business.
10. Discuss the impact of Judiciary on business

UNIT IV

1. State the arguments for and against the social involvement of business
2. Explain the social values and system.
3. State the various social groups.
4. Elucidate the elements of socio-cultural environment.
5. State the factors of social environment
6. Brief the Social Institutions and their Systems.
7. Illuminate the Social Values and Attitudes.
8. Narrate the different types of Culture.
9. Bring out the nature of culture.
10. Explain the primary social institutions.

UNIT V

1. Write notes on Technological leadership.
2. Write notes on Technological followership.
3. What innovation? Discuss the types of innovation.
4. Bring out any five sources of technological dynamics.
5. Discuss the product and process Innovation.
6. Enumerate the government policy towards technology.
7. What are the levels of Transfer of Technology?
8. What are the methods of Transfer of Technology?
9. Explain the IT revolution and Business Environment
10. Explain the appropriate technology and technology adaptation.

SECTION-D

10 Marks

Answer in about 400 words each

UNIT I

1. Explain the process of environmental analysis and its advantages.
2. Explain the factors governing business environment.
3. Elucidate SWOT analysis.
4. Discuss the components of internal and external environment.
5. Elucidate Macro environment of a business.
6. Discuss the economic factors influencing business.
7. Discuss the internal and external environment of business
8. Write the significance and nature of Business Environments
9. What are the advantages and limitations of environmental techniques?
10. Explain the various stages in environmental analysis.

UNIT II

1. Explain the salient features of Indian five year plans and their contribution towards economic development
2. Critically examine the changing dimensions of economic environment in India.
3. Bring out the role public sector in economic development.
4. Critically examine the relevance of development banks to Indian business.
5. Discuss the objectives and role of public sector undertakings.
6. Briefly discuss the Economic policies that affect business.
7. Elucidate the quantitative and qualitative measures of monetary policy.
8. Bring out the importance of Economic planning to Indian economy.
9. Elucidate the procedure for preparation of Five Year plan.
10. Elucidate the Industries Development and Regulation Act

UNIT III

1. State the economic roles of the government.
2. Discuss the reasons for Government intervention in the business.
3. Elucidate the functioning of the three political institutions.
4. Bring out the responsibilities of business to Government and Government to business.
5. "Between democracy and totalitarianism, democracy is preferable for business growth."
- Discuss
6. Discuss how far our Government has executed its Economic Role.
7. Describe the legal systems prevailing in the world?
8. Discuss the Judiciary powers.
9. Discuss the impact of political institutions on business.
10. Is Judicial Activism necessary in our society?

UNIT IV

1. Briefly discuss the impact of socio-cultural environment on Indian business
2. State the impact of socio cultural factors on environment
3. Briefly discuss the impact of various Social institutions on Indian business.
4. Bring out the factors affecting social orientation of business
5. Explain the extent of social orientation.

6. Elucidate the arguments for and against social orientation of business
7. Critically examine the elements of the Socio- Cultural Environment.
8. Discuss the various social institutions.
9. Bring out the elements of Culture. State the impact of cultural adaptation on business.
10. Describe the Factors affecting Social Values and Attitudes.

UNIT V

1. Discuss the Sources of technological dynamics.
2. Discuss in detail the Technological Environment.
3. Elucidate the Competitive Advantage of Technology.
4. Explain the impact of technology on society.
5. Discuss the plant level impact of technology.
6. Bring out the forces that impact the growth of technology.
7. Bring out the salient features of our technology policy
8. Bring out the economic implications of technology
9. Write the distinction between science and technology
10. Discuss the impact of technology on Globalization.

St. Mary's College (Autonomous) Thoothukudi
I M.Com II Semester
Core – 4 OPERATIONS RESEARCH Sub code: 21PCOC24
Question Bank
(For those who joined in June 2021)

Section - A (1 mark)

Unit I

1. Operations research models can be classified according to -----.
(a) Structure (b) purpose (c) nature of environment (d) **all of the above**
2. The focus of Operations research was on -----.
(a) Effective management (b) allocating scarce resources
(c) Scientific analysis (d) **solving complex problems**
3. Operations research is used by -----.
(a) **Executive management** (b) middle level management
(c) Effective Management (d) low level management
4. ----- is a method used to solve problems by repeating the procedure.
(a) Monte-Carlo technique (b) iconic model
(c) **Iterative procedure** (d) predictive model
5. The scientific method in Operations research study generally involves-----.
(a) Judgement phase (b) research phase (c) action phase (d) **all of the above**
6. A model is -----.
(a) A selective representation of reality (b) an abstraction
(c) An approximation (d) **all of the above**
7. Models ----- of decisions that influence objectives.
(a) Refines crude data (b) Helps to identify the types
(c) Are a tool for research the decision making (d) **all of the above.**
8. In business and management decision-making, the Operations research study helps to have -----.
(a) Better control (b) better decisions (c) better system (d) **all of the above**
9. A model in which one physical property is used to represent another physical property is called -----.
(a) Iconic (b) **analogue** (c) deterministic (d) Integrative
10. The model which employs a set of mathematical symbols and functions to represent the decision variable and their function to describe the behavior of the system is called -----.
(a) **Symbolic model** (b) probabilistic model (c) iterative model (d) iconic model

Unit II

11. When the number of occupied cells is less than $m + n - 1$ in transportation problems it is ----.
(a) Degeneracy (b) **non degeneracy** (c) balanced (d) unbalanced
12. An unbalanced transportation problem is the one in which -----.
(a) The number of jobs is not equal to number of facilities

- (b) **The total supply is not equal to total requirement**
 (c) The total supply is equal to total requirement
 (d) The number of jobs is equal to number of facilities
13. ----- is not a method for solving an assignment problem.
 (a) Simplex method (b) transportation method
 (c) Hungarian method (d) **Sequencing method**
14. ----- is reached when there is exactly one assignment in each column and in each row.
 (a) Feasibility (b) **Optimality** (c) Opportunity (d) unbounded solution
15. The assignment problem
 (a) Is a special case of the transportation problem?
 (b) Can be solved with the simplex algorithm.
 (c) When treated as LP it always has an optimal integer solution.
 (D) **all of the above**
16. A major constraint in the use of ----- method is that number of jobs must equal the number of machines.
 (a) Transportation (b) simplex (c) **assignment** (d) simulation
17. The north-west corner rule -----.
 (a) Is based on the concept of minimizing opportunity cost.
 (b) **Is used to find an initial feasible solution.**
 (c) Is used to find an optimum solution.
 (D) all of the above
18. A basic requirement for using the transportation technique is that the transportation model is -----.
 (a) Maximization (b) **balanced** (c) unbalanced (d) minimization
19. Vogel's approximation method is otherwise called as -----.
 (a) Degeneracy method (b) MODI method
 (c) **unit cost penalty method** (d) all of these
20. In transportation problem widely used test for optimality is ----- method.
 (a) **MODI** (b) VAM (c) NWCR (d) Hungarian

Unit III

21. Dual of the dual LP problem is -----.
 (a) Infeasible (b) **primal** (c) unbounded (d) optimal
22. ----- Method is the appropriate method for solving a LPP with more than two decision variables.
 (a) Graphical (b) **Simplex** (c) Hungarian (d) Modified Distribution
23. The inequality constraints are converted into equality constraints by inclusion of ----- variables.
 (a) Slack (b) surplus (c) artificial (d) **all the above**
24. Any variable removed from the basis at one iteration in the simple method for solving an LPP _____ at the next iteration.
 (a) Cannot re-enter (b) **can re-enter** (c) degenerate (d) pseudo
25. Which of the following is not a major requirement of a LPP?
 (a) There must be alternative courses of action among which to decide

- (b) An objective for the firm must exist
 - (c) **The problem must be of maximization type**
 - (d) Resources must be limited
26. Linear programming is -----.
- (a) A constrained optimization model. (b) A constrained decision-making model.
 - (c) a mathematical programming model (d) **all of the above**
27. Constraints appear as ----- when plotted on a graph.
- (a) Curves (b) **straight lines** (c) parallel lines (d) perpendicular lines.
28. If the constraints are of \geq type, then the indicated operations research m is obtained by employing ----- variables.
- (a) Slack (b) artificial (c) **surplus** (d) decision
29. The element of the intersection of the pivot row and pivot column is known as -----.
- (a) **Pivot number** (b) iteration (c) quantity column (d) artificial value
30. A restriction on the resources available in the operations research m of an inequality operations research an equation is called -----.
- (a) Feasible region (b) **constraint**
 - (c) Feasible decision (d) infeasible solution

Unit IV

31. If a game involves more number of competitor research s the game is called -----.
- (a) Two person game (b) zero sum game (c) **n person game** (d) pure strategy
32. The game is said to be fair if the value of the game is -----.
- (a) **Zero** (b) one (c) two (d) less than one
33. ----- is used to reduce the size of pay off matrix.
- (a) Principle of dominance (b) Graphical method
 - (c) **both a and b** (d) none of the above
34. ----- is a tabular arrangement of payments that should be made at the end of a game.
- (a) **Payoff matrix** (b) dominating column
 - (c) maximin minimax competitive game
35. Payoff matrix contains the ----- of the pair of strategies in a two person game.
- (a) **Outcome** (b) principle (c) competitor (d) mixed strategy
36. In case of a mixed strategy , if the matrix is $2 \times n$ operations research m $\times 2$, the problem can Be solved -----.
- (a) algebraically (b) **graphically** (c) two person game (d) all of the above
37. The losses for one player equal the gains for the other player under -----.
- (a) **Zero sum game** (b) two person game (c) non zero sum game
 - (D) N person game
38. The numbers of competitive actions that are available for a player are called ----- to that player.
- (a) pay-off (b) dominance (c) **strategy** (d) saddle point
39. A two-person zero-sum game means that the

(a) **The sum of losses to one player is equal to the sum of gains to other**

- (b) the sum of losses to one player is not equal to the sum of gains to other
 (c) No any player gains operations research losses (d) none of these

40. Game theory models are classified by the

- (a) Number of players (b) sum of all payoffs
 (c) number of strategies (d) **all of these**

Unit V

41. In performing a simulation it is advisable to
 (a) Use the results of earlier decisions to suggest the next decision to try.
 (b) **Use the same number of trials for each decision**
 (c) Simulate all possible decisions. (d) None of the above
42. Simulations are normally run on ----- because they are often long and involve tedious calculations.
 (a) Manually (b) **computers** (c) models (d) none of the above
43. ----- is a means of depicting the likelihood of an uncertain quantity.
 (a) Random number (b) **Probability distribution** (c) System (d) Trial
44. A quantitative analysis technique that involves building a mathematical model that presents a real-world situation. The model is then experimented with to estimate the effects of various actions and decisions is known as -----.
 (a) Decision theory (b) **simulation**
 (c) game theory (d) transportation problem
45. Simulation is used for solving ----- .
 (a) industrial problems (b) queuing problems
 (d) business and economic problems (d) **all of the above**
46. ----- is a type of simulation that uses probability distribution to determine whether operations research not random event occur .
 (a) **Monte Carlo method** (b) system simulation technique
 (c) expected value (d) random number table
47. The simulation approach can be used to study almost any problem that involves -----.
 (a) certainty (b) **uncertainty** (c) inputs (d) outputs
48. When a system contains certain decision variables that can be represented by a probability distribution , it is called -----.
 (a) **stochastic simulation** (b) random number (c) trial (d) simulation
49. Operations Research approach is _____
 a) Multi-disciplinary b) Scientific c) **Initiative** d) All of these
50. Decision variables are _____
 a) Controllable b) Uncontrollable c) Parameters d) **None of the above**

Section B (2 marks)

Unit I

1. What is Operations Research?
2. Define the term operations research

3. What is iconic model?
4. What is the need of Operations research in industry?
5. What are the steps involved in judgment phase?
6. What is analogue model?
7. State any four areas for the application of operations reserach.
8. State the limitations of Operations research.
9. State the different models in Operations research.
10. Write the phases of Operations research

Unit II

1. What is an assignment problem?
2. What is degeneracy in assignment problem?
3. What is a transportation problem?
4. Write a note on maximization in assignment.
5. When is a solution to a transportation problem said to be a degenerate one? How will you overcome the problem?
6. What point should be considered to start with an assignment problem?
7. Write a note on North West Corner rule.
8. What do you me mean by matrix reduction?
9. What is meant by an optimality test in a transportation problem?
10. What is a balanced and unbalanced transportation problem?

Unit III

1. Explain graphical method in LPP.
2. What is a slack variable?
3. Write a note on simplex method.
4. What is artificial variable?
5. What is Big M method?
6. State the assumption underlying in LP.
7. What is unbounded solution in LPP?
8. What is entering variable?
9. Define basic solution in LPP.
10. Distinguish between slack and surplus variable.

Unit IV

1. What is pay-off matrix?
2. What is saddle point?
3. What is zero sum game?
4. What is mixed strategy?
5. State any two characteristics of a competitive game.
6. What is game theoperations research y?
7. State the dominance property.
8. State the maximin-minimax principle.
9. State the assumptions underlying game theoperations research y.
10. State the methods of finding solutions to a given game.

Unit V

1. State two applications of simulation.
2. Define simulation.
3. What is event type simulation?
4. Write a method for generation of random numbers.
5. State the limitations of simulation.
6. What is Monte-Carlo simulation?
7. What is the need of simulation?
8. Explain types of simulation.
9. State any two advantages of simulation method
10. List any two disadvantages of simulation method

Section C (6 marks)

Unit I

1. Explain the nature of Operations Research.
2. Explain the applications of Operations research.
3. What do you understand by Operations research? Discuss its objectives.
4. Explain the advantages of operations research.
5. Explain the phases of operations research.
6. Discuss the scope of operations research in management.
7. Explain the different models in Operations research
8. What are the limitations involved in Operations research?

Unit II

1. Explain how to transform an unbalanced transportation problem into a balanced problem where the demand of warehouses is satisfied by the supply of factories.
2. Find the initial solution using NWCR, LCM and Column minima method.

Origin / Destination	1	2	3	Supply
A	2	7	4	5
B	3	3	1	8
C	5	4	7	7
D	1	6	2	14
Demand	7	9	18	34

3. Solve.

Origin	Destination			Supply
	P	Q	R	
A	5	7	7	70
B	4	4	6	30
C	6	7	7	50
Demand	65	42	43	150

4. Find the optimum solution for the following transportation problem whose cost matrix is given below:

Plant/ware house	I	II	III	IV	supply
1	190	300	500	100	70
2	700	300	400	600	90
3	400	100	600	200	180
demand	50	80	70	140	340

5. Explain the difference between a transportation problem and an assignment problem.
6. How would you deal with the assignment problems where (a) the objective function is to be maximized? (b) some assignments are prohibited?
7. Find the initial solution using NWCR.

Origin / Destination	1	2	3	4	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	10	12	15	43

8. Find the assignment which minimize the total cost of project.

		Job		
		A	B	C
	1	17	25	31
Contractor	10	25	16	
	3	12	14	11

9. Find the assignment.

		Programmers			
		A	B	C	D
Programme	1	12	10	8	9
	2	8	9	11	7
	3	11	14	12	10
	4	9	9	8	9

10. Find the initial solution using NWCR, LCM.

		Destination				Capacity
		I	II	III	IV	
Sources	A	20	5	25	15	50
	B	17	13	16	17	50
	C	5	21	19	23	100
Demand		30	40	60	70	

Unit III

1. Solve graphically:
 Minimise $Z = 8x + 12y$
 Subject to the constraints
 $5x + 4y \geq 60$
 $3x + 7y \leq 84$
 $x + 2y \geq 18$

$$x, y \geq 0$$

2. Solve the following graphically.

$$\text{Maximise } Z = 60x + 40y$$

Subject to:

$$2x + y \leq 60$$

$$x \leq 25$$

$$y \leq 35$$

$$x, y \geq 0$$

3. Determine graphically the quantities of x & y to be produced to

$$\text{Maximise } Z = 4,000x + 3,000y$$

Subject to the constraints

$$x + 2y \leq 10$$

$$4x + 3y \leq 24$$

$$x, y \geq 0$$

4. The ABC electric appliance company produces two products – Refrigerator and Ranges. Production takes place in two separate departments. Refrigerators are produced in department I & ranges in department II. The weekly production cannot exceed 25 Refrigerators research s & 35 ranges. The company regularly employs a total of 60 workers in the two departments. A Refrigerators requires 2 man weeks of labour while a range requires 1 man week of labour. A Refrigerators contributes a profit of Rs. 60 and a range contributes Rs. 40. Formulate the above as an LPP.

5. A firm produce 3 types of cloth say A,B,C. 3 kinds of wool is required- red ,green, blue. One unit length of type A cloth needs 2 yards of red & 3 yards of blue. One unit of type B needs 3yards of red, 2 yards of green & 2 yards of blue. One unit length of type C cloth needs 5 yards of green & 4 yards of blue. The firm has only a stock of 8 yards of red ,10 yards of green & 15 yards of blue. The income obtained from A is Rs.3 , B Rs. 5 & C Rs. 4 . Formulate the above so as to maximize the total income.

6. A company produces two types of pens –A & B. Profit on pen A is Rs. 5 & on pen B Rs. 3 respectively. Raw material required for each pen A is twice as that of pen B. The raw material is sufficient only for 1000 pens B per day. Pen A requires a special clip & only 400such clips are available per day. Fpr pen B only 700 clips are available per day. Find graphically the product mix so that the company can make a maximum profit.

7. Solve graphically.

$$\text{Maximize } Z = 30x + 40y$$

Subject to

$$60x + 120y \leq 12000$$

$$8x + 5y \leq 600$$

$$3x + 4y \leq 500$$

$$x, y \geq 0$$

8. Write on the mathematical formulation of the LPP.

9. Explain the steps to be followed in graphical method.

10. The manager of an oil refinery must decide on the optimum mix of two possible blending processes of which the inputs and outputs per production run is as follows:

Process	Input		Output	
	Grade A	Grade B	Gasoline X	Gasoline Y
1	6	4	6	9
2	5	6	5	5

The maximum amounts available of crudes A & B are 250 units and 200 units respectively. Market demand shows that at least 150 units of gasoline X and 130 units of gasoline Y must be produced. The profits per production run from process 1 and process 2 are Rs. 400 and Rs. 500 resp. Formulate the problem for maximizing the profit.

Unit IV

1. Explain the maximin – minimax principle used in game theory.
2. State the advantages of game theory. Explain the procedure in case of mixed strategies.
3. What is game the operations research y? Discuss its importance to business decisions.
4. Give optimum strategies foperations research each player in the case of strictly determinable game.

	B	
A	0	2
	-1	4

5. Find the saddle point for the following game.

	b	b
a	3	7
a	-5	5

Is it a fair game? Explain your answer.

6. What is the value of the game for the following pay off matrix? Who will be the winner of the game? Why?

	y	
x	1	-2
	2	-1

7. From the following pay off matrix of firm A determine the optimal strategies for both the firms and the value of the game. (using maximin & minimax principle)

	Firm B				
Firm A	3	-1	4	6	7
	-1	8	2	4	12
	16	8	6	14	12
	1	11	-4	2	1

8. Consider the game G with the following pay off

	Player B	
B	B	B

Player A	A	2	6
	A	-2	k

- (a) Show that G is strictly determinable, whatever k may be.
 (b) Determine the value of G.

9. Solve the game whose pay off matrix is given by

		B		
	1	3	1	
A	0	-4	-3	
	1	5	-1	

Unit V

1. Discuss the meaning and areas of application of business simulation.
2. Explain the uses of simulation in business decision making.
3. What are the steps in Monte-Carlo simulation?
4. The demand per day for a particular item has the following probability distribution.

Daily demand	2	3	4	5
Probability	0.15	0.3	0.45	0.1

Consider the following sequence of random numbers :

67, 63, 39, 55, 29, 78, 70, 6, 78, 76

Simulate the demand for the next 10 days.

5. The rainfall distribution in monsoon season is as follows.

Rain in cms.	0	1	2	3	4	5
Probability	0.5	0.25	0.15	0.05	0.03	0.02

Simulate the rainfall for 10 days using the following random numbers.

67,63,39,55,29,78,70,06,78,76

6. Customers arrive at a service facility to get the required service. The inter arrival & service times are constant & are 1.8 minutes and 4 minutes respectively. Simulate the system for 14 minutes. Determine the average waiting time of a customer and idle time of the service facility.

7. “Simulation is a valuable tool for unrealistic and complex problem”- Elucidate.

8. A bakery keeps stock of a popular brand of cake.

Daily demand	0	15	25	35	45	50				
Probability	0.01	0.15	0.2	0.5	0.12	0.02				
Random nos.	48	78	09	51	56	77	15	14	68	09

Section D (12 marks)

Unit I

1. Discuss the advantages of operations research.
2. Discuss the role of computer in operations research.
3. Discuss the role of operations research in decision making.
4. “Operations Research is a bunch of mathematical techniques” – Comment.

5. Explain the phases of operations research
6. Discuss the role of operations research in decision making
7. Explain Big M method.
8. Explain the nature of operations research.
9. What is operations research? Explain clearly its objectives.
10. Enumerate the limitations operations research

.Unit II

1. Explain various methods to obtain an initial basic solution and steps to be followed for each method.
2. Explain in detail the steps involved in solving any transportation.
3. Discuss the Hungarian method of solving an assignment problem.
4. Give an outline on MODI method.
5. Explain the difference between transportation.
6. Distinguish Transportation problem and an assignment problem.
7. Find the assignment which minimise the total cost of project.

	Job		
	A	B	C
1	17	25	31
2	10	25	16
3	12	14	11

8. Find the cost of assignment.

	1	2	3	4	5
A	27	18	--	20	21
B	31	24	21	12	17
C	20	17	20	--	16
D	22	28	20	16	27

9. Solve the transportation problem.

		Destination				
		1	2	3	4	Supply
Source	A	10	20	5	7	10
	B	13	9	12	8	20
	C	4	5	7	9	30
	D	14	7	1	0	40
	E	3	12	5	19	50
Demand		60	60	20	10	

10. Solve:

		Warehouse				
		1	2	3	4	Supply
Plant	I	190	300	500	100	70
	II	700	300	400	600	90

III	400	100	600	200	180
Demand	50	80	70	140	340

11. Make the assignment so that the total scores scored by the batsmen are maximum.

Batsman	1	2	3	4	5
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	59
D	20	19	20	81	25
E	58	60	59	55	53

12. Solve.

	Destination			
Origin	P	Q	R	Supply
A	5	7	7	70
B	4	4	6	30
C	6	7	7	50
Demand	65	42	43	150

13. Priya Enterprises has three factories at locations A, B, and C which supplies to three warehouses located at D, E and F. Monthly factory capacities are 10, 80 and 15 units respectively. Monthly warehouse requirements are 75, 20 and 50 units respectively. Unit shipping costs (in Rs.) are given here.

	Warehouse		
Factory	D	E	F
A	5	1	7
B	6	4	6
C	3	2	5

The penalty costs for not satisfying demand at warehouses D, E and F are Rs 5, Rs 3 Rs 2 respectively. Determine the optimal distribution.

Unit III

1. Explain slack variables, surplus variables and artificial variables giving suitable examples.
2. What is the simplex algorithm? Explain the steps involved in it.
3. Explain the standard form of an LPP.
4. Use simplex method.

$$\begin{aligned} &\text{Maximize } Z = 5x_1 + 3x_2 \\ &\text{Subject to} \\ &3x_1 + 5x_2 \leq 15 \\ &5x_1 + 2x_2 \leq 10 \\ &x_1, x_2 \geq 0 \end{aligned}$$

5. Using simplex method solve the LPP.

$$\begin{aligned} &\text{Maximize } Z = 25x_1 + 20x_2 \\ &\text{Subject to:} \\ &16x_1 + 12x_2 \leq 100 \end{aligned}$$

$$\begin{aligned} 8x + 16x &\leq 80 \\ x, x &\geq 0 \end{aligned}$$

6. Determine the quantities of product P and Q to be produced to

$$\text{Maximize } P = 4000x + 3000y$$

Constraints:

$$x + 2y \leq 10$$

$$4x + 3y \leq 24$$

$$x, y \geq 0$$

Solve using simplex method.

7. Write the dual:

(i) Minimise $Z = 8x_1 + 12x_2$

Subject to the constraints

$$5x_1 + 4x_2 \geq 60$$

$$3x_1 + 7x_2 \leq 84$$

$$x_1 + 2x_2 \geq 18$$

$$x_1, x_2 \geq 0$$

(ii) Maximise $Z = 3x_1 + 5x_2 + 7x_3$

Subject to

$$x_1 + x_2 + 3x_3 \leq 10$$

$$4x_1 - x_2 + 2x_3 \geq 50$$

$$x_1, x_2 \geq 0$$

x_3 unrestricted variable

8. Use simplex method.

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to

$$3x_1 + 5x_2 \leq 15$$

$$5x_1 + 2x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

Unit IV

1. Discuss the characteristics of game the operations research y.
2. What are the major operations research limitation and application of game the operations research y?
3. Explain the “best strategy” on the basis of Minimax criterion of optimality.
4. In a game of matching coins, player A wins Rs 2 if there are 2 heads, wins nothing if there are two tails and lose Re 1 when there are one head and one tail. Determine the pay off matrix, best strategies foperations research each player and the value of the game to A.

5. Reduce the following 2 x 4 game by graphical method and solve.

		B			
	A	3	3	4	0
		5	4	3	7

6. Find the value of the game & optimal strategy for research A & B.

		B		
	A	9	8	-7
		3	-6	4
		6	7	7

7. Solve the following game .

		B		
	A	2	0	1
		0	2	1
		3	0	0

8. 2 players A and B match coins. If the coins match, then A wins one unit of value. If the coins do not match then B wins one unit of value. Determine the optimum strategies for research the players and the value of the game.
9. Consider a game having the following pay-off matrix. Determine whether it has a saddle point. Determine the optimum strategy for each player according to the minimax criterion and find the value of the game.

		Player B		
	Player A	0	-4	-2
		3	-5	1
		-2	-1	6
		1	0	4

10. Find the saddle point of operations research the following game.

		b	b
	a	3	7
	a	-5	5

Is it a fair game? Explain your answer.

11. What is the value of the game for the following pay off matrix? Who will be the winner of the game? Why?

		Y	
	X	1	-2
		2	-1

12. Operations research the following pay off matrix of firm A determines the optimal strategies of operations research both the firms and the value of the game. (using maximin & minimax principle)

		Firm B				
		3	-1	4	6	7

Firm A	-1	8	2	4	12
	16	8	6	14	12
	1	11	-4	2	1

Unit V

1. “Simulation is a valuable tool for research unrealistic and complex problem”- Elucidate.

2. Dr. Strong is a dentist who schedules all her patients for 30 minutes. Some of the patients take more operations research less than 30 minutes depending on the type of dental work to be done. The following summary shows the various categories of work research k, their probabilities and the time actually taken to complete the work

Category operations research	Time required (minutes)	Probability
Filling	45	0.40
Crown	60	0.15
Cleaning	15	0.15
Extraction	45	0.10
Check-up	15	0.20

Simulate the dentist’s clinic operations research four hours and determine the average waiting time operations research the patients as well as the idleness of the doctor operations research . Assume that all the patients show up at the clinic at exactly their scheduled arrival time starting at 8.00 a.m. Use the following random numbers in handling the above problem.

40 , 82 , 11 , 34 , 25 , 66 , 17 , 79

3. The rainfall distribution in monsoon is as follows:

Rain in cms :	0	1	2	3	4	5
Frequency :	50	25	15	5	3	2

Simulate the rainfall for research 10 days.

Random numbers : 67, 63, 39, 55, 29, 78, 70, 6, 78, 76

4. A bakery keeps stock of a popular brand of cake.

Daily demand	0	15	25	35	45	50				
Probability	0.01	0.15	0.2	0.5	0.12	0.02				
Random nos.	48	78	09	51	56	77	15	14	68	09

Simulate the demand for the next 10 days.

5. A tourist car operations research finds that during the past 200 days the demand for research the car fluctuated as below.

Trips per week :	0	1	2	3	4	5
Frequency :	16	24	30	60	40	30

Simulate the demand operations research 10 week period using the random numbers – 82, 96, 18, 96, 20, 84, 56, 11, 52, 03.

6. Discuss the limitations of simulation.
7. Explain the uses of simulation in decision making.

8. A company manufactures 30 items per day. The sale of these items depends upon the demand which has the following distribution:

Sales (units)	27	28	29	30	31	32
Probability	0.10	0.15	0.2	0.35	0.15	0.05

The production cost & sale price of each unit are Rs. 40 & Rs. 50 respectively. Any unsold product is to be disposed of at a loss of Rs. 15 per unit. There is a penalty of Rs. 5 per unit if the demand is not met. Using the following random numbers estimate total profit / loss operations research the next 10 days: 10, 99, 65, 99, 95, 01, 79 11 16 20.

If the company decides to produce 29 items per day, what is the advantage & disadvantage?

9. A company manufactures 200 mopeds. The daily production has been varying and its probability distribution is as below.

Production	196	197	198	199	200	201	202	203	204
Probability	0.04	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished mopeds are transportations research ted in a specially designed lorry that can accommodate only 200 mopeds. Using the random numbers 82, 89, 78, 24,53, 61,18,45,04,23,50, 77,27,54,& 10 simulate the process to find out

- (a) What will be the average number of mopeds waiting in the factory operations research y?
- (b) What will be the number of empty spaces in the operations research?

10. What are the advantages and limitations of using simulation?

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

QUESTION BANK

I M.COM

Core X Financial Markets and Institutions Sub. Code: 21PCOC25

Semester –II

[For those who joined in 2021and after]

SECTION-A

1 Mark

Choose the correct answer:

Unit-I

- The following is one of a financial asset:
a) Gold **b)Share** c) Land d)Silver
- Rights shares are offered to _____ shareholders.
a) New **b) Existing** c) directors d) promoters
- The market for new issue is called _____
a) Call Money Market **b) Primary Market** c) Secondary Market d) Money Market
- _____ is a an unsecured promissory note issued with a fixed maturity by a company approved by RBI.
a) Commercial paper b) Treasury bill c) Documentary bill d) Commercial bill
- Assets which can be easily converted into cash without much effort is known as _____
a) fixed b) current **c) liquid** d)floating
- The _____ market refers to the market for extremely short period loans i.e., one day to fourteen days.
a) Call money b) capital c) industrial d)Treasury bill
- _____ is a promissory note or a finance bill issued by the Government.
a) money b) capital c)acceptance **d) Treasury bill**
- Loan against the security of immovable property is called _____ loan.
a) commercial **b) mortgage** c) financial d) home
- Bills which do not arise out of genuine trade transactions are known as _____ bills.
a)Clean **b)Accommodation** c)Usance d)indigenous
- Assets which can be easily converted into cash without much effort is known as _____
a)fixed b)current **c)liquid** d)floating

Unit-II

- A developed money market facilitates the effective implementation of monetary policy of _____ bank.
a)commercial b)development c)EXIM **d)Central**
- The _____ market refers to the market for extremely short period loans i.e., one day to fourteen days.
a)Call money b)capital c)industrial d)Treasury bill
- DFHI stands for _____
a)Discount and Fund Housing India
b)Discount and Finance House of India

- c)Discount and Federation House of India
d)Discount and Foundation House of India
4. _____ market deals in instruments like shares, debentures, Government bonds etc.
a)money **b)capital** c)acceptance d)Treasury bill
5. _____ is a promissory note or a finance bill issued by the Government.
a)money b)capital c)acceptance **d)Treasury bill**
6. _____ market is otherwise called as Gilt-Edged securities market.
a)Industrial **b)Government securities** c)Mortgage d)Term-loan
7. Loan against the security of immovable property is called _____ loan.
a)commercial **b)mortgage** c)financial d) home
8. _____ assets are mostly useful for consumption.
a) Financial **b) industrial** c)physical d)capital
9. The market for short- term loans is known as _____ market.
a) Call money b) Treasury bill **c) Money** d)Acceptance
10. Acceptance bills drawn, accepted and payable after three months are called _____ bills.
a)Usance bills b)Indigenous c) Clean d) Supply
11. The market which helps commercial banks to maintain their SLR requirements _____ market.
a) Discount b) acceptance c) Commercial bill **d) Call loan**
12. The certificate which evidences an unsecured corporate debt of short term maturity is _____.
a) Short term loan **b) Certificate of deposit**
c) Inter-bank participation certificate d) Commercial paper
13. The major player in the Indian money market is _____ Bank.
a) Co-operative b) Indigenous **c) Commercial** d)Reserve
14. The bill which does not require any acceptance is called _____ bill.
a) Usance b) Accommodation **c)Treasury** d) Commercial
15. The market for extremely short period loans is called _____ market.
a) **Call money** b) capital c) Treasury bill d) Industrial
16. The DFHI was set up in India _____
a) 1985 b)1986 **c)1987** d)1988
17. Repo stands for _____
a) Repole **b) Repurchase** c) Repeat d) Respond
18. _____ is an unsecured promissory note issued with a fixed maturity by a company approved by RBI.
a) **Commercial paper** b)Treasury bill c) Documentary bill d)Commercial bill

Unit-III

1. Public issues involves no _____
a) Cost **b) Intermediaries** c) Initial capital d) minimum subscription
2. Rights shares are offered to _____ shareholders.
a) New **b) Existing** c)directors d) promoters
3. _____ is the suitable method where small companies issue shares.

- a) **Placement** b) rights issue c) Fresh issue d) Outright sales
4. _____ refers to the work of investigation, analysis and processing of new project proposals.
- a) **Origination** b) Orientation c) offering d) underwriting
5. IPO stands for _____
- a) Initial People Offering **b) Initial Public Offering**
- b) Initiative Provident Offers d) Imitative Public Offering
6. _____ is a process of admitting securities for trading on a recognized Stock exchange.
- a) Grading b) Mortgaging **c) Listing** d) Pledging
7. The number of shares which are less than the market lot are called _____
- a) Even lots **b) Odd lots** c) Middle lots d) Initial lots
8. The market for new issues is called _____
- a) Call Money Market **b) Primary Market** c) Secondary Market d) Money Market
9. The _____ market is meant for dealing in unlisted securities.
- a) Green Market b) White Market **c) Grey Market** d) Red Market
10. _____ is a process of admitting securities for trading on a recognized Stock exchange
- a) Listing b) Arbitrage c) securitising d) transfer

Unit-IV

- 1.. SEBI stands for _____
- a) The Services and Exchange Board of India
- b) The Securities and Entrance Board of Industry
- c) The Securities and Exchange Board of India**
- d) The Services and Exchange Bureau of India
2. Following is/are the credit rating agencies.
- a) CRISIL b) CARE c) ICRA **d) All the above**
3. Companies with a paid-up capital between Rs. _____ and Rs. 25 crores can enlist on OTCEI
- a) 10 lakhs b) 20 lakhs **c) 30 lakhs** d) 40 lakhs
4. NSE follows _____ driven system of trading.
- a) **Order** b) Management c) Shares d) Agreement
5. Computers are linked by satellite through _____ in NSE.
- a) NSAT **b) VSAT** c) MSAT d) YSAT
6. Members of OTCEI are _____ only.
- a) Individuals b) Non-Profit Organisations c) Partnership Firms **d) Corporates**
7. DFHI mainly deals with _____
- a) Commercial Paper **b) Treasury Bills** c) Certificate of Deposits d) Stocks
8. The wholesale debt market is a market for _____
- a) Government Securities b) Commercial Paper c) Treasury Bills
- d) Certificate of Deposits
9. Following is / are the promoters of OTCEI:
- a) UTI b) ICICI c) IFCI **d) All the above**
10. NSE has _____ segments.
- a) 2 **b) 3** c) 4 d) 5
11. One can expect total transparency in _____

- a) Stock Exchange b) OTCEI c) **NSE** d) BSE

Unit-V

1. A Depository is an institution which transfers the ownership of a second _____ mode.
a) paper b) **electronic** c) hard copy d) mobile
2. The central Depository holds the security on behalf of _____.
a) company b) creditors c) **investors** d) government
3. _____ of the shares is the first step in the depository process.
a) **immobilisation** b) withdrawal c) transfer d) declaration
4. _____ is the link between the depository and the owner.
a) **Depository Participants** b) Depository System
c) Depository promoters d) Depository personal
5. Depository system reduces time for _____ of securities.
a) post b) **transfer** c) surrender d) endorse
6. _____ indemnifies the loss to the beneficial owner caused to him due to the negligence of the depository or the depository participants.
a) **depository** b) BSE c) NSE d) SEBI
7. Stamp duty is _____ in share transfer through depository.
a) taxed b) levied c) **exempted** d) not exempted
9. _____ of securities means stopping the physical movement of shares.
a) mobilization b) **immobilisation** c) transfer d) depository
10. The cosponsors of CDSL is /are _____.
a) SBI b) HDFC c) Bank of Baroda d) **All the above**

SECTION-B

2 Marks

Unit-I

1. Distinguish between a physical asset and a financial asset.
2. Classify financial assets giving examples.
3. What is the money market?
4. What is the capital market?
5. Distinguish between a primary market and a secondary market.
6. What is a performance guarantee?
7. State the functions of a foreign exchange market.
8. What do you mean by indirect securities? Give an example.
9. What is venture capital financing?
10. What is gilt – edged securities?

Unit - II

1. Define a money market.
2. Who are the participants in a call loan market?
3. Distinguish between a discount market and an acceptance market.
4. What is a commercial paper?

5. What do you know about certificates of deposit?
6. State the objectives of the discount and finance house of India.
7. Distinguish between new issue market and stock exchange.
8. What do you mean by public issues?
9. What is a Repo instrument?
10. What is a Treasury bill?

Unit – III

1. What is Capital market?
2. What is the primary market?
3. What is the secondary market?
4. Write any four functions of the new issue market.
5. Distinguish between primary market and secondary market.
6. What is a commercial bank?
7. Distinguish between new issue market and stock exchange
8. What are the defects of the Indian stock market?(any four)
9. What are the advantages of underwriting?
10. What is origination?
11. Who are the players in the new issue market?

Unit – IV

1. What is market making?
2. State the features of OTCEI
3. What is a trade confirmation slip?
4. State the objectives of BSE
5. Who are the promoters of OTCEI?
6. Write a short note on formation of OTCEI
7. List out the participants in the OTCEI market.
8. What are the services rendered by OTCEI to its investors?
9. How do you list your securities on OTCEI?
10. What are the weaknesses in the Indian Stock market?
11. State the objectives of NSE
12. Write a note on National Securities Clearing Corporation.
13. What are the objectives of starting the primary issues through a screen-based automated trading system?
14. What is a time-bound PIO system?
15. What are the major stock indices of BSE?

Unit – V

1. Define a depository.
2. State the objectives of depository
3. What is fungibility?
4. Write a note on Depository Participants.

5. What is rematerialisation?
6. Who are the interacting institutions?
7. What are the activities of the depository?
8. Write a note on depositories in the international market.
9. Write scope of SEBI (Depositories and Regulation Act, 1996)
10. Write a short note on free transferability.
11. Write about NSDL & its formation

SECTION-C

5 Marks

Unit - I

1. Classify the financial markets and explain their characteristic features.
2. Write a brief note on the financial guarantees market operating in India.
3. What are financial instruments? What are their characteristic features?
4. What legislative measures have been taken by the government to support the Indian financial system?
5. Classify financial assets and bring out their features.
6. Write a brief note on the present Indian financial system.
7. Trace out any six developments of the financial system in India.
8. Show the classification of financial intermediaries in India.
9. Explain marketable and non – marketable assets.
10. What are the weaknesses of IFS?

Unit – II

1. Distinguish between a money market and a capital market.
2. Bring out the features of a money market.
3. Discuss the importance of the commercial bill market.
4. What are the merits of a Treasury bill market?
5. Enumerate the characteristics and features of the call money market.
6. Explain the instruments of the money market.
7. Discuss the new instruments of the money market.
8. What is Repo? Explain the procedures for conducting Repo transactions in the money market.
9. Enumerate the deficiencies of the Indian money market.
10. State and explain the steps taken by RBI to promote the bill market in India.

Unit – III

1. What are the various methods of issue of securities in the new issue market?
2. What is underwriting? Discuss the various methods of underwritings.
3. Discuss the services of stock exchanges.
4. Write any ten defects of the Indian stock market.
5. Discuss any ten measures taken in recent times to make the capital market vibrant.
6. Write the functions of the new issue market.

7. How does the new issue market differ from the secondary market?
8. What is listing? What are the merits and demerits of listing?
9. State and explain the differences and relationship between New Issue Market and Stock Exchange.
10. Bring out the advantages of underwriting.
11. Who are the major players in the new issue market? Discuss their functions.
12. How are the listed securities grouped? Explain.
13. State and explain the advantages of Listing of Securities.
14. Explain the guidelines imposed by SEBI with respect to the primary market.
15. What are the SEBI guidelines for Stock exchanges?

Unit – IV

1. Explain the participants in the OTCEI market.
2. Bring out the steps involved in buying/selling scrips through OTC.
3. What are the functions of the depository system under OTCEI?
4. State and explain the advantages of OTCEI for the investors.
5. State and explain the advantages of OTCEI for the company.
6. Describe the recent trends in OTCEI
7. Explain the recommendations of Deve Committee regard to OTCEI
8. Describe the features of NSE
9. Compare between stock exchange, OTCEI and NSE
10. Explain about the three segments in BSE

Unit – V

1. What is a Depository System? Explain its objectives.
2. State and explain the objectives and activities of the depository
3. Explain the functions of the three interacting institutions.
4. Explain the steps involved in the process of converting paper certificates into an electronic mode.
5. Explain with an illustration the immobilisation process.
6. How will you trade a depository system?
7. Write about the depositories and their functions in the international market.
8. Describe the depository system in India.
9. Explain the benefits of the depository system to the investors.
10. Explain the benefits of the depository system to the Companies.
11. Explain the benefits of the depository system to the capital market.
12. Explain the functions of NSDL
13. Explain the remedial measures taken by government and regulatory authorities to overcome the constraints in the depository system in India.

SECTION-D

10 Marks

Unit – I

1. Classify the various financial intermediaries functioning in the Indian financial system and bring out their features.
2. Show the classification of Indian financial markets in the form of a chart and explain the features of each market.
3. Trace out the development of the financial system in India.
4. “In Spite of suitable legislative measures, the Indian financial system remains weak”- Comment.
5. Discuss the features of a developed money market and bring out its importance.
6. Discuss Indian financial system post 1950.
7. Explain the structure of the Indian financial system and comment on its strength and weaknesses.
8. Explain how a sound financial system helps to grow the economy of a country
9. Discuss the recent developments of Indian financial system
10. Explain the characteristic features of financial instruments.
11. How is the money market divided? Explain.

Unit – II

1. Discuss the various components of a money market and bring out their features.
2. List down the various money market instruments and state their features.
3. Give the structure of the Indian money market and point out its deficiencies.
4. What steps have been taken in recent years to make the Indian money market a developed one?
5. Explain the new Instruments of the money market.
6. Differentiate Indian money market and Indian capital market
7. Describe the characteristic features of a developed money market.
8. Elucidate the deficiencies of the Indian money market.
9. Describe the RBI guidelines with regard to certificate of deposit.
10. State and explain the features and advantages of commercial paper.

Unit – III

1. Write an essay on the functions of the new issue market.
2. Examine the recent trends in the primary market in India.
3. Explain the term ‘New Issue Market’. How does it differ from the secondary market? Are they connected to each other?
4. “The Indian stock market is suffering from many limitations” – What are they?
5. Discuss the various measures taken in recent times to make the capital market vibrant.
6. Enumerate the guidelines of SEBI on primary market and secondary market.
7. Compare and contrast primary and secondary markets.
8. Discuss the merits and demerits of listing. Also examine the methods of issue of securities in the new issue market.
9. Define underwriting. Describe the methods of underwriting.
10. Elucidate the important players in the new issue market.

Unit – IV

1. Explain the advantages of OTCEI to Investors and the Company
2. Discuss the methods of Trading in OTCEI

3. Explain the functions and working of DFHI.
4. Make a comparison between Stock Exchange, OTCEI and NSE
5. Explain the features of NSE
6. Explain the features of BSE
7. Explain the three segments in BSE and the Stock indices of BSE.
8. Explain the shareholding pattern and shares of the promoters of OTCEI
9. How do you trade on the OTC exchange? What are the steps involved in trading?
10. Elucidate the advantages of OTCEI for the investors and the company.

Unit – V

1. Explain the immobilisation process with suitable examples and a diagram.
2. Describe the advantages of the depository system.
3. Explain the features of SEBI (Depository and Participants) Regulation Act.
4. Discuss the drawbacks of the depository system and suggest measures to make it efficient one.
5. Describe the functions of NSDL and CDSL
6. Describe the depository process in India.
7. Explain about the trading methods in a depository system.
8. Describe the drawbacks of the depository system in India.
9. Explain the benefits of the depository system to investors, companies and the capital market.
10. Describe the activities of the Depository System in the international market.

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QUESTION BANK

I M.Com II Semester
SUPPLY CHAIN MANAGEMENT Sub. Code: 21PCOE21
SECTION A (1 MARK EACH)

Choose the correct answer

Unit I

1. The costs of inventory at various levels and cost of logistics form the total cost of
a) **Distribution network** b) Planning network c) Performance network d) Logistics network
2. Each functional area creates its own independent strategy with the objective of optimizing its

a) Planning b) **Performance** c) Distribution d) Improvement
3. Which of the following is the cost involved in holding goods in a warehouse?
a) Facility cost b) Processing cost c) **Inventory cost** d) Transportation cost
4. _____ cost is the cost involved in direct labour.
a) Overhead b) Labour c) **Processing** d) Inventory
5. _____ cost includes administrative costs, rent of an office building, and so on.
a) **Overhead** b) Labour c) Processing d) Inventory
6. _____ represents an investment in a product or material.
a) Overhead b) Labour c) Processing d) **Inventory**
7. The birth of supply chain management as a discipline was given by world renowned
management guru _____
a) F.W.Taylor b) Alexander c) Adams Smith d) **Peter Ducker**
8. Supply chain design is also called as _____
a) **Network design** b) supply design c) warehousing design d) Production design

9. Supply chain management has _____ levels.

- a) 2 b) 4 c) **3** d) 5

10. In supply chain planning the time frame considered is _____

- a) **Quarter year** b) yearly c) Half year d) six months

UNIT-2

ONE WORDS:

1. Types of enablers in supply chain performance are ---

Ans: 3

2. IT can make a major change in-----

Ans: supply chain, processes, functions, and strategies.

3. Three major enablers have helped firms and nations in reducing-----

Ans: supply chain costs

4. Three enablers of supply chain performance are very important for managing the----

Ans: firm's success

5. -----that helpful in integrating partner firms

Ans: EDI technology

6. ____ measure can be defined as an approach to judge the performance of supply chain system.

Ans: supply chain performance

7. Cycle time is often called the ____ time.

Ans: lead

8. The customer service level in a supply chain is marked as an Operation of ____ unique performance indices.

Ans: multiple

9. _____ and _____ needs are two of the most significant aspects.

Ans: customer care, meeting customer

10. _____ sales growth is a sure indication of a company's prosperity.

Ans: profitable

11. _____ measures is the assessments used to measure the performance, and compare or track the performance or products.

Ans: quantitative

12. _____ and _____ are heavily dependent on a brand's supply chain delivery efficiency,

Ans : consumer retention, loyalty

13. The two supply chain measures are _____ measure and _____ measure.

Ans : quantitative and qualitative

14. _____ cost include inventory-carrying costs, transportation costs and logistics administration costs.

Ans: logistics

16. Handling material in the organisation within the production process is part of _____

Ans: supply chain management

17. Keeping stock updated in the warehouse is the the function of _____

Ans: supply chain management

18. Handling material with the help of proper instruments is also includes in _____

Ans: supply chain management

19. Moving goods from suppliers to manufacturing company is part of _____

Ans: supply chain management

20. _____ measures involve multiple dimensions and they are discussed in detail in the subsequent chapters.

Ans: supply chain performance

Unit 3

ONE WORDS:

1. _____ is a process where all the parties involved with the fulfillment of a product are integrated into a single system.

Answer : SUPPLY CHAIN INTEGRATION

2. _____ recognizes that different functions within a firm should not act as functional silos, but instead as part of an integrated process.

Answer : INTERNAL INTEGRATION

3. Internal integration in essence refers to information sharing between _____

Answer : INTERNAL FUNCTIONS, STRATEGIC CROSS FUNCTIONAL COOPERATION AND WORKING TOGETHER.

4. In _____ structure, there exists a central authority responsible for decision making .

Answer : CENTRALIZED

5. In _____ structure the individual entities can make their own decisions.

Answer: DECENTRALIZED

6. A hybrid system is a _____

Answer : Dynamic systems

7. This is similar to the to the concept of synchronous manufacturing also known as the Oryfor constrained process by_____

ANSWER: GOLD

8. One specific case of a supplier women fracture PVC and a buyer who manufactures _____

ANSWER:. Pvc Pipes.

9. Very high reliability of hybrid system_____

ANSWER: Combing wind power, and solar power.

10. Production production reduction of _____

ANSWER : CO2

11. _____ simplify technology refreshment by easing the process of combing existing equipment with newer technologies.

ANSWER: Hybrid system .

12. _____ is also divided into customer and supplier integration

ANSWER: External Integration.

13. Information is passed on from _____

ANSWER: Buyer to Supplier

14. _____ is a good example of external integration.

ANSWER : lean manufacturing

15. The integration greater control the quality, price of_____.

ANSWER: input and output

16. Most important benefits of integrated supply chain is increased_____.

ANSWER: flexibility

17. Horizontal integration can lead to _____.

ANSWER: monopoly

18. _____ are able to control each others functions and process.

ANSWER: Trading Partners

19. Horizontal integration as a form of_____

ANSWER: supply chain integration

20. External integration requires the integration of_____.

ANSWER: logistics activities

21. _____ is important for the procurement department to run smoothly.

ANSWER: communication.

22. _____ between organizations for the purchase and supply of goods or services.

ANSWER : Commercial transaction.

23. Long term commitment between _____ and _____ is needed to plan for continuous improvement.

ANSWER: buyers, suppliers

24. Supply chain disruptions have a negative impact on global industrial production and trade, and a positive impact on _____.

ANSWER: Inflation.

25. The main challenges facing supplier relationship management teams today include _____.

ANSWER: Ensuring quality.

26. Supplier bargaining power is _____.

ANSWER: high

27. Supplier management is a _____ program.

ANSWER: Structural

28. Quick response manufacturing may be an effective remedy for the _____

ANSWER: Bullwhip effect

29. The bullwhip effect is an unfortunate effect of poor _____ Management and demand forecasting.

ANSWER: supply chain

30. Jay Forrester is credited as the person who invented the term _____ effect

ANSWER: Bullwhip effect.

31. The supply chain consists of _____ activities that transcend functional and organizational boundaries.

ANSWER: Boundary – spanning.

32. To strive for value – added productivity throughout the supply chain a firm should successfully overcome the _____

ANSWER: Bullwhip effect.

33. _____ is a deliberate strategy adopted to limit the potential for future losses.

ANSWER: Hedging

34. 'hedging', which means reducing or _____

ANSWER : Controlling risk.

35. Hedging, to buy or sell a _____ on a commodity exchange as a temporary substitute for an intended later transaction in the cash market.

ANSWER: futures contract

36. Hedging attempts to reduce the amount of risk, or volatility, associated with a security's _____

ANSWER : price change.

37. Supply chain also importantly involves _____

ANSWER: financial flows.

38. Hedging involves the simultaneous _____ of currency contracts in two markets.

ANSWER : purchase and sale.

39. Hedging can be done by shifting the risk to the customer , to the supplier , or the market, Feasibility, costs, and impact of each option must be _____

ANSWER:weighed.

40. Hedge against risk through common financial tools or by generating _____

ANSWER: monetary assets

41. _____ provides a means for traders and investors to mitigate market risk .

ANSWER: volatility

42. Hedging does not prevent the investments from suffering losses, but it just reduces the extent of _____

ANSWER: negative impact.

43. Hedging techniques are not only employed by individuals but also by _____

ANSWER: asset management companies .

44. Hedge is an _____ which aims at decreasing the possible losses suffered by an associated investment.

ANSWER: investment status

45. In _____ refers to protecting investments can be effective hedges against their underlying assets.

ANSWER: finance

46. To reduce market risk, depending on the asset or portfolio of assets being _____

ANSWER:hedged

47. Hedging is buying or selling _____ as protection against the risk of loss due to changing prices in the cash market.

ANSWER: Futures contract.

48. Hedge ratio may also be a comparison of the value of futures contracts purchased or sold to the value of the _____ being hedged.

ANSWER: cash commodity

49. Company seeking to buy the commodity takes the opposite position on the contract known as the _____

ANSWER:long-hedged position

50. The supply chain also importantly involves ____

ANSWER:financial flows.

UNIT 4

1. _____ planning involves the supply chain network design, which determines the location, size and optimal numbers of Suppliers, the production plants and distributors to be used in the network.

- a) Tactical Level
- b) Strategic Level
- c) Operational Level
- d) Decision Level

Answer: b

2. SWOT stands for _____

- A) Strengths, Weakness, Opportunities and Threats
- B) Strategic, Weakness, Objectives and Transportation
- c) Strengths, Wanes, Opportunities and Transmission
- d) Strategic, Wanes, Objectives and Threats

Answer: a

3. What are the four functional roles IT in Supply Chain Management?

- a) Reporting, DSS, Collaboration, Transactional.
- b) Reporting, Accounting, Collaboration, Transactional.
- c) Planning, DSS, Collaboration, Transactional.

Answer: a

4. ERP stands for _____

- a) Event-Related Potential
- b) Estimated Retail Price
- C) Enterprise Resource Planning

Answer: c

5. _____ can be used to aid better decisions through Supply Chain Planning systems.

- a) Execution System
- b) Transactional System
- c) Inventory System
- d) Decision Support System

Answer: d

UNIT-2

2marks

Unit I

- 1.What is Supply Chain Management?**
- 2.How supply chain management works?**
- 3.The supply chain which consists of five parts?**
- 4.What is Supply Chain Management give example?**
- 5.What Are the Steps in a Supply Chain?**
- 6.Definition of supply chain management?**
- 7.What is lean inventory?**

- 8. What is order processing?**
- 9. What is demand forecasting?**
- 10. What is logistics?**
- 11. What is collaboration?**
- 12. Explain the Bid and Spend Tools ?**
- 13. Any five types of supply chain management?**
- 14. What is evolution of supply chain management?**
- 15. Evolution period of supply chain management**
- 16. What are the three phases of evolution in supply chain concept?**
- 17. What is the main reason behind the evolution of supply chain management?**
- 18. What are The Evolution stages and its key performance**
- 19. What is Decrease Purchasing Cost ?**
- 20. What is Total Supply Chain Cost ?**
- 21. Write any three importance of supply chain management?**
- 22. What is most important supply chain?**
- 23. What are the most important activities of supply chain management?**
- 24. Why is supply chain management important in India?**
- 25. What is the importance of supply chain management in hospitality industry?**
- 26. What are the levels of supply chain management?**
- 27. write a short note on Strategic Level?**
- 28. Write a short note on Tactical level of supply chain management**
- 29. Write a short note on Operational Level?**

30. Write a short note on design decisions

31. Write a short note on Operations decisions

5 MARKS

1. Concepts of supply chain management?

2. Types of Supply Chain Management ?

3. Evolution of Supply Chain Management

4. Write a brief note on Strategic Level

5. Write a brief note on Tactical level

10 MARKS

1. Importance of Supply Chain Management

2. Types of Supply Chain Management ?

3. Explain the evolution of Supply Chain Management in detail

4. Write down the levels of supply chain management

5. Write down the Decision phases in a supply chain?

Unit 3

10 MARKS:

- 1. ENABLERS OF SUPPLY CHAIN PERFORMANCE:**
- 2. EMERGENCE OF THIRD- PARTY LOGISTICS PROVIDER:**
- 3. SUPPLY CHAIN PERFORMANCE IN INDIA :**
- 4. MEASURES OF SUPPLY CHAIN:**

5. LINKING SUPPLY CHAIN AND BUSINESS PERFORMANCE:

5 MARKS:

- 1. IMPROVEMENT IN COMMUNICATION AND IT:**
- 2. EMERGENCE OF THIRD- PARTY LOGISTICS PROVIDER:**
- 3. SUPPLY CHAIN PERFORMANCE IN INDIA:**
- 4. MEASURES OF SUPPLY CHAIN:**
- 5.LINKING SUPPLY CHAIN AND BUSINESS PERFORMANCE:**

2 MARKS:

- 1. ENABLERS OF SUPPLY CHAIN PERFORMANCE:**
- 2. Write briefly about Improvement in Communication and IT?**
- 3. What is third party logistics ?**
- 4. ROLE OF THIRD PARTY LOGISTICS PROVIDERS:**
- 5. ENHANCED INTER FIRMS COORDINATION CAPABILITIES:**
- 6. SUPPLY CHAIN PERFORMANCE:**
- 7.What is performance in supply chain?**
- 8.Why supply chain performance is important?**
- 9. What are the two measures of supply chain performance**
- 10. LINKING SUPPLY CHAIN AND BUSINESS PERFORMANCE:**

TWO MARKS

- 1. What is meant by internal integration?**
 - 2. What means decentralized?**
 - 3. What is centralization in supply chain?**
 - 4. What is the difference between centralized and decentralized procurement?**
 - 5. What is centralized procurement structure?**
 - 6. Definition of hybrid system?**
 - 7. Scope of hybrid system ?**
 - 8. What are the type of hybrid system?**
- 9 . what is Causes of Price Volatility?**
- 5.What Is Volatility?**
- 6. What are the types of volatility?**
- 7.what is Market Volatility?**
- 8.What is external Integration ?**
- 9.Give the examples of External Integration?**
- 10.Types of external integration ?**
- 11. What is buyer and supplier relationship?**
- 12. What is the importance of buyer supplier relationship?**
- 13. how does Supplier Relationship Management affect supply chain management?**
 - 14. What is the most important factor between buyer and seller interaction?**
 - 15. How to suppliers impact a business?**
 - 16. What are the three types of buyer supplier relationships?**
 - 17. Why is the relationship issue so much important in supply chain management?**
 - 18. How can buyers improve relationships?**
 - 19. What is the negative impact of supplier?**
 - 20. What are the impacts of suppliers?**

21. What Is Bullwhip Effect?
22. Give an example of bullwhip Effect

23. How to avoid bullwhip effect?

24. What is risk hedging in supply chain management?

25. Define hedging?

Five marks

1. What is meant by internal integration?
2. Advantage and disadvantage of hybrid system?
3. Write Benefits of external integration?

4. What are the types of supply chain relationship?

5. What is the impact of supply chain decisions on the success of the firm?
6. What are the major Causes of Bullwhip Effect?

Ten marks

1. Give brief explanation of centralized and non centralized?
2. Write the External integration. Discuss about the barriers of external integration ?
3. Brief note on hedging ?

4.

23.

9.

10.

11.

12.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI – 628001.
II M.COM SEMESTER – III
PART III CORE I ADVANCED CORPORATE ACCOUNTING 21PCOC31
(For those who joined in July 2021 and after)
QUESTION BANK

Section A (one mark each)
Choose the correct answer:

Unit :I

1. IASC Stands for
(a) **International accounting standard committee** (b) Indian accounting standard committee
(c) International accounting standard company (d) Indian accounting standard company
2. IASC established in the year
(a) 1963 (b) **1973** (c) 1983 (d) 1993
3. IASB Stands for
(a) **International accounting standard Board** (b) International accounting standard Board
(c) Indian accounting standard Board (d) None of the above
4. IASB established in the year
(a) 2000 (b) **2001** (c) 2003 (d) 2004
5. When accounting standard board has been constitute
(a) 21 Feb 1977 (b) 21 March 1977 (c) **21 April 1977** (d) 21 May 1977
6. How many Ind AS are there in India
(a) 39 (b) 38 (c) 42 (d) **41**
7. Income taxes Comes under
(a) Ind AS 11 (b) **Ind AS 12** (c) Ind AS 13 (d) Ind AS 14
8. Intangible assets come under
(a) AS 22 (b) AS 23 (c) AS 24 (d) **AS 26**
9. Interim financial reporting comes under
(a) Ind AS 31 (b) Ind AS 32 (c) Ind AS 33 (d) **Ind AS 34**
10. The accounting standards are mandatory for
(a) Sole Trader (b) Firms (c) Societies (d) **Companies**

Unit : II

1. The revenue from sales to external customers as reported in the profit and loss account is known as ____
(a) Enterprise revenue (b) Segment revenue (c) Segment assets (d) None of these
2. _____ are interest and other cost incurred by an enterprise in connection with borrowing of funds.
(a) Transfer cost (b) Borrowing Cost (c) Qualifying cost (d) None of these
3. A _____ is an asset that necessarily takes a substantial period of time to get ready for use or sale
(a) Borrowing asset (b) Qualified asset (c) Qualifying asset (d) None of these
4. The difference between Segment revenue and segment expense is -----
(a) Segment asset (b) Segment enterprise (c) Segment result (d) None of these
5. Related Party Disclosures
(a) AS – 15 (b) AS – 14 (c) AS – 11 (d) AS - 18
6. Segment Reporting
a) AS – 15 (b) AS – 17 (c) AS – 12 (d) AS - 18
7. _____ rate is the mean of exchange rates in force during a period.

- (a)Closing (b) Average (c) Forward rate (d) Exchange rate
8. _____ currency is the currency used in presenting the financial statements.
 (a)Exchange (b)Reporting (c)Foreign (d)Settlement
9. In Double Accounting system Preliminary expenses is shown on _____
 (a) liability side of the general B/S (b) debit side of the capital a/c
 (c)asset side in the balance sheet (d) debit side of the revenue a/c
10. Cost of licence appears in _____
 (a)Capital a/c (b) Net revenue a/c (c) General B/S (d)Revenue a/c

Unit : III

- Under Double Account System when an assets is replaced:
 - The current cost of replacement is written off to revenue.
 - The original cost of the assts is written off to revenue
 - The original cost reduced by the amount of depreciation is written off to revenue
 - The lower of (a) or (b)
- Original cost of an asset Rs. 5,00,000. Present cost of replacement Rs. 6,50,000. Amount spent on replacement Rs. 7,60,000. Under Double Account System the amount chafeable to revenue will be:
 - Rs. 6,50,000
 - Rs. 5,00,000
 - Rs. 7,60,000
 - Rs. 2,60,000
- Under Double Account System, when an assets is replaced, any amount realized on sale of old materials will be credited to
 - Replacement account
 - Assets account
 - Revenue account
 - Net revenue account
- The essential feature of the Double Account System is:
 - for every debit there is a corresponding credit
 - the presentation of capital receipts and capital expenditure in separate account.
 - the presentation of assets at original cost, the depreciation to date being shown to the credit of depreciation reserve account.
 - all the above
- The Profit and Loss Account under Double Account System id termed as
 - Revenue Account
 - Income and Expenditure Account
 - Profit & Loss Account'
- Shares forfeited account is shown an:
 - Credit side of the Net Revenue Account
 - Credit side of the Receipts and Expenditure on Capital Account
 - Liabilities side of General Balance Sheet.
- Original cost of an asset is Rs. 1,00,000. Present cost of its replacement is Rs. 1,30,000. The amount spent in its replacement is Rs. 1,52,000. The amount to be capitalized will be
 - Rs. 22,000
 - Rs. 1,52,0000
 - Rs. 1,30,000
- Cost of license appears in
 - Revenue account
 - Capital account
 - General Balance Sheet
- On replacement of an asset any amount realized on account of sale of old material is credited to
 - Asset Account
 - Revenue Account
 - Replacement Account
- Preliminary Expenses Account is shown on:
 - Asset side in the General Balance Sheet
 - debit side of the Net Revenue Account
 - debit side of the Receipts and Expenditure on Capital Account.

UNIT-IV

- A holding company is one that holds the ----- of another company.
 - whole of the share capital
 - half of the share capital
 - more than 50% of the share capital
 - less than 50% of the share capital

2. Every holding company is required to present a consolidated balance sheet and a consolidated profit and loss account
 - a) under the Companies Act, 1956.
 - b) under NI Act, 1881
 - c) under B/E Act, 1882
 - d) Holding companies Act
3. A company is a subsidiary of a holding company when the latter company controls
 - a) the composition of a Board of Directors of the former company.
 - b) the shareholders of the former company.
 - c) Directors of the former company.
 - d) Members of the former company.
4. The present organization acquiring controlling interest in another company is called
 - a) Holding company.
 - b) joint stock company
 - c) Subsidiary company.
 - d) public company.
5. Minorities are called as
 - a) Outsiders
 - b) Members
 - c) Shareholders
 - d) Directors
6. Pre-acquisition profits are treated as
 - a) revenue profits
 - b) Capital profit
 - c) net profit
 - d) Profit
7. Post-acquisition Profits are treated as
 - a) capital profits.
 - b) revenue profit.
 - c) Gross Profit.
 - d) Net profit.
8. Dividends paid out of pre-acquisition profits by the subsidiary company must be ----- to Investment account by the holding company.
 - a) Credited
 - b) Debited
 - c) Added
 - d) Deducted
9. Bonus shares issued out of pre-acquisition profits by the subsidiary company will have ----- on the Consolidated Balance Sheet.
 - a) No effect
 - b) Effect
 - c) addition
 - d) none
10. Outsiders are called as
 - a) Minorities
 - b) Outsiders
 - c) Shareholders
 - d) Directors

Unit V:

1. The amount of backlog depreciation should be changed to_____.
 - a) Profit & Loss A/c
 - b) Current cost reserve A/c
 - c) Balance sheet
 - d) Revaluation A/c
2. Monetary working capital is the difference between_____ and_____.
 - a) Trade debtors & Creditors
 - b) Current Assets & Current Liabilities
 - c) Fixed Assets & Fixed Liabilities
 - d) Owned capital & Borrowed capital
3. Gearing ratio is the ratio between_____ and_____.
 - a) Trade debtors & Creditors
 - b) Current Assets & Current Liabilities
 - c) Fixed Assets & Fixed Liabilities
 - d) Borrowed capital & Shareholders funds
4. In historical cost approach,_____on recruiting, hiring, training and developing the human resources of the organisation is taken.
 - a) Actual cost incurred
 - b) Fixed cost
 - c) Standard cost
 - d) Current cost
5. _____is used in case of employees who can be readily hired from outside.
 - a) Opportunity cost approach
 - b) Historical cost approach
 - c) Standard cost approach
 - d) Replacement cost approach
6. Under CCP Accounting, assets are presented at_____.
 - a) Economic value
 - b) Net realizable value
 - c) Current replacement cost
 - d) Historical cost adjusted for General price

- level changes
7. Fixed assets are shown in the balance sheet at their _____ under CCA method.
 - a) Current values
 - b) Original costs
 - c) Replacement values
 - d) Depreciated value
 8. Under CCA method, stocks are shown in the balance sheet at their _____.
 - a) Market price
 - b) Costs or market price whichever is less
 - c) Value to the business
 - d) Cost price
 9. The difference between the current values and depreciated values of fixed assets is transferred to _____ account under CCA method.
 - a) Revaluation
 - b) Revaluation Reserve
 - c) Realization
 - d) General Reserve
 10. The main objective of CCA approach is to _____.
 - a) Maintain operating capability of the enterprise
 - b) Maintain the purchasing power of shareholders fund
 - c) Ascertain general purchasing power gain or loss
 - d) Measure all values at constant rupees

SECTION – B

UNIT I

1. What are Accounting Standards?
2. Define Accounting Standards.
3. Give the reason why Accounting Standards was established.
4. What are International Accounting Standards?
5. State the objectives of Accounting Standards.
6. How are accounting standards formulated?
7. What is IASB?
8. State any two advantages of Accounting Standards.
9. What is the function of IASB?
10. Differentiate between International AS and Indian AS.

UNIT II

1. What is meant by Reporting Currency?
2. What is meant by Exchange Rate?
3. What is meant by Forward Rate?
4. What is meant by Monetary Items?
5. What is meant by Business Segment?
6. What is meant by Enterprise Revenue?
7. What is meant by Segment Revenue?
8. What is meant by Segment Accounting Policies?
9. What is meant by Segment Liabilities?
10. State the difference between an Associate and a Joint Venture.

UNIT III

1. What is meant by double account system?
2. What is contingency reserve?
3. What is reasonable return?
4. What is capital base?
5. What do you mean by disposal of surplus?
6. Write any two differences between single account system and double account system.
7. What is clear profit?
8. Write a note on Development reserve.
9. Write a note on replacement of an asset.
10. What is Contingency Reserve Fund?

UNIT IV

1. Define Holding Company.
2. What is a subsidiary company?
3. What do you mean by minority interest?
4. What is cost of control/ goodwill/capital reserve?
5. Define capital profit.
6. Mention any two differences between capital profit and revenue profit.
7. What are unrealized profits?
8. What is a contingent liability?
9. What are bonus shares?
10. What is an interim dividend?
11. What is revenue profit?

UNIT V

1. Define Inflation Accounting.
2. What is CPPA?
3. What is CCA?
4. What is SGPLA?
5. Write any two objectives of CPPA.
6. What is historical accounting?
7. What is COSA?
8. What is back leg of depreciation?
9. What is MWCA?
10. What is gearing adjustment?

SECTION C

UNIT I

1. Discuss the origin of Accounting Standards.
2. Indicate the Need for Accounting Standards.
3. Classify any 10 Indian Accounting Standards.
4. Illustrate the scope and functions of Accounting Standards Board.
5. List out the Advantages of Accounting Standards.
6. Explain the significance of Accounting Standards.
7. Brief out the formation of Accounting Standards.
8. Explain the Scope and Functions of ASB.
9. Brief out Audited Financial Statements.
10. Brief out the Compliance with the Accounting Standards.

UNIT II

1. Summarize the main features of Related Party Disclosures.
2. Discuss the following terms :
 - (i) Provident Fund Contribution
 - (ii) Gratuity
 - (iii) An Associate
 - (iv) Segment Liabilities and Assets
3. Differentiate between Business Segment , Geographical Segment and Reportable Segment.
4. Explain the two approaches under AS-12.
5. Brief out the features of AS -12.
6. Brief out the features of AS -16.
7. What is meant by Borrowing Cost ? Explain its features.
8. What is a Qualifying Asset in the context of AS -16?
9. Brief out the features of AS -18.
10. Who is a related party and an Associate ?

UNIT III

1. A Railway station was built in 1998 at a cost of Rs. 3,00,000. It was replaced in 2018 by a new railway station at a cost of Rs. 16, 00,000. Prices of materials have risen to 250% and the labour rates have trebled. The proportion of materials and labour in the old station was 2: 3.

Old materials valued at Rs. 25,000 are used in the construction of the new station and included in the cost of Rs. 16,00,000. Rs 42,000 as realized by a sale of old materials. Give journal entries for recording the above transactions.

2. What are the salient features of double account system? How does it differ from single account system and double entry system?
3. The following particulars are available from the books of Hasan Electricity Company.

	Rs
Balance of repairs and renewals reserve account as on 1 st April 2015	1,20,000
Actual repairs incurred during the year ended	
31 st March 2016	75,000
31 st March 2017	35,000

The company transfers annually a sum of Rs. 50,000 to the 'repairs and renewals' reserve account. Draw up the account for the years 2015 – 2016 and 2016 – 2017.

4. A power house originally built for Rs. 4,00,000 is to be replaced by a new one. The total cost of the construction is Rs. 14,00,000. But the estimated cost of construction of the original size power house is Rs. 6,00,000. Find out the amount to be charged to revenue and capital.
5. The Delhi Electric Co Ltd rebuilt and reequipped a part of their power house at a cost of Rs. 80,00,000 ; the part of the old power house thus superseded had cost originally Rs. 50,00,000 but if erected at the present time would cost 20% more. Rs. 6,00,000 is realized from the sale of old materials and Rs. 3,00,000 worth of old materials are used in the reconstruction and are included in the cost of Rs. 80,00,000 mentioned above. Give necessary entries for recording the above transactions in the books of the company, indicating the allocations between capital and revenue and give reasons for such allocations.
6. A water supply concern had to replace a quarter of the mains and lay an auxiliary main for the remaining length in order to augment supplies of water to a locality. The total cost of the original main was Rs. 4,00,000. The auxiliary main cost Rs. 4,50,000 and the new main cost Rs. 1,75,000. It is estimated that the cost of laying a main has gone up by 30%. Part of the old main realized Rs. 15,000.
Pass journal entries to record the above and show the total amount capitalized and written off.
7. The Bombay Corporation decides to replace water mains with a modern one with a large capacity. The cost of installation in 1990 was Rs. 24 lakhs, the components of materials, labour and overheads being in the ratio of 5 : 3 : 2. It is ascertained that the costs of materials and labour have gone up by 40% and 80%, respectively. The proportion of overheads to total cost is expected to remain the same as before.
The cost of the new mains as per improved design is Rs. 60 lakhs and in addition material recovered from the old mains of a value of Rs. 2,40,000 has used in the construction of the new mains. The old main was scrapped and for Rs. 7,50,000.
You are asked to make the allocation between capital and revenue and pass necessary entries under double account system.
8. An Electricity company laid a main at a cost of Rs. 50 lakh. Some years later the company laid down an auxiliary main for one – fifth of the length of the old main at a cost of Rs. 15 lakhs. It also replaced the rest of the length of the old main at a cost of Rs 60 lakhs. The cost of material and labour having gone up by 15%. Sale of old material realized Rs. 80,000. Old materials valued at Rs. One lakhs were used in renewal and those valued at Rs. 50,000 were used in the construction of the auxiliary main.
You are required to give the journal entries for recording the above transactions.
9. An Electricity Supply Co. rebuilds its main at the cost of Rs. 19,90,000. This excludes value of Rs. 13,800 material of old friend used for new one. The original mains were constructed at a cost of Rs. 9,90,000. The ratio of material and labour then was 7 : 3. The increase in

material prices is 12 ½ % and wages rates 15%. A material worth Rs. 25,200 from old works was sold.

Show Journal Entries and prepare Works Account and Replacement A/c under Double Account System for the above and determine the net cost of replacement.

10. Write detailed notes on
- 1) Calculation of Reasonable Return
 - 2) Capital Base

UNIT IV

1. Explain the following item in the context of preparing Consolidated Balance —Sheet:
 - i) Cost of control
 - ii) Payment of Dividend out of Pre-and-Post-acquisition Profit
 - iii) Minority Interest
2. From the balance sheet given below prepare a conciliated Balance Sheet of A. Ltd. and its subsidiary company B Ltd.

Liabilities	A. Ltd. Rs.	B. Ltd. Rs.	Assets	A. Ltd. Rs.	B. Ltd. Rs.
Share Capital: Shares of Rs. 10 each	25,00,000	6,00,000	Land & Building	6,40,999	2,00,000
General Reserve	3,60,000	1,20,000	Machinery	12,60,000	3,40,000
Profit and Loss A/c	2,40,000	1,80,000	Furniture	1,40,000	60,000
Trade Creditors	3,50,000	1,00,000	40,000 shares in B. Ltd.	5,00,000	----
			Stock in hand	4,10,000	2,50,000
			Debtors	3,80,000	1,00,000
			Bank Balance	1,20,000	50,000
	34,50,000	10,00,000		34,50,000	10,00,000

At the date of acquisition of A Ltd. Of its holding of 40,000 shares in B. ltd., the latter company had undistributed profits and reserves amounting to RS. 1,00,000 none of which has been distributed since then.

3. H Ltd. acquired 80,000 shares of Rs. 10 each in S Ltd. on 1st summarized Balance Sheets of H. Ltd. and S. Ltd. on 31-3-2018 are as follows:

	H. Ltd. Rs.	S. Ltd. Rs.		H. Ltd. Rs.	S. Ltd. Rs.
Share Capital in shares of Rs. 10 each	20,00,000	10,00,000	Machinery	6,00,000	4,50,0000
Reserves	1,00,000	1,50,000	Furniture	20,000	40,000
Profit and Loss A/c	50,000	45,000	Shares in S. Ltd.	8,80,000	
			9% Debentures in S. ltd.		—
			Stock	80,000	

9% Debentures		2,00,000	Debtors		
Creditors	4,00,000	2,00,000	Bills receivable	5,20,000	6,50,000
Bills Payable	20,000	10,000	Cash	1,80,000	2,70,000
				10,000	15,000
				2,80,000	1,80,000

Bills Receivable of S. Ltd. includes bills for Rs. 8,000 accepted by H. Ltd. and creditors of S. Ltd. include Rs. 20,000 due to H. Ltd. An amount of Rs. 30,000 was transferred by S. Ltd from the current years' profits to reserves.

You are required to prepare the Consolidated Balance Sheet as on 31st March, 2018 showing herein how your figures are made up.

4. From the following balance sheets of holding company and subsidiary company prepare a consolidated balance sheet of holding company and its subsidiary company.

	Holding Co. Rs.	Subsidiary Co. Rs.		Holding Co. Rs.	Subsidiary Co. Rs.
Share capital in shares of Rs. 10 each	20,00,000	10,00,000	Assets	25,00,000	12,00,000
Liabilities	15,00,000	2,00,000	Investments in 1,00,000 shares of RS. 10 each of the subsidiary company (All the shares held)	10,00,000	---
	35,00,000	12,00,000		35,00,000	12,00,000

5. From the Balance Sheets given below prepare a Consolidated Balance Sheet:

Balance Sheet as at 31st

	H Ltd. Rs.	S. Ltd. Rs.		H Ltd. Rs.	S. Ltd. Rs.
Share Capital: Shares of Rs. 10 each	8,00,000	3,00,000	Land & Building	4,00,000	2,00,000
Creditors	3,50,000	1,60,000	Plant & Machinery	2,00,000	1,00,000
Bills Payable	40,000	20,000	Furniture & Fixtures	50,000	20,000
			Investment in shares of S. Ltd.: 24,000 shares of Rs. 10 each	2,40,000	---
			Stock	1,50,000	80,000
			Sundry Debtors	1,00,000	60,000
			Bank Balance	50,000	20,000
	11,90,00	4,80,000		11,90,00	4,80,000

6. From the Balance Sheet and information given below, prepare Consolidated Balance Sheet.

Balance Sheets as at 31st March, 2018

	H Rs.	S Rs.		H Rs.	S Rs.
Share Capital: Rs. 10 fully paid	10,00,000	2,00,000	Sundry Assets	8,00,000	1,20,000
Profit & LossA/c	4,00,000	1,20,000	Stock	6,10,000	2,40,000
			Debtors	1,30,000	1,70,000

Reserve	1,00,000	60,000	Bills Receivable	10,000	
Creditors	2,00,000	1,20,000	Shares in S		—
Bills Payable		30,000	15,000 at Cost	1,50,000	—
	17,00,000	5,30,000		17,00,000	5,30,000

- i) All the profit of S has been earned since the shares were acquired by H, but there was already the Reserve of Rs. 60,000 at that date.
 - ii) The bills accepted by S. Rs. 10,000 are in favour of H.
 - iii) Sundry assets of S are undervalued by Rs. 20,000.
 - iv) The stock of H includes RS. 50,000 bought from S at a profit to the latter of 25 per cent on cost.
7. How would you ascertain the amount of goodwill or capital reserve preparing a Consolidated Balance Sheet?
 8. How would you deal with the revaluation of assets and liabilities of the subsidiary while preparing a consolidated Balance Sheet?
 9. While preparing a Consolidated Balance Sheet, how would you treat contingent liabilities and unrealized profits?
 10. Explain with suitable examples the treatment of the following item in the accounts of a holding company:
 - a) Issue of bonus shares by the subsidiary company.
 - b) Payment of dividend by the subsidiary company.
 - c) Common transactions between the holding company and the subsidiary company.

UNIT V

1.A Ltd had the following monetary items on January 1.

		Rs.
Debtors		50,000
Bills Received		20,000
Cash		20,000
		90,000
Less : Bills Payable	15,000	
Creditors	35,000	50,000
		40,000

The transactions affecting monetary items during the year were:

- i) Sales of Rs. 1, 60,000 made evenly throughout the year.
- ii) Purchase of goods of Rs. 1, 20,000 made evenly during the year.
- iii) Operating expenses of Rs. 50,000 were incurred evenly throughout the year.
- iv) One machine was sold for Rs.18,000 on July 1.
- v) One machine was purchased for Rs.25,000 on December 31.

The general price index was as follows:

On January 1 -300; Average for the year -350; On July 1 -360; On December 31-400.

Compute the general purchasing power gain or loss.

2.A company has the following transactions at the given dates and price indices for the first quarter of 2018.

Rs.	Price index
------------	--------------------

Opening Balance (Jan. 1)	8,000	100
Cash Sales (Feb. 1)	15,000	125
Payment to creditors (March. 1)	10,000	125
Cash purchase (March 1)	2,000	125
Payment of expenses (March 31)	4,000	130
Closing balance	7,000	130

Calculate net monetary gain or loss

3) A firm purchased a machinery for a sum of Rs. 2 lakhs on January 1, 2008. It has an expected life of 10 years without any scrap value. The price indices for the asset were as follows:

January 1, 2008	100
January 1, 2011	160
December 31, 2011	175

You are required to value the machinery on January 1, 2011 and December 31, 2011, both according to historical cost accounting system and current cost accounting system, charging depreciation on straight line basis. Also, find the amount which needs to be adjusted for appreciation during 2011.

4. From the following information, calculate the cost of sales under Historical and Current Cost Accounting System.

Opening stock of raw materials on 1-1-2011 (200 tons @ Rs. 40 per tonne)	Rs. 8,000
Purchased during the year 2011	Nil
Materials consumed during 2011	160 tonnes
Price of raw material on 1-1-2011	Rs. 50 per tonne
Average price during 2011	Rs. 60 per tonne
Price of raw materials on 31-12-2011	Rs. 70 per tonne

5. From the following information, as per historical cost accounting method, compute the Monetary Working Capital adjustment under current cost accounting method:

	Jan 1, 2011	Dec 31, 2011
Accounts Receivable (Rs)	7,000	12,600
Accounts Payable (Rs)	3,850	6,440
Monetary Working Capital (Rs)	3,150	6,160
Price Index for materials	200	230
Price Index for finished goods	150	180

(Note: Index of correct value be modified)

6. From the data below, calculate the gearing adjustment required under Current cost accounting method:

Particulars	Opening (Rs)	Closing (Rs)
Convertible debentures	200	240
Bank overdraft	120	160
Cash	20	60
Paid up share capital	300	400
Reserves	100	160

Particulars	Rs
Cost of sales adjustment	40
Monetary Working Capital Adjustment	30
Depreciation adjustment	10
Total of Adjustments	80

7. Following data relates to Gearing Ltd:

(i) Particulars	Rs.	
	Beginning	End

	Net Long Term Borrowings	14,000	14,000
	Creditors	4,000	2,800
	Bank overdraft	5,000	5,600
	Taxation	1,500	1,400
	Cash	(5,000)	(8,400)
	Net Borrowings	19,500	15,400
(ii)	Share capital & Reserves from		
	Current Cost Balance sheet	37,080	47,056
	Proposed dividend	500	600
	Total Shareholders interest	37,580	47,656
(iii)	Current cost adjustment		
	Depreciation		1,700
	Fixed Assets Disposal		1,800
	Cost of sales adjustment		1,620
	Monetary Working Capital Adjustment		1,120
	Total		6,240
	Find out:		

(i) Gearing Adjustment Ratio.

(ii) Current Cost Adjustment after Abating Gearing Adjustment.

8. Enumerate the features of Current Cost Accounting

9. Enumerate the valuation of Human Resources.

10. Enumerate the objectives of Current Cost Accounting.

SECTION D

UNIT I

1. Discuss in detail the origin of Accounting Standards.
2. Indicate the Need for Accounting Standards.
3. Classify any 10 Indian and International Accounting Standards.
4. Illustrate the scope and functions of Accounting Standards Board.
5. List out the Advantages of Accounting Standards.
6. Explain the significance of Accounting Standards.
7. Brief out the formation of Accounting Standards.
8. Explain the Scope and Functions of ASB in detail.
9. Brief out Audited Financial Statements.
10. Brief out the Compliance with the Accounting Standards.

UNIT II

1. Summarize the main features of Related Party Disclosures.
2. Discuss the following terms :
 - (i) Provident Fund Contribution
 - (ii) Gratuity
 - (iii) An Associate
 - (iv) Segment Liabilities and Assets
3. Differentiate between Business Segment , Geographical Segment and Reportable Segment.
4. Explain in detail the provisions relating to Government Grants.
5. Summarize the main features of AS -12.
6. Summarize the main features of AS 16.
7. What is meant by Borrowing Cost ? Explain its features.
8. What is a Qualifying Asset in the context of AS -16?
9. Brief out the features of AS -18.
10. Explain in detail the provisions relating to Foreign Exchange.

UNIT III

1. From the following balance as on December 31, 2017, appearing in the ledger of the Electric Light and Power Co. Ltd. you are required to prepare:

- a) Revenue account
- b) Net revenue account
- c) Capital account
- d) General Balance sheet.

	Rs		Rs
Equity share	54,900	Stores on hand	700
Debentures	20,000	Cash	300
Lands on 31 – 12 -2016	15,000	Cost of generating electricity	3,000
Lands purchased during 2017	500	Cost of distributing electricity	600
Machinery on 31 -12 – 2016	60,000	Rent, rates and taxes	400
Machinery purchased during 2017	500	Management expenses	1,200
Mains including cost of laying 31/12 /2016	20,000	Depreciation	2,000
Spent on mains during 2017	5,100	Sale of current	13,200
Sundry creditors	100	Rent of meters	300
Depreciation fund	25,000	Interest on debentures	1,000
Sundry debtors for current supplied	4,000	Dividends	2,000
Other debtors	50	Balance of net revenue account 31/12/2016	2,850

2. The following is the trial balance of the Social Electric Lighting Co. Ltd. for the year ended December 31, 2017:

Dec.31, 2017

Dec. 31, 2017

	Dr.	Cr.
Nominal capital 10,000 shares of Rs 50 each		
1,00,000 subscribed – 5,000 shares, Rs. 25 paid		1,25,000
75,000 debentures 6% interest		75,000
5,600 Depreciation fund		5,000
Calls in arrears	5,000	
46,500 Freehold land	46,500	
20,000 Buildings	25,000	
30,000 Machinery at station	50,000	
25,000 mains	40,000	
5,000 Transformers, Motors, etc.	10,000	
2,500 Meters	7,500	
1,500 Electrical instruments	2,000	
8,000 general stores (cables. Mains, etc.) in stock	11,750	
2,250 Office furniture	1,250	
Coal and fuel	9,500	
Oil, waste and engine room stores	3,750	
Coal, oil waste, etc. in stock	500	
Repairs and replacements	2,500	
Rates and taxes	1,500	
Salaries of secretary, manager, etc.	7,500	
Wages at station	15,000	
Directors' fees	5,000	
Stationary, printing and advertising	3,000	
Incidental expenses	500	

Law charges	1,000	
Sales of meters		43,750
Sales by contracts		25,000
Meter rents		1,500
Sundry creditors		5,000
Sundry debtors	15,000	
Cash in hand and at bank	16,500	
	2,80,250	2,80,250

1) Provide depreciation on:

Buildings 2 ½% ; Machinery 7 ½% ; Mains 5% ; Transforms etc. 10%, Meters 15%.

2) A call of Rs 5 per share was payable on 30th June, 2017 and arrears are subjected to interest at 5% per annum.

Prepare revenue account and capital account for the year ended December 31, 2017 and balance sheet as on that date.

3. The following balances have been extracted from the books of Kanpur Electricity Company at the end of 2016.

	Rs
Share capital	10,00,000
Reserve fund (invested in 4 ½% Government securities at par)	5,00,000
Contingencies reserve (invested in 5% State loan)	1,00,000
Loan from State Electricity Board	6,00,000
8% Debentures	2,00,000
Development reserve	1,00,000
Fixed assets	20,00,000
Depreciation reserve on fixed assets	5,00,000
Consumers' deposits	5,50,000
Amount contributed by consumers for fixed assets	10,000
Intangible assets	50,000
Tariffs and dividends control reserves	50,000
Current assets (monthly average)	2,00,000

The company earns a profit of Rs. 75,000 (after tax) in 2016. Show how the profit is to be dealt with the company, assuming the bank rate is 9%.

4. Gupta electricity Company earned a profit of Rs. 33,97,000 after paying Rs. 1,20,000 @ 6% as debenture interest for the year ended March 31, 2018. The following further information is supplied to you:

	Rs
Fixed assets	7,20,00,000
Depreciation written off	2,00,00,000
Loan from Electricity Board	1,60,00,000
Reserve fund investment at par 4%	40,00,000
Contingency reserve investment at par 4%	30,00,000
Tariff and Dividend Control Reserve	4,00,000
Security deposits of customers	6,00,000
Customer's contribution to assets	2,00,000
Preliminary expenses	1,60,000
Monthly average of current assets including amount due from customers Rs. 10,00,000	30,40,000

Development reserve 10,00,000

Show the disposal of the profits mentioned above.

5. From the following particulars draw up

1) Capital Account and

2) General balance sheet as on 30th June, 2018 on double account system.

Authorized Capital Rs. 30,00,000 ; Subscribed Capital Rs. 26,00,000 ; 11% Debentures Rs. 4,00,000 ; Trade Creditors Rs. 1,60,000 ; Reserve Rs. 1,50,000 ; Trade Debtors Rs. 3,80,000 ; Cash in hand and at Bank Rs. 3,50,000 ; Investment Rs. 1,50,000 ; Stock Rs. 2,40,000.

Expenditure to 30th June 2017:

Land Rs. 1,20,000 ; Shafting etc. Rs. 13,50,000 ; Machinery Rs. 4,00,000 ; Buildings Rs. 1,30,000.

The expenditure during the year ended 30 – 6 – 2018 was Rs. 2,50,000 ; Rs. 2,50,000 and Rs. 1,00,000 respectively on the last three items and a Renewal Fund of Rs. 2,50,000 had been created. The balancing items of Rs. 1,60,000 may be taken as profit of the company.

6. The following balances are extracted from the books of Railway Company after completion of the Revenue Account for the year ended 31st March 2018. You are required to prepare the Receipts and Expenditure on Capital Account and the General Balance Sheet.

	Dr. Rs.	Cr. Rs.
Equity shares		10,00,000
6% Preference Shares		6,00,000
7 ½ % Debentures		4,00,000
Lines open for traffic	17,04,000	
Lines in the course of construction	10,000	
Lines leased	40,000	
Working stock (Engines, Carriage, etc.,)	2,60,000	
Lines jointly owned	1,00,000	
Freehold land	25,000	
Share premium		55,000
Cash at Bank	10,000	
General stores and stock	25,000	
Net revenue A/C		32,000
Traffic Accounts due to the company	20,000	
Due from other companies	5,000	
Sundry Outstanding Accounts	7,000	
Due to other companies		4,000
Sundry Creditors		30,000
Fire Insurance Fund		5,000
General Reserve		65,000
Superannuation Fund		15,000
	----- 22,06,000	----- 22,06,000

During the year there was an issue of Rs.1,50,000 6% Preference shares at par and this was fully subscribed. Equity shares of Rs. 2,00,000 were also issued at a premium of 10%. Expenditure during the year made on lines open for tariffs Rs. 40,000 and lines in the course of construction

Rs 3,000 were made and the construction to lines jointly owned Rs. 20,000.

7. The following Balances are extracted from the books of City Lights Supply Corporation as on 31st March 2018:

	Rs	Rs
Equity shares		1,64,700
Debentures		60,000
Sundry creditors on open account		300
Depreciation fund		75,000
Capital expenditure on 31 – 3 – 2017	2,85,000	
Capital expenditure during 2017 – 18	18,300	
Sundry debtors and current supplied	12,000	
Other debtors	150	
Stores in hand	1,500	
Cash in hand	1,500	
Cost of generation of electricity	9,000	
Cost of distribution of electricity	1,500	
Rent, Rates and Taxes	1,500	
Management Expenses	3,600	
Depreciation	6,000	
Interest on debentures	3,000	
Interest Dividend	6,000	
Sale of Current		39,000
Meter rent		1,500
Balance of Net Revenue Account as on 1 st April 2017		8,550
	----- 3,49,050 -----	----- 3,49,050 -----

Prepare a) Capital account b) Revenue Account c) Net Revenue Account and d) General Balance Sheet from the above Trial Balance.

8. The following is the trial balance Social Electric Lighting Co. Ltd. for the year ended March 31, 2018.:

March 31, 2017

March 31 2018

1,00,000	Nominal capital 10,000 shares of Rs. 50 each	Dr.	Cr.
75,000	Subscribed – 5,000 shares, Rs. 25 paid		1,25,000
5,000	Debentures, 6% interest		75,000
	Depreciation fund	5,000	5,000
	Calls in arrears	46,500	
46,500	Freehold land	25,000	
20,000	Buildings	50,000	
30,000	Machinery at station	40,000	
25,000	Mains	10,000	
5,000	Transformers, motors, etc.	7,500	
2,500	Meters	2,000	
1,500	Electricity instruments	11,750	
8,000	General stores (cables, mains, etc.) in stock	1,250	
1,250	Office furniture	9,500	
	Coal and fuel	3,750	
	Oil, waste and engine room stores		
	Coal, oil waste, etc. in stock	500	
	Repairs and replacements	2,500	
	Rates and taxes	1,500	
	Salaries of secretary, manager, etc.	7,500	
	Wages at station	15,000	
	Directors' fees	5,000	
	Stationary, printing and advertising	3,000	
	Incidental expenses	500	
	Law charges	1000	
	Sales of meters		43,750
	Sales by contracts		25,000
	Meter rents		1,500
	Sundry creditors		5,000
	Sundry debtors	15,000	
	Cash in hand and at bank	16,500	
		2,80,250	2,80,250

1) Provide depreciation on opening balances:

Building 2 ½ %;

Machinery 7 ½%

Mains 5%

Transformers etc.10%

Meters 15%

2) A call of Rs.5per share was payable 30th September, 2017 and arrears are subject to interest at percent per annum. Prepare revenue account and capital account for the year ended March 31, 2018 and balance sheet as on that date.

9. The following balances relate to an electricity company and pertain to its accounts the year ended 31st March 2018:

	Rs.(in lakhs)
Share capital	100
Reserve fund (invested in5% Government Securities at par)	60
Contingencies reserve – invested in 6% State Government Loans	20
Loan State Electricity board	30

11% debentures	8
Development reserve	10
Fixed assets	200
Depreciation reserve on fixed asset	80
Consumers' deposits	75
Amounts contributed by consumers towards fixed assets	2
Intangible assets	5
Tariffs and Dividend Control Reserve	6
Current assets – Monthly average	20

The company earned a post tax (clear) profit of Rs. 9 lakhs. Show how the profits of the companies will be default with under the provisions of the Electricity Act, assuming that the bank rate during was 8%.

10. A water supply concern had to replace a quarter of the mains and lay and auxiliary main for the remaining length in order to argument suppliers of water to a locality. The total cost of the original main was Rs. 8,00,000 ; the auxiliary main cost Rs. 9,00,000 and the new main cost Rs. 3,50,000. It is estimated that cost of laying a main has gone up by 30%. Parts of old main realized Rs. 15,000.

Pass the necessary journal Entries to record the above transactions.

UNIT IV

1. From the Balance Sheet and information given below, prepare consolidated Balance Sheet.

	H. Ltd. Rs.	S. Ltd. Rs.		H. Ltd. Rs.	S. Ltd. Rs.
Share Capital:					
Shares of Rs. 10 each fully paid	5,00,000	1,00,000	Fixed Assets	4,00,000	60,000
Profit & Loss	2,00,000	60,000	Stock	3,00,000	1,20,000
Reserves	60,000	40,000	Debtors	75,000	85,000
Bills Payable		15,000	Bills receivable	20,000	
Creditors	1,10,000	60,000	Shares in S. Ltd. 7,500 at cost	75,000	—
			Preliminary Expenses	—	
					10,000
	8,70,000	2,75,000		8,70,000	2,75,000

Additional Information:

- The bills accepted by S. Ltd. are all in favour of H. Ltd.
- The stock of H ltd. includes Rs. 25,000 bought from S Ltd. at a profit to latter of 20% of sales.
- All the profit of S Ltd. has been earned since the shares were acquired by H Ltd. but there was already the reserve of Rs. 40,000 at that date.

2. The Following Balance Sheets are presented to you as on 31st March, 2018.

	H. Ltd. Rs.	S. Ltd. Rs.		H. Ltd. Rs.	S. Ltd. Rs.
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Share Capital: Shares of Rs. 100 each	5,00,000	2,00,000	Fixed Assets	3,50,000	1,50,000
General Reserve	1,00,000		Stock	90,000	40,000
Profit & Loss A/c	80,000	1,00,000	Debtors	60,000	30,000
6% Debenture		45,000	6% Debentures in S Ltd. at per	60,000	
Trade Creditors	75,000		Shares in S Ltd. 1500 @ Rs. 80	1,20,000	
			Bank	75,000	25,000
			Profit & Loss A/c		1,00,000
	7,55,000	3,45,000		7,55,000	3,45,000

H Ltd. acquired the shares August 1, 1998. The profit & Loss Account of S Ltd. showed a debit balance of Rs. 1,50,000 on April 1, 1998. During June, 1998 goods costing Rs. 6,000 were destroyed by fire and insurer paid only Rs. 2,000. Trade creditors of S Ltd. include Rs. 20,000 for goods supplied by H Ltd. on which the later company made a profit of Rs. 2,000. Half of the goods were still in stock. Prepare the consolidated Balance Sheet.

3. The Balance Sheets of H Ltd. and S Ltd. on 31st March, 2018 were as follows:

Liabilities	H. Ltd. Rs.	S. Ltd. Rs.	Assets	H. Ltd. Rs.	S. Ltd. Rs.
Share Capital: 10% Preference Shares of Rs. 100 each		1,00,000	Land & Building at Cost	3,10,000	1,60,000
Equity shares of Rs. 100 each		4,00,000	Machinery less 10% Depreciation	2,70,000	1,35,000
General Reserve		50,000	3,000 Shares in S Ltd.	4,50,000	
Profit & Loss A/c	10,00,000		Stock at cost	2,20,000	
Balance on 1-4-1998	1,00,000	30,000	Sundry Debtors	1,55,000	1,50,000
Profit for 1998-99		80,000	Cash & Bank		90,000
Creditors	40,000	70,000	Balance	85,000	
	2,00,000				1,95,000
	1,50,000				
	14,90,000	7,30,000		14,90,000	7,30,000

H ltd. acquired 3,000 Equity Shares in S Ltd. on 1st October 2017. As on the date of acquisition. H Ltd. found that the value of land and buildings and machinery of S Ltd. should be Rs. 1,50,000 and Rs. 1,92,500 respectively.

Prepare the consolidated Balance Sheet of H ltd. and its subsidiary S Ltd. as on 31st March, 2018 taking into consideration the fact that assets are to be taken at their proper value.

4. Prepare consolidated Balance Sheet in the books of H Co. Ltd. from the following Balance Sheets of H Co. and S Co. and given information:

Balance Sheets as on 31st March, 2018

Liabilities	H. Co. Rs.	S. Co. Rs.	Assets	H Co. Rs.	S Co. RS.
Preference Share Capital	1,00,000	40,000	Goodwill	20,000	10,000
Equity Share Capital (Rs. 100 per share)	11,00,000	2,00,000	Machinery	6,00,000	1,80,000
Reserves	4,00,000	1,50,000	Furniture	1,00,000	34,000
Profit & Loss A/c	2,00,000	50,000	Investments 1,6000 shares in S Co.	3,20,000	
Creditors	3,00,000	1,00,000	Other Assets	10,60,000	3,46,000
Proposed Dividend	—	40,000	Discount on issue of shares		10,000
				—	
	21,00,000	5,80,000		21,00,00	5,80,000

Information's:

- On the date of acquisition of shares by H Co., Reserves and Profits and Loss Account of S. Company stood at Rs. 50,000 and Rs. 30,0000 respectively.
- Machinery (Book value Rs. 2,00,000) of S Co. was revalued at Rs. 3,00,000 by H Co.
- Furniture (Book value RS. 40,000) of S Co. was revalued at Rs. 30,00 by H Co.
- S Co. made a bonus issue during the year out of pre-acquisition profits for Rs. 40,000 not recorded in books.
- Included in the Creditors of S Co. is Rs. 20,000 for goods supplied by H Co. Also included in the stock of S ltd. are goods to the value of Rs. 8,000 which were supplied by H Co. at a profit of 25% on sales.

5. H Ltd. acquitted 20,000, (i.e., 4%) equity shares of S ltd. of RS. 100 each on 31st March 1995. The summarized Balance Sheets of H Ltd. and S. Ltd. as 31st March 2018 were as follows:

Balance Sheet

Liabilities	H. Ltd. Rs.	S. Ltd. Rs.	Assets	H. ltd. Rs.	S. ltd. Rs.
Share Capital in shares of Rs. 100 each	80,00,000	25,00,000	Fixed Assets	70,00,000	25,00,000
Reserves	30,00,000	5,00,000	Current Assets	40,00,000	20,00,000
Profit & Loss A/c	10,00,000	10,00,00	20,000 shares in S Ltd.	30,00,000	
Creditors	20,00,000	5,00,000			
	1,40,000	45,00,000		1,40,000	45,00,000

S Ltd. had the credit balance of Rs. 5,00,000 in the reserves and Rs. 2,00,000 in the Profit and Loss Account when H Ltd. acquired the shares in S Ltd. S Ltd. issued bonus shares @ 1 for every 5 out of post-acquisition profits. Calculate cost of control before and after issue of bonus share. Prepare consolidated Balance Sheet.

6. On April 1, 2018 S Ltd. issued 10% Preference Shares of Rs. 1,00,000 at par. On this date, S Ltd.'s General Reserve and profit and Loss Account showed balance of Rs. 80,000 and Rs. 50,000 respectively. On July 5, 2018 S Ltd. paid a final dividend of 12% on equity shares for the year ended 31st March, 2018.

On April 1, 2018 H Ltd. acquired 80% equity shares in S Ltd. for RS. 3,00,000. On this date machinery of S ltd. was revalued at Rs. 2,50,000. No entry for this was made in the books of S Ltd.

7. On March 31, 2018, the summarized balance sheets of H Ltd. and its subsidiary S Ltd. stood as follows:

Liabilities	H Ltd. Rs.	S. Ltd. RS.	Assets	H Ltd. Rs.	S Ltd. Rs.
Equity Share Capital	8,00,000	3,00,000	Machinery	6,25,000	2,70,000
10% Preference Share Capital	—	1,00,000	Furniture	85,000	50,000
General Reserve	4,00,000	1,50,000	Shares in S ltd.	3,00,000	—
Profit and Loss	2,00,000	90,000	Stock	4,00,000	1,90,000
Loans	1,10,000	—	Loan to H Ltd.	—	10,000
Creditors	1,70,000	76,000	Debtors	1,50,000	80,000
Bill Payable	—	4,000	Bank	1,20,000	1,10,000
			Preliminary expenses	—	10,000
	16,80,000	7,20,00		16,80,000	7,20,00

The following further information is furnished:

- S ltd. provides depreciation on Machinery @ 10% on written down value. No machine was sold or purchased during the year.
- H Ltd. Made payment by a cheque of Rs. 10,000 to S Ltd. on 27th March, 2018 for repayment of loan which was received by S Ltd. in April 2018.
- No part of preliminary expenses was written off during the year.

Prepare consolidated Balance Sheet of H Ltd. and S Ltd. as at 31st March, 2018.

8. The Balance Sheets of H Co, and S. Co. as on 31st March, 2018 are as follows:

Liabilities	H. Co. Rs.	S. Co. Rs.	Assets	H. Co. Rs.	S. Co. Rs.
Preference Share Capital	3,00,000	40,000	Goodwill	70,000	60,000
Equity Share Capital of Rs. 100 each	9,00,000	4,00,000	Land & Buildings	6,00,000	2,60,000
General Reserve as on 1-4-2017	2,00,000	1,20,000	Plant & Machinery	3,30,000	1,80,000
P & L Account	2,80,000	1,80,000	Investments: 3,000 shares in S. Co. (on 30-9-2017)	4,80,000	---
Creditors	1,60,000	1,00,000	Debtors	40,000	1,50,000
Bills Payable	—	40,000	Stocks	2,00,000	1,80,000
			Cash	1,20,000	40,000
			Preliminary Expenses	—	10,000

	18,40,000	8,80,000		18,40,000	8,80,000
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Information's:

- i) A dividend of 15% was paid by S. Co. in October, 2017 for the year ended 31st March, 2017.
- ii) Plant & Machinery of Rs. Co. in the beginning was RS. 2,00,000. H. Co. revalued it by Rs. 1,10,000 more at the time of purchase of shares.
- iii) There was a bonus issue of Rs. 40,000 out of post acquisition profits by S. Co.
- iv) Credit balance of P & L A/c of S. Co. on 1st April, 2017 was Rs. 1,00,000.
- v) Included in creditors of S. Co. are Rs. 40,000 for goods supplied by H Co. Also included in stocks of S. Co. are goods to the value of Rs. 16,000 which were supplied by H Co. at profit of 25% on sales.

Prepare Consolidated Balance Sheet giving working notes.

9. A Ltd. holds 80% of the equity share capital of B Ltd. which was acquired on 31st March, 2017 when the latter company had a credit balance in Profit and Loss Account of Rs. 15,000 and General Reserve of Rs. 20,000. Stock held by A Ltd. includes Rs. 5,000 for goods supplied by B Ltd. at a profit of 20% on selling price. From the following balance sheets, prepare a consolidated balance sheet at 31st March, 2019:

Liabilities	A Ltd. Rs.	B Ltd. Rs.	Assets	A Ltd. Rs.	B Ltd. Rs.
Share capital:					
Equity Shares of Rs. 10 each	5,00,000	1,00,000	Freehold Properties	2,30,000	20,000
Capital Reserve	1,00,000	—	Furniture	15,000	3,000
General Reserve	1,20,000	30,000	Investments 8,000 shares of B Ltd.	1,20,000	—
Profit & Loss A/c	40,000	10,000	Stocks	4,14,000	1,23,000
Creditors	1,49,700	36,000	Debtors	87,000	37,400
Bills Payable	21,300	1,000	Cash	64,000	—
Bank Overdraft		6,400			
	<u>9,31,000</u>	<u>1,83,400</u>		<u>9,31,000</u>	<u>1,83,400</u>

10. Major Ltd. acquired 80% of the shares of Minor Ltd. On 1st January, 2018 at a total cost of Rs. 4,25,000. The Balance Sheets of the two companies as on 31st December, 2018 are given below:

Balance Sheets as at 31st December, 2018

Liabilities	Major Ltd. Rs.	Minor Ltd. Rs.	Assets	Major Ltd. Rs.	Minor Ltd. Rs.
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Share Capital: Equity Shares of Rs. 10 each	5,00,000	2,50,000	Land & Building	4,65,000	1,85,000
Preference Shares of Rs. 10 each	2,00,000	—	Plant & Machinery	1,50,000	1,09,000
General Reserve	3,50,000	15,000	Stock	1,55,000	70,800
Profit & Loss Account	3,00,000	1,50,000	Investments	4,25,000	
Sundry Creditors	70,000	65,000	Debtors	1,20,000	62,700
			Cash at Bank	1,05,000	52,500
	14,20,000	4,80,000		14,20,000	4,80,000

The following further information is relevant:

- Sundry Creditors in Major Ltd., include Rs. 20,000 for goods purchased from Minor Ltd., on which the subsidiary company made a profit of RS. 5,000.
- Half of the goods sold as above were still included in the stock of Major Ltd.
- The general Reserve of Minor Ltd., represents the balance as on 1st January 1998. Profit & Loss Account balance on 1st January, 2018 was Rs. 50,000 out of which dividend @ 10% was paid for the year 2017.

You are required to prepare the Consolidated Balance Sheet of Major Ltd., and Minor Ltd.

10. The Balance Sheets of H Ltd. and S Ltd. on 31st March, 2018 were as follows:

Balance Sheet of H Ltd.

Liabilities	Rs.	Assets	Rs.
Share Capital:		Fixed Assets	3,80,000
Authorized : 40,000 Shares of Rs. 10 each	4,00,000	Stock	40,000
Issued and Subscribed 40,000 Shares of Rs. 10 each, fully paid	4,00,000	Sundry Debtors	40,000
General Reserve	80,000	Investments:	
Profit and Loss Account	1,40,000	8,000 Shares in S ltd. at cost	1,60,000
Sundry Creditors	60,000	Cash at Bank	60,000
	6,80,000		6,80,000

Balance Sheet of S Ltd.

Liabilities	Rs.	Assets	Rs.
-------------	-----	--------	-----

Share Capital: Authorized: 40,000 Shares of Rs. 10 each	1,00,000	Fixed Assets	2,00,000
Issued and Subscribed: 40,000 Shares of Rs. 10 each, fully paid	1,00,000	Stock	25,000
General Reserve	40,000	Sundry Debtors	50,000
Profit and Loss Account	60,000	Cash at Bank	15,000
Sundry Creditors	90,000		
	<u>2,90,000</u>		<u>2,90,000</u>

H Ltd. acquired the shares on 1st October, 2018. The Profit and Loss Account of S Ltd. showed a credit balance of Rs. 20,000 on 1st April, 2018. The debtors of H Ltd. include Rs. 10,000 due from S Ltd. Prepare a consolidated Balance Sheet as on 31st March, 2019.

UNIT V

1. Balance sheet for a partnership firm as on 1st April, 2017 and profit and loss statement for the year ending March 2018 are given below.

Balance sheet as on 1.4.2017

Liabilities	Rs.	Assets	Rs.
Capital	4,00,000	Plant & Machinery	3,00,000
13% Loan	1,00,000	Furniture and Fixtures	40,000
Current Liabilities	50,000	Inventory	60,000
		Debtors	50,000
		Cash	1,00,000
	<u>5,50,000</u>		<u>5,50,000</u>

Profit and Loss statement for the year ending 31st March 2018

Sales		10,00,000
Less: Cost of goods sold: Opening Inventory	60,000	
Add: Purchases	7,10,000	
	7,70,000	
Less: Closing Inventory	70,000	7,00,000
Gross Profit		3,00,000
Less: Operating Expenses	1,51,000	
Interest on Loan	13,000	2,13,000
Depreciation on Machinery	45,000	87,000
Depreciation on Furniture	4,000	
Net Profit		

Debtors and Current Liabilities balances remained constant throughout the year.

Interest on debentures was paid on 31.03.2018.

The general price index was as follows:

On April 1, 2017: 300; Average for the year: 320; On March 31, 2018: 360

You are required to prepare the financial statements for the year 2017-2018 after adjusting for price level changes under current purchasing power method.

2. A firm purchased a machinery for a sum of Rs.2 lakhs on January 1, 2008. It has an expected life of 10 years without any scrap value. The price indices for the asset were as follows,

January 1, 2008	100
January 1, 2011	160
December 31, 2011	175

You are required to value the machinery on January 1, 2011 and December 31, 2011, both according to historical cost accounting system and current cost accounting system, charging depreciation on straight line basis. Also, find the amount which needs to be adjusted for appreciation during 2011.

3. From the following information, calculate the cost of sales under Historical and Current Cost Accounting system.

Particulars	Rs.
Opening stock of raw materials on 1-1-2011	8,000
Purchased during the year 2011	Nil
Materials consumed during 2011	160 tonnes
Price of raw material on 1-1-2011	50 per tonne
Average price during 2011	60 per tonne
Price of raw materials on 31-12-2011	70 per tonne

4. From the following information, as per historical cost accounting method, compute the Monetary Working capital adjustment under current cost accounting method:]

Particulars	Jan 1, 2011	Dec 31, 2011
Accounts Receivable	7,000	12,600
Accounts Payable	3,850	6,440
Monetary Working Capital	3,150	6,160
Price index for materials	200	230
Price index for finished goods	150	180

(Note: Index of correct value be modified)

5. From the data below, calculate the gearing adjustment required under Current Cost Accounting Method.

Particulars	Opening	Closing
Convertible debentures	200	240
Bank overdraft	120	160
Cash	20	60
Paid up share capital	300	400
Reserves	100	160

Particulars	Rs.
Cost of sales adjustment	40
Monetary Working Capital Requirement	30

Depreciation adjustment	10
Total of adjustments	80

6. Following data relate to Gearing Ltd:

(i) Particulars	Rs. '000	
	Beginning of the year	End of the year
Net Long Term Borrowings	14,000	14,000
Creditors	4,000	2,800
Bank overdraft	5,000	5,600
Taxation	1,500	1,400
Cash	(5,000)	(8,400)
Net Borrowings	19,500	15,400
(ii) Share Capital & Reserves from Current cost balance sheet	37,080	47,056
Proposed dividend	500	600
Total Shareholders' interest	37,580	47,656
(iii) Current cost adjustment		1,700
Depreciation		1,800
Fixed Assets Disposal		1,620
Cost of sales adjustment		1,120
Monetary Working Capital Adjustment		6,240

Find out:

(i) Gearing Adjustment Ratio

(ii) Current Cost Adjustment after Abating Gearing Adjustment.

7.(a) The current cost balance sheet of a company contained the following figures:

Particulars	Rs. '000
Current Assets:	
Bank and cash (not included in monetary working capital)	450
Current Liabilities:	
Creditors (Hire Purchase)	170
Taxation	210
Proposed dividends	250
Bank overdraft (not included in monetary working capital)	190
Net assets employed	3,540
Shareholders funds	2,680
Long Term Loans:	
Debentures	540
Deferred Liabilities:	
Deferred Taxation	320

Required: Calculate the current cost gearing proportion.

(b) The facts are exactly the same as (a) above and the current cost adjustments were:

Particulars	Rs.
Depreciation	870
Fixed Assets Disposals	80
Cost of sales	1,050
Monetary Working Capital	320

Required: Calculate the current cost gearing adjustment.

8. Explain under CCA method what is meant by,

(i) Cost of sales adjustment (ii) Monetary Working Capital Adjustment (iii) Gearing adjustment

9. What do you mean by inflation accounting? Give its advantages and disadvantages.

10. Discuss the methods which can be adopted to adjust price level changes, while determining income.

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI
QUESTION BANK

II M.Com

Core-2 Human Resource Management

Sub.Code: 21PCOC32

III Semester – November 2022

(for those who joined in July 2021 and after)

Time: 3 hours

Max: 75 marks

Section A (1 mark)

Choose the best answer

UNIT – I

- Human resources mean the _____.
a. **people** b. place c. material d. machine
- HRM is the process of making efficient and effective use of _____ resources.
a. company b. **human** c. material d. future
- _____ is one of the important elements in the planning process.
a. Planning b. Organizing c. **Forecasting** d. Leading
- Planning is a process of determining the _____ goals.
a. personal b. physical c. mental d. **organizational**
- Organising involves giving each subordinate a _____ task.
a. **specific** b. general c. physical d. mental
- Staffing involves deciding what type of people should be _____.
a. recruited b. **hired** c. selected d. trained
- _____ is the process of activating group efforts to achieve the desired goals.
a. Distributing b. Diagnosing c. **Directing** d. Disgusting
- Controlling is the process of setting standards for _____.
a. perseverance b. publicity c. personality d. **performance**
- Personnel management is an _____ process.
a. **independent** b. dependent c. physical d. mental
- PM does not focus on _____ management.
a. Primary b. Human Resource c. **Strategic** d. None

UNIT – II

- HRP is a process of striking balance between human resources _____ & _____ in an organization.
a. **required & acquired** b. determine & acquired c. assigned & required d. available & acquired

12. HRP is a process by which an organization determines how it should _____ manpower.
 a. antire b. **acquire** c. aspire d. altire
13. Recruitment is the process of locating, _____ and attracting capable applicants.
 a. **identifying** b. proving c. checking d. verifying
14. _____ is the most widely used method for generating many applications.
 a. Journals b. Newspaper c. **Advertisement** d. Employment exchange
15. A _____ is a systematic procedure for comparing the behavior of two or more persons.
 a. sample b. **test** c. ability tests d. personality test
16. Recruitment for certain professionals and technical position is made through professional associations also called as _____ .
 a. raiding b. deputation c. **head hunters** d. poaching
17. _____ is the commonest device for getting information from a prospective candidate.
 a. **Application blank** b. Bio-graphical c. Work experience d. Salary
18. Deputation means sending an employee to organization for _____ duration.
 a. **short** b. long c. medium d. mental
19. _____ is hiring the best candidate from the pool of applications.
 a. **Selection** b. training c. evaluating d. mentoring
20. Selection _____ recruitment.
 a. endures b. **follows** c. substitutes d. replaces

UNIT-III

21. _____ may include initial assignment of job to new employee, on transfer, promotion or demotion of the present employee.
 a. **Placement** b. Induction c. Promotion d. Demotion
22. Induction is also known as _____
 a. Organizing fresher's welcome b. Administration c. Integration d. **Orientation**
23. _____ is the process of teaching the new and /or present employees the basic skills they need to effectively perform their jobs.
 a. **Training** b. Induction c. Placement d. None
24. Areas of training includes _____
 a. Knowledge b. Techniques c. **both a& b** d. All the above
25. _____ refers to the learning opportunities designed to help employees grow.
 a. Training b. **Development** c. Education d. All the above

26. Task analysis is also called _____
 a. job analysis **b. operational analysis** c. both a& b d. system analysis
27. Trainee is asked to try out the trainer's instruction is _____
 a. **Performance** b. presentation c. follow up d. preparation
28. How does training and development offer competitive advantage to an organisation?
a. Removing performance deficiencies b. Deficiency is caused by a lack of ability
 c. Individuals have the aptitude and motivation to learn d. None of the above
29. The following are the benefit of training.
 a. Increased productivity b. Reduced accidents c. Reduced supervision **d. All of the above**
30. _____ is widely used for human relations and leadership training
 a. Business games **b. Role playing** c. Case study method d. Job rotation

UNIT IV

31. _____ promotion is also an employee where he is assigned to a higher level without increase in pay.
 a. **Dry** b. Temporary c. Permanent d. Horizontal/ vertical
32. Promotion from present employees reduces the requirement for _____.
 a. expert b. job approval **c. job training** d. proving
33. _____ transfers are also known as job rotation.
 a. **Versatility** b. Demotion c. Promotion d. Transfer
34. Stagnation of skills decreases _____ and efficiency of the organisation.
 a. **productivity** b. collectivity c. re-productivity d. cost
35. _____ employees are not sure to get promotion.
 a. **Existing** b. Fresher c. Former d. Unskilled
36. Promotion is _____ movement of employee within the organization.
 a. **vertical** b. downward c. sideward d. middle
37. A transfer means lateral movement of employees within the _____ grade.
 a. single **b. same** c. double d. different
38. Demotion is the _____ movement of an employee in the organizational hierarchy.
 a. upward b. sideward **c. downward** d. middle
39. _____ means the service agreement of an employee with the organization comes to an end.
 a. Situation b. Transfer c. Placement **d. Separation**
40. Compensation is the _____ received by an employee in return for their contribution

to the organization.

- a. promotion b. **remuneration** c. demotion d. transfer

UNIT V

41. Performance appraisal is the systematic evaluation of individual _____ .
a. **performance** b. appearance c. knowledge d. training
42. Job evaluation means _____ a job before an employee is appointed.
a. identifying b. **rating** c. evaluating d. mentoring
43. Performance appraisal means rating a job _____.
a. applicant b. giver c. **holder** d. finder
44. Performance appraisal is conducted to determine the _____ needs of an employee.
a. manufacturing b. personal c. medical d. **training**
45. A formal system of assessing an employee's effectiveness and productivity is called what?
a. Productivity appraisal b. **Performance appraisal**
c. Developmental analysis d. Effectiveness assessment
46. Employee evaluation, performance evaluation, performance review and employee rating are all terms used to define
a. criterion appraisal b. employee development appraisal
c. **performance appraisal** d. subjective appraisal
47. Performance appraisals are basically used by organizations to
a. defining needed capabilities b. **administered wages and salaries**
c. recruiting employees d. fulfilling staffing needs
48. When ratings are collected from supervisors, customers and peers, it is called
a. 350-degree feedback b. 320-degree feedback
c. **360-degree feedback** d. 380-degree feedback
49. What is linked with performance appraisal?
a. Job Design b. Development c. Job analysis d. **None of the above**
50. Which of the following is an alternate term used for performance appraisal?
a. Quality and quantity of output b. Job knowledge c. **Employee assessment** d. None of the above

Section B

(2 Marks)

Answer in about 50 words

UNIT I

1. What is Human Resource Management?
2. What is the nature of HRM?
3. What is out sourcing?
4. What do you mean by Human Resource Policies?
5. What is a Harvard model?
6. What do you mean by a feedback loop?
7. What is Human Capital Management?
8. What is a societal objective?
9. What is a functional objective in HRM?
10. What are the personal objectives in HRM?

UNIT II

1. What is Human Resource planning?
2. What is Environmental Scanning?
3. What do you mean by Demand Forecasting?
4. What do you understand by Supply Forecast?
5. What is Human Resource Information system?
6. What is meant by Delphi Technique?
7. What is Ratio trend Analysis?
8. What are the various forecasting techniques?
9. What do you mean by Recruitment?
10. What is meant by Selection?
11. Give a note on Employee referrals?
12. Define graphology.
13. Define Halo effect.
14. What is placement?
15. What is Induction?
16. What is the purpose of orientation?

UNIT III

1. Define Training Development and Education.
2. What do you mean by Task Analysis?
3. What is man Analysis?

4. What do you mean by vestibule training?
5. What is On the job training?
6. What is transactional Analysis?
7. What do you understand by Sensitivity training?
8. What is Executive Development?
9. What are the two schools of thought in Organisation Development?
10. Define Organisation Development.
11. What is team Building?
12. What are the characteristics of Organisation Development?

UNIT IV

1. Define Motivation.
2. What do you mean by Need for Achievement?
3. What is Job – status based rewards?
4. What is Job Design?
5. What is Job satisfaction?
6. What is Ergonomics?
7. What is Job Rotation?
8. What is tele commuting?
9. What do you mean by Empowerment?
10. What are the conditions necessary for Empowerment?
11. Define Workers` participation in Management.
12. Give a note on Quality of work life.
13. Give a note on Career Management.

UNIT V

1. What is job Evaluation?
2. What are the objectives of job Evaluation?
3. What is performance appraisal?
4. What is check list method?
5. What do you mean by graphic rating scale method?
6. What is meant by potential appraisal?
7. Enumerate the objectives of potential evaluation.
8. What is career planning?
9. What is succession planning?
10. Enumerate the need for career planning.
11. Identify the five career anchors.
12. What is a grievance?
13. Define Industrial Disputes.

Section –C

(5 marks)

Answer in about 200 words.

UNIT I

1. What is HRM? What are its function and objectives.
2. Explain the importance of HRM.
3. Explain the managerial functions of HRM
4. Enumerate the various types of policies.
5. What are the characteristics of a sound Human Resource policy?
6. What are the various steps in formulating a Human Resource policy?
7. Explain the coverage of Human Resource policy.
8. Enumerate the administrative role of a HR Manager.
9. Enumerate the various advantages of HR policies.
10. Trace out the evolution of HRM.

UNIT II

1. Discuss the Various Barriers to Human Resource Planning.
2. What are the Requisites for successful Human Resource planning?
3. Discuss the Human Resource Supply forecast.
4. Explain Managerial succession planning.
5. Discuss the Retention plan to reduce avoidable separations.
6. Explain the purpose and importance of Recruiting.
7. Briefly explain the external and internal factors governing recruitment.
8. Give a note on internal recruitment.
9. Explain the external source of recruitment.
10. Explain the four possible outcomes of a selection decision.
11. What are the various Barriers to effective selection?
12. Enumerate the different tests administered in the selection process.
13. What is an Employment interview? Explain the various types.
14. What are the common interview problems?
15. Enumerate the Various steps to overcome the interview problems.
16. List out the objectives behind a physical test in the process of selection.
17. Enumerate the various Recruitment practices in India.
18. Give a note on Application blank.
19. What do you understand by placement? What are the various problems faced in this process?
20. What are the requisites of an effective induction programme?

UNIT III

1. Explain the need for training.
2. What are the various areas which need training?
3. "If you wish to plan for a year sow seeds, if you wish to plan for ten years plant trees, if you plan for life- time develop men"- Elucidate it from the point of view of training.
4. What are the three components in identifying a training need?
5. List out the various impediments to effective training.
6. Enumerate the point to be considered to make training effective.
7. Explain the process of Executive Development.
8. Explain the characteristics and objectives of Organisation Development
9. What are the salient issues in Organisation Development
10. What are the OD interventions that are targeted towards individuals?

UNIT IV

1. Enumerate the importance of motivation
2. Discuss MC Cleland's Need theory.
3. Evaluate Maslow's Need hierarchy Model.
4. Explain Vroom's Expectancy theory
5. Give a note on Porter and Lawler's Expectancy theory.
6. Discuss the non- monetary rewards.
7. Give a note on job satisfaction and Work Behaviour.
8. Explain Job Engineering.
9. Explain job Enlargement
10. What are some cautions to be considered about job Enrichment?
11. What are the Barriers to Empowerment?
12. Explain the approaches and dimensions of Employee Empowerment.
13. Explain the process to develop empowered teams.
14. What is WPM? What are its objectives?
15. Discuss the levels of WPM.
16. Give a note on Quality of work life
17. Explain Career Development cycle
18. Explain the measures to be taken to make incentives and benefits more effective.
19. Explain the Occupational Hazards and Diseases.
20. What are the various causes of Accidents?
21. What is the Significance of Industrial Safety?
22. Explain the Safety Measures or programmes.

UNIT V

1. Explain the procedure of Job Evaluation.
2. Explain the process of performance Appraisal.
3. What are the approaches to performance appraisal?
4. Discuss Management by Objectives
5. Enumerate the problems in Performance Appraisal.
6. Discuss the measures to be taken for making Performance Appraisal more effective.
7. Explain the career stages.
8. Discuss the career planning process.
9. Give a note on a Model Grievance Procedure.
10. Explain the Legislative enactments that deal with the redressal of employees.
11. What are the essential of a sound Grievance Procedure?
12. Explain the types of Industrial Disputes.
13. What are the preventive measures to be taken for preventing Industrial Disputes?

Section –D

(10 marks)

Answer in about 400 words

UNIT I

1. Briefly give a note on the functions of HRM.
2. Explain the various operative function of HRM.
3. Enumerate the advantages and obstacles of Human Resource Policies.
4. What are the qualities and qualification of a Human Resource Manager?
5. Explain the role of a Human Resource Manager.
6. Enumerate the various HRM Modals.
7. Differentiate HRM from Personnel Management.
8. Explain the nature and objectives of HRM.
9. Enumerate the principles guiding the formulation of HR Policies.
10. Discuss the environment of HRM.

UNIT II

1. Explain the importance of Human Resource planning.
2. Enumerate the factors affecting HRP.
3. Briefly explain the various forecasting techniques.
4. Explain the various steps in implementing HRIS.
5. Briefly explain the recruitment process.

6. Explain the various methods of recruitment.
7. Briefly explain the selections process.
8. Enumerate the common problems faced in the process of interview. List out the various steps to overcome them.
9. What are the various problems of orientation or induction? Enumerate the requisites of an effective programme.
10. Explain in detail the induction programme.

UNIT III

1. Explain the need and importance of training.
2. Briefly explain the steps in training programme.
3. Explain the various methods of training.
4. What are the impediment to effective training List out the ingredients to make training effective .
5. Explain the various techniques of executive development.
6. Explain the objectives of executive Development.
7. Explain the different models of Organisation Development.
8. Discuss some of the techniques of Organisation Development interventions.
9. Explain the various benefits of Employee training.
10. Explain the various types of training.

UNIT IV

1. Discuss Maslows Need Hierarchy theory.
2. Discuss MC Gregor`s participation theory.
3. Explain the Determinants of Reward.
4. Explain the Determinants of job satisfaction.
5. Briefly give a note on the Theories of job satisfaction.
6. What is job Enrichment? Explain in detail its characteristics.
7. Explain Quality Circles.
8. Discuss the forms of HRM.
9. Review the Scheme of Workers participation in management in India and outline the pre conditions for their success.
- 10 Enumerate the nature and objectives of compensation planning.
11. Explain various types of incentive schemes.
12. Explain the various types of benefit.
13. Discuss the statutory provisions concerning Health.
14. Explain briefly the statutory provisions for Industrial safety in India.

UNIT V

1. Enumerate the advantages and disadvantages of Job Evaluation.
2. Explain briefly the methods of Job Evaluation Programme.

3. What are the essentials of a Job Evaluation Programme?
4. Explain the Traditional methods of Performance Appraisal.
5. Discuss the problems in performance Appraisal.
6. What are the problems in Performance Appraisals? Discuss the measures to be taken for making Performance Appraisals more effective.
7. Explain in detail the procedure for redressing the grievance.
8. What is a grievance? What are the causes or sources of grievances?
9. Discuss the forms of Industrials disputes.
10. List out and discuss the causes of Industrial Dispute.
11. Explain the machinery available for resolving Industrial Disputes under the Industrial Disputes Act 1947.

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI.
QUESTION BANK
II M.Com

Core 3 -XIII

E-Commerce

Sub. Code : 21PCOC33

Semester III - November 2021

(for those who joined in July 2019 and after)

Time : 3 hours

Max. Marks : 100

Section A

Choose the correct answer :

Unit I

1. Which of the following describes e-commerce?
 - a. **Doing business electronically**
 - b. Doing business
 - c. Sale of goods
 - d. All of the above
2. Which of the following is part of the four main types for e-commerce?
 - a. B2B
 - b. B2C
 - c. C2B
 - d. **All of the above**
3. Which segment do eBay, Amazon.com belong?
 - a. B2Bs
 - b. **B2Cs**
 - c. C2Bs
 - d. C2Cs
4. Which type of e-commerce focuses on consumers dealing with each other?
 - a. B2B
 - b. B2C
 - c. C2B
 - d. **C2C**
5. Which segment is eBay an example?
 - a. B2B
 - b. C2B
 - c. C2C
 - d. **B2C**
6. Which type deals with auction?
 - a. B2B
 - b. B2C
 - c. C2B
 - d. **C2C**

7. In which website Global Easy Buy is facilitated?
- a. **Ebay.com**
 - b. Amazon.com
 - c. Yepme.com
 - d. None of these
8. The best products to sell in B2C e-commerce are:
- a. Small products
 - b. **Digital products**
 - c. Specialty products
 - d. Fresh products
9. Which products are people most likely to be more uncomfortable buying on the Internet?
- a. Books
 - b. **Furniture**
 - c. Movies
 - d. All of the above
10. Digital products are best suited for B2C e-commerce because they:
- a. Are commodity like products
 - b. Can be mass-customized and personalized
 - c. Can be delivered at the time of purchase
 - d. **All of the above**

Unit- II

1. EDI standard

- a) is not easily available
- b) defines several hundred transaction sets for various business forms
- c) is not popular
- d) **defines only a transmission protocol**

2. A digital signature is

- a. a bit string giving identity of a correspondent
- b. **a unique identification of a sender**
- c. an authentication of an electronic record by tying it uniquely to a key only a sender knows
- d. an encrypted signature of a sender

3. The Secure Electronic Transaction protocol is used for

- a. credit card payment
- b. cheque payment
- c. **electronic cash payments**
- d. payment of small amounts for internet services

4. EDI use
- requires an extranet
 - requires value added network
 - can be done on internet
 - requires a corporate intranet
5. The solution of business needs is _____
- EDI
 - ERP**
 - SAP
 - SCM
6. All of the following are techniques B2C e-commerce companies use to attract customers, except:
- Registering with search engines
 - Viral marketing
 - Online ads
 - Virtual marketing**
7. Which is a function of E-commerce
- marketing
 - advertising
 - warehousing
 - all of the above**
8. Which is not a function of E-commerce
- marketing
 - advertising
 - warehousing**
 - none of the above
9. The threat of new entrants in e-commerce is high when it is:
- Hard for customers to enter the market
 - Hard for competitors to enter the market
 - Easy for competitors to enter the market**
 - Easy for customers to enter the market
10. What is the name for direct computer-to-computer transfer of transaction information contained in standard business documents?
- internet commerce
 - e-commerce
 - transaction information transfer
 - electronic data interchange**

Unit-III

1. In electronic cheque payments developed, it is assumed that most of the transactions will be
 - a. customers to customers
 - b. customers to business**
 - c. business to business
 - d. banks to banks
2. In Electronic cash payment
 - a. a debit card payment system is used
 - b. a customer buys several electronic coins which are digitally signed by coin issuing bank
 - c. a credit card payment system is used
 - d. RSA cryptography is used in the transactions**
3. Digital Cash has following characteristic
 - a. Anonymity
 - b. Security
 - c. Confidentiality
 - d. All of Above**
4. Which of the following is an internet-based company that makes it easy for one person to pay another over the internet:
 - a. Electronic Check
 - b. Electronic bill presentment and payment
 - c. Conversion rates
 - d. Financial cybermediary**
5. What are plastic cards the size of a credit card that contains an embedded chip on which digital information can be stored?
 - a. Customer relationship management systems cards
 - b. E-government identity cards
 - c. FEDI cards
 - d. Smart cards**
6. Which of the following is a method of transferring money from one person's account to another?
 - a. electronic check**
 - b. credit card
 - c. e-transfer
 - d. none of the above
7. An electronic check is one form of what?
 - a. e-commerce
 - b. online banking
 - c. e-cash**
 - d. check

8. If you need to transfer money to another person via the internet, which of the following methods could you use?
- a. financial cybermediary
 - b. electronic check
 - c. electronic bill presentment and payment
 - d. **all of the above**
9. Which of the following permits the transmission of a bill, along with payment of that bill, to be conducted over the Internet?
- a. financial cybermediary
 - b. electronic check
 - c. **electronic bill presentment and payment**
 - d. all of the above
10. A combination of software and information designed to provide security and information for payment is called a what?
- a. **digital wallet**
 - b. pop up ad
 - c. shopping cart
 - d. encryption

Unit IV

1. Which of the following model is part of E-Governance:
- a. G2B
 - b. G2C
 - c. **B2G**
 - d. C2G
2. The term Internet is the assemblage of two words;
- (a) **Inter connection & Network**
 - (b) Intercontinental & Network
 - (c) Interface & Network
 - (d) None of above
3. To have an internet connection one needs to have following arrangements;
- (a) Modem
 - (b) Telephone or TV
 - (c) Computer & ISP connection
 - (d) **All of above**
4. The term ISP is the abbreviation of the full phrase;
- (a) Inter state policy
 - (b) Incoming state policy
 - (c) **Internet service provider**
 - (d) None

5. Which of the following term refers to cyber crime?
- (a) Home maker
 - (b) Hacker**
 - (c) Holiday
 - (d) House keeping
6. When a person's computer is broken into to access personal information is called;
- (a) Hacking**
 - (b) Theft
 - (c) Stalking
 - (d) None
7. Cyber crime is widely categorized into ;
- (a) Individual
 - (b) Property
 - (c) Government
 - (d) All of these**
8. Which of the following terms as prevention measures for cyber crime;
- (a) Avoid disclosing personal information
 - (b) Avoid sending photograph to strangers
 - (c) Avoid sending credit card numbers
 - (d) All of above**
9. Today we can use internet for following services;
- (a) Read Newspaper
 - (b) View TV
 - (c) Send pictures
 - (d) All of these**
10. In _____ Tim Berrers Lee invented World Wide Web.
- (a) 1979
 - (b) 1989**
 - (c) 1999
 - (d) 1969

Unit V

1. A firewall is a
- a. wall built to prevent fires from damaging a corporate intranet
 - b. security device deployed at the boundary of a company to prevent unauthorized physical access
 - c. security device deployed at the boundary of a corporate intranet to protect it from unauthorized access**
 - d. device to prevent all accesses from the internet to the corporate intranet

2. Encryption can be done
 - a. only on textual data
 - b. only on ASCII coded data
 - c. on any bit string
 - d. only on mnemonic data
3. SET protocol on internet stands for:
 - a. Secure Electronic Transaction**
 - b. Secure Internet Transaction
 - c. Secure Establish Transaction
 - d. Secure Electronic Transmission
4. Who breaks into other people's computer system and steals and destroys information:
 - a. Hackers**
 - b. Software
 - c. Hacktivists
 - d. Script Kiddies
5. Which process is used to re install data from a copy when the original data has been lost
 - a. Backup
 - b. Recovery**
 - c. Bench marking
 - d. Data cleansing
6. What is the percentage of customers who visit a website and actually buy something:
 - a. Affiliate Program
 - b. Click-through
 - c. Spam
 - d. Conversion rate**
7. What floods a website with so many request for service that it slows down or crashes:
 - a. Computer virus
 - b. Worm
 - c. Denial of service attack**
 - d. None of above
8. Which of the following is a useful security mechanism when considering business strategy IT?
 - a. encryption
 - b. decryption
 - c. firewall
 - d. all the above**
9. Which of the following is not related to security mechanism
 - a. encryption
 - b. decryption
 - c. e-cash**
 - d. all the above

10. Public key encryption uses multiple keys. One key is used to encrypt data, while another is used to decrypt data. The key used to encrypt data is called the __key, while the key used to decrypt data is called the _____key.

- a. encryption, decryption
- b. private, public
- c. encryption, public
- d. public, private**

Section B (Two Marks)

Unit 1

1. What is E-Commerce?
2. What do you mean by e-business?
3. Define E-Commerce.
4. What is B2C business?
5. What is point of sale?
6. What is telemarketing
7. What is M-Commerce?
8. What is supply chain management?
9. What is B2B business?
10. What is teleshopping?

Unit 2

11. What is e-trading?
12. What do you mean by e-business?
13. List out the usage of e-market..
14. Define EDI.
15. What is EDI security?
16. List out EDI standards.
17. What is credit transaction trade cycle?
18. What is inter-organisational transactions?
19. Define e-markets.
20. List out few examples of e-markets.

Unit 3

1. Define e-cash.
2. Write about smart cards.
3. List out the types of e-payment systems.
4. What is the difference between debit and credit card?
5. What do you mean by e-payment system?
6. Define e-purses.

7. What is e-cheques?
8. What is digital wallet?
9. List out the ways to secure e-payments.
10. List out the features of e-payment systems.

Unit 4

1. What is internet?
2. What is internet governance?
3. Define e-governance.
4. Comment on WWW.
5. What is e-sourcing?
6. What is intranet?
7. What is e-trading?
8. What do you mean by e-advertisements?
9. Define internet marketing.
10. What is internet banking?

Unit 5

1. What do you mean by cyber crimes?
2. Define deception.
3. What is intrusion?
4. What is bug?
5. What is cryptography?
6. Brief about Secure Socket Layer (SSL).
7. What is firewall?
8. What is a cyber law?
9. What is digital signature?
10. What is Secure Electronic Transaction?

Section C (6 Marks)

Answer in about 200 words:

Unit I

1. Difference between e-commerce and traditional commerce
2. Describe the channels of e-commerce.
3. Explain the concept of e-commerce.
4. Discuss the media convergence in e-commerce.
5. Discuss the channels of e-commerce.
6. What are the needs for ecommerce?
7. List out the features of e-commerce.

8. Write down the features of e-business.
9. List out the features of M-Commerce.
10. List out the significance of supply chain management in e-commerce.

Unit II

1. Write about Credit Transaction Trade Cycle.
2. Discuss the EDI benefits and implementations.
3. Discuss about e-markets.
4. Discuss the usage of e-markets.
5. Explain the role of e-markets in e-commerce.
6. What is EDI? Discuss the impact of e-markets.
7. Define EDI. List out the benefits of EDI.
8. Describe the EDI technology in e-commerce.
9. Describe the EDI communication in e-commerce.
10. Describe the EDI agreement in e-commerce.

Unit III

1. Draft the components of an effective electronic payment system.
2. Summarise the special features required in payment systems for e-commerce.
3. What are the special features required in e-cash?
4. List out the special features of e-purses.
5. List out the special features of smart cards.
6. Describe the business issues in e-commerce.
7. Discuss the risk management options in e-payment systems.
8. Describe the operational credit of e-payment systems.
9. Explain the e-currency in payment system.
10. What are the special features required for credit cards?

Unit IV

1. Brief the evolution of internet.
2. Illustrate the role of Advertising in Internet.
3. Illustrate the role of Marketing in Internet.
4. Discuss the advantages in internet banking.
5. Discuss the disadvantages in internet banking.
6. Discuss about internet portals.
7. Discuss about e-sourcing.
8. Discuss about internet governance.
9. Describe about World Wide Web.
10. Discuss about e-sourcing.

Unit V

1. Narrate the security issues in e-commerce.
2. List down the advantages of Secure Electronic Transaction (SET).
3. Discuss the areas of internet security.
4. Write about deception and intrusion.
5. Write about the salient provisions in cyber laws.
6. Write short notes encryption and cryptography.
7. Draft about Digital signature.
8. Discuss about e-commerce security solutions.
9. Discuss about Security Precautions in e-Commerce.
10. Draft about Corporate Digital Library

Section D (3 x 12 = 36)

Answer in about 500 words each:

Unit 1

1. Discuss the business models in e-commerce.
2. Describe the advantages and disadvantages of e-commerce.
3. Discuss the business application of e-commerce.
4. Comment on e-commerce as an electronic trading system.
5. Draft the infrastructure of e-commerce.
6. Discuss the role of supply chain management in e-commerce.
7. Describe the advantages and disadvantages of m-commerce.
8. Explain the role of teleshopping in e-commerce business.
9. Explain the role of telemarketing in e-commerce business.
10. Explain the role of point of sale system in e-commerce business.

Unit 2

1. Discuss about the e-markets suitable for Indian Scenario.
2. Describe the advantages of e-markets.
3. Describe the disadvantages of e-markets.
4. Comment on the future of e-markets in India.
5. Explain the role of EDI standards in e-markets.
6. Explain the role of EDI implementation in e-markets.
7. Explain the role of EDI security in e-markets.
8. Draft about the credit transaction trade cycle.
9. Discuss on Inter-organisational Transactions.
10. Discuss the updated EDI technology for the implementation of e-commerce.

Unit-3

1. Explain the types of e-payment systems.
2. Describe the role of e-payment systems in e-commerce.
3. Describe the role of e-cheque in e-commerce.
4. Describe the role of e-cash in e-commerce in business.
5. Discuss the advantages and disadvantages about credit cards.
6. Discuss the advantages and disadvantages of smart cards.
7. Discuss the advantages and disadvantages of debit cards.
8. Describe the role of e-payment system in e-commerce in business.
9. Describe the legal risks of e-payment systems.
10. Describe the Risk management options in e-payment systems.

Unit-4

1. Enumerate the dynamics of internet banking.
2. Describe the growth of internet.
3. Discuss the gateway to digital world.
4. Discuss the role of internet portals in e-commerce.
5. Describe the impact of Advertising and Marketing through Internet.
6. Describe the e-trading.
7. Describe the advantages and disadvantages of internet.
8. Describe the advantages and disadvantages of e-sourcing.
9. Describe the advantages and disadvantages of e-trading.
10. Describe the advantages and disadvantages of e-governance.

Unit -5

1. Comment on Cyber Law in India.
2. Discuss about the cyber crimes.
3. Describe the need of security in e-commerce.
4. Explain the advantages of SET.
5. Discuss the Regulatory and legal Framework of e-commerce.
6. Narrate the limitations of cyber laws in India.
7. Describe the role of firewalls in e-commerce.
8. Discuss about Secure Socket Layer (SSL).
9. Discuss about Secure Electronic Transaction (SET).
10. Discuss about Security Precautions in e-Commerce.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI
QUESTION BANK

M.Com.

Core IV

International Business

Sub.code: 21PCOC34

Semester III

(For those who joined in July 2021 and after)

Time: 3 hours

Max.marks :100

Section A

1 Mark

Unit I

1. The term international business has emerged from the term-----
 - a) export marketing
 - b) International marketing
 - c) **both**
 - d) none
- 2.The companies extended the operations beyond trade is -----
 - a) International marketing to international trade
 - b) **international trade to international marketing**
 - c) international trade to international business
 - d) international business to international trade
- 3.International trader is in a position to ----- the global social, technical, economic, political, & natural environment factors more clearly.
 - a) **Analyse& interpret**
 - b) Identify
 - c) Classify
 - d) Specify
- 4.The international business need ----- to make an appropriate decision.
 - a) Accurate information
 - b) Timely information
 - c) **Both**
 - d) none
- 5.The size of international business should be large in order to impact on the -----
 - a) **Foreign economies**
 - b) Market
 - c) Customers
 - d) None
- 6.Most of international business houses segment their market based on the -----
 - a) **Geographical market segmentation**
 - b) Local area
 - c) Domestic market
 - d) Foreign market

7.----- involves international marketing, international investment, management of foreign exchange, procuring international finance from IMF, IBRD, IFC, IDA etc.,

- a) **International business**
- b) International trade
- c) International market
- d) International Economy

8. **The first phase of globalization started around 1870 and ended with**

- a. **The World War I**
- b. The World War II
- c. The Establishment of GATT
- d. In 1913 when GDP was High

9.-----Markets do not promise a higher rate of profit, business firms search for -----markets that hold promise a higher rate of profits.

- a. **Domestic, Foreign**
- b. Foreign, Domestic
- c. Local, National
- d. None of the above.

10. ----- is the example for expanding the production capacities beyond the demand of the Domestic country.

- a. Indian software company
- b. **Toyota Japan**
- c. Pepsi
- d. Coca-cola

11. **4. Which is the right sequence of a stages of Internationalization**

- a. Domestic, Transnational, Global, International, Multinational
- b. **Domestic, International, Multinational, Global, Transnational**
- c. Domestic, Multinational, International, Transnational, Global
- d. Domestic, Internatinal, Transnational, Multinational, Global

12. **Subsidiaries consider regional environment for policy / Strategy formulation is known as -----**

- a. Polycentric Approach
- b. **Regiocentric Approach**
- c. Ethnocentric Approach
- d. Geocentric Approach

13. ----- mean that continuation of the same policies of the government for a quite longer period.

- a. **Political stability**
- b. Political instability
- c. Political ability
- d. None of the above.

14. **According to this theory the holdings of a country's treasure primarily in the form of gold constituted its wealth.**

- a. Gold Theory
- b. Ricardo Theory
- c. **Mercantilism**
- d. Hecksher Theory

15. The Theory of Absolute Cost Advantage is given by

- a. David Ricardo
- b. Adam Smith**
- c. F W Taylor

d. Ohlin and Heckscher

16. The developed countries due to ----- reasons attract companies from the developing world.

- a. Availability of technology
- b. competent human resource
- c. Both a & b**
- d. only a.

17. The Theory of Relative Factor Endowments is given by

- a. David Ricardo
- b. Adam Smith
- c. F W Taussig

d. Ohlin and Hecksher

18. The source of ----- is a major factor for attracting the companies from various foreign countries.

- a. Highly qualitative raw materials
- b. Bulk raw materials
- c. Both a & b**
- d. Only b.

19.-----changed policies attracted the multinational companies to extent their operations to these countries.

- a. Liberalisation
- b. Globalisation
- c. Both a & b**
- d. None of the above.

20. The theory of Comparative cost advantage is given by

- a. David Ricardo**
- b. Adam Smith
- c. F W Taussig
- d. Ohlin and Hecksher

21. Government also fixes -----in order to -----the competition to the domestic companies from the foreign companies.

a. Import quotas; reduce

- b. Export quotas, increase
- c. Import quotas, increase
- d. Export quotas, reduce.

22. ----- is a major source for high quality and low-cost human resource.

- a. USA
- b. Japan
- c. India**
- d. China.

23. Globalization refers to:

- a) Lower incomes worldwide
- b) Less foreign trade and investment
- c) Global warming and their effects
- d) A more integrated and interdependent world.**

24.----- is the major factor that discourages the spread of international business.

- a) High cost **b) Political instability** c) Corruption d) Exchange instability
25. ----- has become an international phenomenon.
 a) Technological pirating **b) Corruption** c) Entry requirements d) Quality maintenance
- 26 Which of the following is not a force in the Porter Five Forces model?**
 a. Buyers
 b. Suppliers
 c. **Complementary products**
 d. Industry rivalry
27. corporation produces in home country or in a single country and focuses on marketing these products globally or vice versa.
 a. **Global**
 b. International
 c. Transnational
 d. None of the above
28. The ----- economy has the world's largest GDP.
 a) Japanese b) Australian c) Canadian **d) United states**
29. International business firms have to meticulously maintain ----- of each country .
 a) High cost **b) Quality maintenance** c) Political factor d) Entry requirements
30. The developing countries with less purchasing power are lured into a debt trap due to the operation of ----- in these operations
 a) TNCs **b) MNCs** c) GNCs d) INCs
31. ----- attitudes and practices of government delay sanctions, granting permission and licenses to foreign companies
 a) Technological b) **Bureaucratic** c) High-cost d) All of the above
32. ----- Advocated four approaches of International business.
 a. Eliheckscher b. Michael E. Porter **c. Douglas Wind & Pelmutter**
- 33.** Under approach, the domestic companies view foreign markets as an extension to to the domestic company
a. Ethnocentric approach b. Polycentric approach
 c. Regiocentric approach d. Geocentric approach
34. According to this theory the holding of a country's treasure primarily in the form of gold constituted its wealth -----
a. Mercantilism b. Non mercantilism c. Absolute cost advantage theory
35. Which theory suggested that comparative advantage arises from differences in national factor endowments?
 a. Mercantilism b. absolute cost advantage -----
c. Heckscher-ohlin
36. ----- focuses on firms' strategic decisions to acquire and develop competitive advantages in order to compete internationally.
 a. Comparative cost advantage b. Country similarity theory

c. Global strategic rivalry theory

37. Multinational company is also referred to as _____
a) **Multidomestic** b) Multi-international c) Multiglobal d) Transnational
38. World trade organization headquarter in -----
A) **Geneva** B) Germany C) France D) Switzerland

Unit II

- Culture which handle information in a direct, linear fashion are called -----
(A) **monochromic** (B) polychromic (C) None of these
- Irrespective of the religion, race, region, caste, etc., all of us have more or less the same needs are referred to as -----
(A) **Cultural Universals**
- enable the businessmen to market the products in many foreign countries with modifications.
(A) **Cultural Universals**
- environment consists of religious aspects, language, customs, traditions, beliefs, tastes, preferences, social institutes, living habits, dressing habits, eating habits etc.
(A) Political (B) **Social** (C) Economic (D) cultural
- means giving a gift or money to others for the help they rendered.
(A) **Guanxi**
- ideology is the body of complex ideas, theories, and objectives.
(A) Social (B) **political** (C) Technological (D) Economic
- aims that all citizens should be equal politically and legally and should enjoy freedom.
(A) Totalitarianism (B) **Pure democracy** (C) None
- Countries moderate in political rights and civil liberties are termed as
(A) free countries (B) **partly free countries** (C) fully free countries (D) none
- The process of nationalisation of a property without compensation is called -----
(A) Expropriation (B) **Confiscation** (C) Nationalisation (D) Domestication
- is the process of nationalisation of property with compensation.
(A) **Expropriation** (B) Confiscation (C) Nationalisation (D) Domestication
- is the process of shifting the ownership of private property from private individuals or institution to the government.
(A) Expropriation (B) Confiscation (C) **Nationalisation** (D) Domestication
- In -----, foreign business firms relinquish control and ownership in favour of domestic investors either partly or fully.
(A) Expropriation (B) Confiscation (C) Nationalisation (D) **Domestication**

13. ----- risks are due to the imposition of controls on the foreign business operation by the host government.
 (A) General Instability Risk (B) **operation Risk** (C) Political risk (D) None
14. ----- is caused by clashes between or among community groups, religious groups and ethnic groups.
 (A) Corruption (B) **Social Unrest** (C) Attitudes of nationals (D) None
15. ----- is a systematic application of scientific or other organised knowledge to particular tasks.
 (A) **Technology** (B) Political (C) Cultural (D) Economical
16. ----- is mostly concerned with the introduction of existing technology to other countries, preferably to a less advanced country through international business operations.
 (A) Innovation (B) **Technology Transfer** (C) Invention (D) None
17. Low Income Countries are also known as -----
 (A) **Third World countries/ pre-industrial countries**
 (B) Less developed countries
 (C) Industrialising countries
 (D) Advanced countries, Industrialised, post-industrial or First World countries
18. Lower-Middle-Income Countries are also known as -----
 (A) Third World countries/ pre-industrial countries
 (B) **Less developed countries**
 (C) Industrialising countries
 (D) Advanced countries, Industrialised, post-industrial or First World countries
21. Upper-Middle Income Countries are also known as -----
 (A) Third World countries/ pre-industrial countries
 (B) Less developed countries
 (C) **Industrialising countries**
 (D) Advanced countries, Industrialised, post-industrial or First World countries
22. High Income Countries are also known as -----
 (A) Third World countries/ pre-industrial countries
 (B) Less developed countries
 (C) Industrialising countries
 (D) **Advanced countries, Industrialised, post-industrial or First World countries**

Unit III INTERNATIONAL TRADE POLICIES AND INTERGRATION

1. Tariffs are of _____ types.
 (a) **2** (b) 3 (c) 4 (d) 1

2. Tariff levied as a fixed amount for each unit is _____

- a) Ad valorem
- b) Specific
- c) General
- d) Group

3. Tariff levied as a proportion of the value of the imported goods is called _____

- A) Ad valorem
- b) Specific
- c) General
- d) Group

4. The payment by government to domestic countries to reduce operating cost is called _____

A) Import quotas

b) Subsidies

- c) Tariff
- d) Group

5. The _____ is the link between the European Union and member governments.

- a) Corper
- b) agent
- c) auditor
- d) union

6. Tariff refers to tax imposed on _____

a. Imports (b) Subsidies (c) Export d. output

7. A VOLUNTARY EXPORT RESTRAINT is the opposite form of import quotas.

(a) **Voluntary export restraint** (b) Subsidies (c) Tariff

8) IMPORT QUOTA are the direct restriction on the quantity of goods which are imported into country.

(a) **Import quotas** (b) Subsidies (c) Tariff d. export quotas

9) A group of country agree to abolish trade restrictions and barriers among (or) charge low rate of tariff in carrying out international trade it is called **Free Trade Area**

a.) Customs union b.) free trade area c.) common market d.) economic union

10. **Economic integration** among the world economies varies in degree

a.) Economic union b.) Economic integration c.) Customs union d.) Both

11. ECSC stands for **European coal and steel community**

- a.)European community and steel community
- b.)European coal and steel community
- c.)European common and safety community
- 12) Economic union is superior to common market
 - 1.free trade area 2) customs union 3)**common market** 4)economic union
- 13) The european economic community is also known as european common market
 - 1)european economic community 2)**european common market** 3) european economic union
- 14) ESCAP is the regional arm of the UNO
 - a. 1)UN 2)UMO 3)**UNO** 4)GNO
- 15) What is the expansion for SAARC?
 - a. **South Asian Association for Regional Co-operation**
- 16) Who are the members of SAARC?
 - a. **India, Bangladesh, Bhutan, Pakistan, Maldives and Sri Lanka**
- 17) What are the geographical areas covered by ESCAP?
 - i. **East : Cook Islands**
 - ii. **West : Azerbaijan**
 - iii. **North :Mangolia**
 - iv. **South : Australia & New Zealand**

18.The European economic community also known as **European common market**

- a.)European steel market b.)European coal market
- c.)European common market d.)European economic market

19.European councilis the main administrative body of European union

- a.)European community b.)European common market c.)European social fund
- d.)European council

20. Court of auditorwas appointed as a part of the European union by amending the Treaty of role

- a.)Court of justice b.)monitory community
- c.)Court of auditor d.)advisory community

Unit IV

1. Net Current Assets =

Fixed Assets + Current Assets – Current Liabilities

Current Assets – Fixed Assets + Current Liabilities

Fixed Assets – Current Assets + Current Liabilities

Current Assets – Current Liabilities – Fixed Assets

2. Capital Reserves =

Current Assets – Current Liabilities

Net Assets – Current Liabilities

Net Current Assets – Non-current Liabilities

Current Assets – Non-current Liabilities

3. GAAP

Generally Accepted Accounting Principles

Generally Accepting Accounting Policies

Generally Accepted Accounting Policies

Generally Accepting Accounts Principles

4. IFRS

Information Fund Reporting System

International Financial Reporting Standards

International Finance Report System

International Financing Report Standards

5. IAS

International Accounting Standards

International Accounting System

Information Accounts System

International Accounts Standards

6. _____ is a double entry system of record of all economic transactions.

Balance of payments c) Balance of trade

Surplus system d) Deficit system

7. _____ takes into account only merchandise exports and imports.

Balance of payments c) **Balance of trade**

Surplus system d) Deficit system

8. Balance of payment is _____ than Balance of trade.

Narrower b) Smaller c) **Wider** d) Greater

9. _____ includes both visible and invisible services.

Unilateral payments a/c c) Official statement a/c

Current a/c d) Capital a/c

10. _____ covers movements in external financial assets and liabilities of commercial and co-operative banks.

- Private capital c) **Banking capital**
Official capital d) Capital a/c

11. _____ are giving gift.

- Unilateral transfers a/c** c) Official statement a/c
Current a/c d) Capital a/c

12. When the demand of supply of foreign country are equal it is called _____ of balance of payments.

- Surplus c) Defecit
Equilibrium d) Disequilibrium

13. _____ is concerned with the fluctuations in imports and exports due to business cycles.

- Secular disequilibrium
Cyclical disequilibrium
Development disequilibrium
Structural disequilibrium

14. When the balance of payment position is defecit, the currency is _____

- Overvalued b) Revalued c) **Devalued** d) None

15. Deliberate measures include:

- Monetary measures c) Automatic corrections
Miscellaneous measures d) **All the above**

16. FASB

Financial Accounting Standards Board

- Financial Accounting Systems Board
Fundamental Accounting Standards Board
Fundamental Accounting Systems Board

17. Accounting aspect of control systems

- a) Budgets b) Exchange Rate changes
c) Transfer pricing **d) All of these**

18. _____ is an instrument issued by a bank

- a) Counter trade b) Credit card c) **Letter of credit** d) Open account

19. _____ is a hybrid of fixed and floating rate

- a) Floating –rate system b) **Pegging of currency** c) Crawling peg
d) Target –zone arrangements

20. A number of industrialized countries adopted new practices called fixed capital accounting

current cost accounting

fixed cost accounting

current capital accounting

Unit V

1. **Multinational corporation** is an organisation doing business in more than one country.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
2. **Transnational corporation** produce, market, invest and operate across the world.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
3. Global corporation produce in home country or in a single country & focuses on marketing these products globally & domestically.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
4. **International corporation** conduct the operation in one or more foreign countries but with domestic orientation.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
5. companies become MNC by locating their manufacturing facilities in **foreign countries**.
 - a) domestic countries b) foreign countries
 - c) both
6. MNC engages in various activities like exporting, importing, manufacturing in different countries.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
7. **Transnational corporation** mostly uses inputs of the host countries where it operates unlike a MNC.
 - a. a) multinational corporation b) global corporation
 - b. c) international corporation d) transnational corporation
8. firm becomes MNC in order to increase their market share by expanding their operation to a number of host countries.
 - a. a) reduce cost b) protection c) market share
 - b. d) overcome tariffs
9. **global corporation** develop the knowledge in various countries but its units do not share such knowledge across the globe.
 - a. a) multinational corporation b) global corporation

- b. c)international corporation d)transnational corporation
10. MNC draw more or less the same resources both at the **home and host countries**.
11. RD MEANS -----
- a. Residential domain **b) Residential development** c) Restrict domain d) Restrict development
12. . Multinational organizational enterprises operating in diverse geographic markets or geographic area are organized based on the **geographic** structure.
- a) matrix b) product c) geographic d) virtual
13. A matrix organization is appropriate when problem solving is complex.
Management attention b) problem solving c) economies of scale d) none of the above
14. **Virtual** organizational structure does not physically exist but its effect is felt.
matrix b)product c)geographic d)virtual
15. The MNC's are an invaluable dynamic force and instrument on -----
report
- a)Adam smith b) Thomas L **C) ILO** d) J.K. GALBRITH

Section- B

2 Marks Questions

Unit-I

- 1) What is International Business?
- 2) Define Globalization.
- 3) State any two features of International Business?
- 4) What do you mean by a Domestic Company?
- 5) State any two approaches to International Business?
- 6) What do you mean by Regions centric Approach?
- 7) What is the Global Company?
- 8) What do you mean by Multinational Corporation?
- 9) What is Opportunity Cost?
- 10) What is Cultural Transformation?

Unit-II

- 11) What is business environment?
- 12) Mention the factors of business environment?
- 13) Define culture and socio- culture.
- 14) What is Cross-cultural communication?

- 15) What is Non – verbal communication?
- 16) Define technology and technology transfer.
- 17) What are the stages of business development?
- 18) Give difference between low-income and high – income countries.
- 19) Mention the types of economic systems prevailing in the world?
- 20) What are the types of political system under which business survive?

Unit-III

- 21) What are trade policies used for international business?
- 22) Write a short note on the parties who are affected by tariffs?
- 23) What are subsidies?
- 24) What do you mean by import quotas?
- 25) Write a short note on voluntary export constraints?
- 26) Write about the formal and informal policies used by the government to restrict import and boost exports?
- 27) Give any five examples of trade blocs?
- 28) What is economic integration?
- 29) Write the basic characteristics of common market?
- 30) What are the requirements to be fulfilled for joining the European Economic Community as members?

Unit-IV

- 31) What is FDI?
- 32) Who are FIIS?
- 33) Explain letter of credit.
- 34) What is Global Depositary Receipt?
- 35) Explain Invisible exports.
- 36) What is Balance of Payment?
- 37) What is Balance of Trade?
- 38) What is accounting Clusters?
- 39) Define Inflation Accounting.
- 40) What do you mean by foreign currency translation?

Unit-V

- 41) State the meaning of MNC
- 42) Definition of International Company
- 43) What is cultural erosion?
- 44) What is profit maximization?
- 45) What is diversification policy?
- 46) Explain market superiorities
- 47) What is transnational corporation?
- 48) What is political interference?
- 49) State any 4 steps of designing organizational structure for forming MNCs.
- 50) What is Indianisation of Transnational's?

Section-C

Unit-I

1. State the nature of International Business in brief.
2. Give Competitive advantages possible in a Global setting.
3. List out the problems of International Business.
4. Explain the evolution of International Business.
5. Why do the business firms of a country go to other countries?
6. What is the need for International Business?
7. Explain "Ethnocentric Approach" and "Polycentric Approach" briefly.
8. State the differences between Domestic, International and Multinational Company.
9. Explain Comparative Cost Theory advocated by David Ricardo.
10. How is international business broader in scope compared to international trade and international market?

Unit-II

11. What is business environment? Explain the factors of business environment?
12. Describe social environment? Give various aspects of social environment?
13. What are the characters of culture?
14. Explain the Cross-cultural communication with examples.
15. Give the relationship between technology and globalization

16. Briefly explain the changes caused due to globalization in economic systems.
17. What is political instability? Mention the ways to minimize political risks?
18. How do you classify the countries as low- income, middle- income, rich- income countries?
19. What is political environment? How does it affect international business?
20. Explain how non-verbal communication brings and affects business.

Unit-III

21. Explain the need for formulating international trade policy?
22. Why do advanced countries insist on elimination of subsidies?
23. Explain the role of international law on international business?
24. Define the term 'International Relations'. How does it affect international business?
25. What is economic integration? Explain the different kinds of economic integration?
26. Brief out the strengths and weaknesses of economic integration?
27. Describe the steps taken by NAFTA in bringing economic integration among USA, Canada and Mexico?
28. Explain SAARC preferential trading agreement (SAPTA)?
29. Why ASEAN is next to EEC in achieving economic integration? Explain its organization structure and potentialities?
30. Write about the implications of trade blocs on business?

Unit-IV

31. What is the significance of the accounting system in international business?
32. Why does the accounting standard vary widely from country to country?
33. Define the term Balance of payment. Distinguish the term balance of payment from balance of trade.
34. What is current account? Explain the different items in the current account.
35. What is capital account? Explain the different items in the capital account
36. List out the impact of absence of comparability in foreign capital.
37. Describe the term Global Depository Receipts.
38. How do you determine exchange rates of a country?
39. Can you illustrate the impact of foreign institutional investors in business?

40. Enumerate the features of capital expenditure.

Unit-V

41. Discuss the relationship between Headquarters and Subsidiaries in MNCs.

42. Why do some countries impose controls over MNCs?

43. State the advantages and disadvantages of Matrix organizational structure

44. Explain the distinction among IC, MNC, GC,& TNC

45. Explain the role of MNCS in India

46. Explain vertical & horizontal organizational structure of MNC.

47. Explain product organizational structure and its advantages.

48. Elucidate – MNCs in India.

49. Explain the need for MNCs.

50. Explain the following terms: -

i)Market Territory

ii) Product Innovation

iii)Organizational design

iv)Political Interference

Section-D

Unit-I

1. Why is international business a crucial venture?

2. Why do the business firms of a country go to other countries? Explain with suitable examples.

3. Explain different stages of Internationalization.

4. State the different theories developed by experts about International Business.

5. What are the competitive advantages a business magnet enjoys in International Business?

6. State the different approaches used to understand International Business.

7. What are the assumptions, merits and Demerits of Hecklscher-Ohlin thesis?

8. Why is international business not a bed of roses? Elucidate your answer with suitable examples.

9. Explain the comparative cost theory of international business, its assumptions and outcomes.
10. State the differences between Ethnocentric, polycentric, Regiocentric and Geocentric approaches to International Business.

Unit-II

11. Mention the cultural changes of people due to globalization with example
12. Give the influence of technology in people in their life style.
13. Explain the various types of communication process.
14. What is the impact of culture on consumers?
15. Briefly explain the technology with reference to the economic development
16. Explain the various types of economic systems.
17. What are the stages of business development? Explain them.
18. Explain the various types of political systems.
19. What is the role of technological changes in the global business?
20. Explain the relationship between the business and social environment

Unit-III

21. Explain in detail the various instruments of international trade policy?
22. How do you support for the government intervention in formulation of trade policy?
23. State the objectives and functioning of European Economic Community and sketch out its organization structure
24. Write about AFTA, EFTA, and LAIA?
25. Describe the objectives and organization structure of SAARC. Why did SAARC fail in achieving economic integration among member countries?
26. Write about the achievements and recommendations made for the infrastructure development of ESCAP?
27. Explain the role played by SEZS and ETDZS in developing china as an economically powerful country?
28. Explain the scope and opportunities for Russia to develop as an important business centre in the globe?
29. Write about the subsidiary bodies of the ASEAN committee?

30. Explain the features of Economic Monetary union and the Common Agricultural Policy?

Unit-IV

31. How do you cluster the countries based on the similarities in their accounting Standards?

32. What are the consequences of differences in accounting standards and how do you harmonize the differences in accounting standards?

33. Explain the impact of FIIS and GDRs on Indian Economy

34. Explain the trends in India's balance of payments position. What are the reasons for disequilibrium in the balance of payments?

35. Explain the causes and effects of balance of payment crisis of 1990.

36. Explain how the management of disequilibrium in the balance of payment help the growth of international business.

37. Explain the different methods of payment in international trade.

38. Describe the international risk management in making foreign investment,

39. What are the implications of convertibility of the rupee on Indian economy?

40. What are the methods of correcting disequilibrium in the balance of payments?

Unit-V

41. Why many domestic Companies want to become MNCs.

42. Explain the organization design and structure of MNCs.

43. Explain the various approaches to organization structure MNCs.

44. Explain the advantages and disadvantages of MNCs to the home countries and host countries.

45. Explain the factors contributed for the growth of MNCs.

46. State the features of strategic business unit structure.

47. Explain the organizational characteristics of Global Corporation, Transnational Corporation.

48. Explain the role of MNCs in Indian economy, and why do Transnational Corporations would like to Indianize their operation?

49. Why do developing countries allow MNCs to operate in their countries?

50. Distinguish between product organizational structure and geographical organization structure.

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI
II M.Com. Semester III
Core 5 RESEARCH METHODOLOGY Sub.code:21PCOC35
QUESTION BANK

Section A 1 mark each

UNIT I – INTRODUCTION TO RESEARCH

- 1) Study which is used to test a hypothesis of a causal relationship between variables is known as----- .
a) Exploratory b) Descriptive c) Diagnostic
d) Hypothesis testing
- 2) ----- research includes survey & fact finding enquiries of different kinds.
a) Descriptive b) Analytical c) Fundamental d) Conceptual
- 3) Research which follows the case-study methods or in-depth approaches to reach the basic causal relations is named as ----- .
a) Clinical/Diagnostic research b) Historical research
c) Field-setting research d) Decision-oriented research
- 4) Under which step in the research process problem is formulated and brief summary of it should be written down.
a) Development of working hypothesis **b) Extensive literature survey**
c) Hypothesis –testing d) Execution of the project
- 5) ----- is a one which requires a research to find out the best solution for the given problem.
a) Research problem b) Research process c) Research design d) All the above
- 6) A research must discuss his problem with their colleagues and others who have enough experience in the same or in working on similar problem is quite often known as an-----.
a) Experience survey b) Literature survey
c) Field survey d) None
- 7) ----- is an effective evaluation of selected document on a research topic.
a) Collection of data **b) Review of literature** c) Analysis of data d) Report writing
- 8) ----- is used to identify the sources used by other researcher.
a) Review of literature b) Research problem c) Research process d) None
- 9) ----- research which utilizes to study the events or ideas of the past.
a) Historical research b) Conclusion-oriented c) Longitudinal research d) Decision-oriented
- 10) ----- approaches is concerned with subjective assessment of attitudes.
a) Qualitative b) Quantitative c) Experimental d) Stimulation

UNIT II – RESEARCH AND SAMPLING DESIGN

- 1) Defining a ----- properly and clearly is a crucial part of a research study.
a) research process b) research design **c) research problem** d) sample design
- 2) The ----- deals with the method of selecting items to be observed for the given study.
a) Operational research b) Statistical design c) Observational design **d) Sampling design**
- 3) The variable that is antecedent to the dependent variable is termed as-----
a) Variable b) Continuous variable **c) Independent variable** d) Dependent variable

- 4) Independent variables that are not related to the purpose of the study, may affect the dependent variable are termed as-----.
- a) Continuous variable **b) Extraneous variable** c) Control variable d) Confounded relationship
- 5) The ----- is a predictive statement that relates an independent variable to a dependent variable.
- a) Research hypothesis** b) Experimental hypothesis c) Non-experimental hypothesis d) Hypothesis testing
- 6) In some instances the most practical way of sampling is to select every ith item on a list. Sampling of this type is known as----- .
- a) Systematic sampling** b) Stratified sampling c) Multi-stage sampling d) Cluster sampling
- 7) The list of sampling units is called as-----
- a) Sample design b) Research design c) Sampling **d) Sampling frame**
- 8) The data obtained in census survey is free from-----
- a) **Sampling errors** b) Non-sampling errors c) Both d) None
- 9) Quota sampling is an example of ----- .
- a) Probability sampling b) Simple random sampling **c) Non-probability sampling** d) Systematic sampling
- 10) ----- is a definite plan for obtaining a sample from a given population.
- a) Sampling **b) Sample design** c) Research design d) Research process

UNIT III – COLLECTION OF DATA

- 1) The ----- is the most commonly used method specially in studies relating to behavioural sciences
- a) Observational method** b) Participant observation
c) Controlled observation d) Uncontrolled observation
- 2) ----- method can be used only when respondents are literate and cooperative
- a) Questionnaire** b) Schedules c) Both d) None
- 3) ----- interview is meant to focus attention on the given experiences of the respondents
- a) Focused** b) Telephone c) Personal d) Unfocused
- 4) The clinical interview is concerned with ----- .
- a) Feelings b) Motivations c) Individual life experience **d) All the above**
- 5) In case of ----- interview, the interviewer's function is simply to encourage the respondent to talk about the given topic.
- a) Clinical **b) Non-Directive** c) Telephone d) Focused
- 6) ----- method of data collection is quite popular particularly in case of big enquiries.
- a) Schedule **b) Questionnaire** c) Observational d) Interview
- 7) The success of collecting data through Schedules depends much on the ----- of enumerators.
- a) education b) occupation **c) honesty** d) number
- 8) ----- interviews are those that are designed to discover underlying motives and desires and are often used in motivational research.
- a) Depth** b) Telephone c) Personal d) Unfocused

- 9) The ----- method places more emphasis on the full analysis of a limited number of events or conditions and their inter-relations.
a) case study b) interview c) observation d) questionnaire
- 10) ----- data are those which are collected afresh and for the first time and thus happen to be original in character.
a) Primary b) Secondary c) Both d) None

UNIT IV – PROCESSING AND ANALYSIS OF DATA

- 1) ----- is the rejection of hypothesis which should have been accepted
 a) Null hypothesis b) Alternative hypothesis
c) Type I error d) Type II error
- 2) ----- is the accepting of hypothesis which should have been rejected
 a) Null hypothesis b) Alternative hypothesis
 c) Type I error **d) Type II error**
- 3) z-test is based on-----
a) Normal distribution b) Binomial distribution
 c) Poisson distribution d) F- distribution
- 4) -----is used when the sample size is more than 30
a) Z-test b) T-test c) F-test d) None of these
- 5) ----- is used when the sample size is more than 30
 a) Z-test **b) T-test** c) F-test d) None of these
- 6) -----is a process of examining the collected raw data to detect errors and omissions
 a) Coding **b) Editing** c) Tabulations d) Data clearing
- 7) -----refers to the process of assigning numerals or other symbols
a) Coding b) Editing c) Tabulations d) Graphical representation
- 8) The independent observations which make up a statistic is known as -----
 a) Chi-square b) T-test c) F-test **d) Degrees of freedom**
- 9) ----- distribution is used to obtain confidence interval estimate of unknown population variance
a) Chi-square b) T-test c) F-test d) Degrees of freedom
- 10) SPSS is used for -----
a) Discriminant analysis b) Technical analysis
 c) None of these d) Graphical representation

UNIT V – INTERPRETATION AND REPORT WRITING

- 1) ----- refers to the task of drawing inferences from the collected facts after an analytical study.
 a) Report writing b) Task of drawing **c) Interpretation** d) Experimental study
- 2) Interpretation is technically described as----- .
a) Post-factum b) Pre-factum
 c) Both a&b c) None

UNIT III – COLLECTION OF DATA

1. Define Data. Give some examples.
2. What is meant by Primary data?
3. What are the uses of Secondary data?
4. Write a short note on indirect observation.
5. List out mechanical devices used for Observation.
6. What are Open-ended questions?
7. Give two examples of Leading questions.
8. What is Pre testing?
9. What is a Pilot study?
10. What do you mean by Mail survey?

UNIT IV – PROCESSING AND ANALYSIS OF DATA

1. What do you mean by Data processing?
2. What is editing?
3. What is meant by Tabulation?
4. What is meant by Coding of data?
5. Write a note on Classification of data.
6. What is ANOVA?
7. What is a Null hypothesis?
8. What is Range?
9. What is the significance of Z test?
10. What are non-parametric tests?

UNIT V – INTERPRETATION AND REPORT WRITING

1. What do you mean by interpretation of data?
2. What is a Research report?
3. What is the purpose of a Research report?
4. What is a Research abstract?
5. Write a note on Bibliography.
6. What is the significance of Report writing?
7. What is a Thesis?
8. What is a Business report?
9. Write a note on popular report.
10. What is an interim report?

Section - C 5 marks.

Answer in about 150 words each.

UNIT I – INTRODUCTION TO RESEARCH

1. Explain the significance of research in modern times.
2. Write short notes on:
 - i. Objectives of research
 - ii. Ex post facto research
3. What are the points to be observed by a researcher in selecting a research problem?
4. Write short notes on:
 - i. Pilot survey
 - ii. Rephrasing the research problem
5. What kinds of literature a researcher reviews?
6. How will you define a research problem?
7. How will you formulate a research problem?

8. Explain the purpose of review of literature.
9. Write a short note on criteria of good research.
10. What is the necessity of defining a research problem?

UNIT II – RESEARCH AND SAMPLING DESIGN

1. What are the advantages and limitations of sampling?
2. Differentiate between probability and non probability sampling.
3. Describe the procedure of lottery method of drawing samples.
4. When is judgment sampling appropriate? What are its merits and demerits?
5. What is convenience sampling? What are its limitations?
6. Write a note on Hypothesis.
7. Differentiate between dependent and independent variable.
8. Discuss the importance of a research plan.
9. Explain the criteria for selecting sampling techniques.
10. Explain systematic random sampling method.

UNIT III – COLLECTION OF DATA

1. Explain the different types of observation.
2. Explain the factors that influence the choice of methods of data collection.
3. Distinguish between questionnaire and schedule
4. Explain the process of constructing a questionnaire.
5. Briefly describe the various types of questions with an example.
6. Explain the different types of interviews.
7. Discuss the meaning and functions of a pilot study.
8. Differentiate between a pilot study and a pre test.
9. Describe the procedure of pre-testing an instrument.
10. Explain the merits and demerits of secondary data.

UNIT IV – PROCESSING AND ANALYSIS OF DATA

1. What is editing? For what is it done?
2. What is data processing? What does it involve?
3. What is meant by transcription of data? Why is it done?
4. Draw a table and show its components.
5. Explain the significance of coding.
6. Explain the significance of t-test and F-test in research.
7. Discuss the principles of tabulation.
8. Explain the types of classification of data..
9. Describe the hypothesis testing procedure.
10. Explain the significance of measures of dispersion in research.

UNIT V – INTERPRETATION AND REPORT WRITING

1. What are the functions of research report?
2. Explain the importance of interpretation in research.
3. Explain the significance of report writing in research.
4. “Interpretation is a fundamental concept of research process”. Explain.
5. Write a note on documentation in the context of research report.
6. What points will you keep in mind while preparing a research report?
7. Explain the meaning and purpose of research report.

8. Distinguish between a technical report and a popular report.
9. Distinguish between research abstract and a research article.
10. Explain the importance of bibliography in the context of research report.

Section – D 10 marks

Answer in about 400 words each.

UNIT I – INTRODUCTION TO RESEARCH

1. Describe the different steps involved in a research process.
2. Are different types of research sharply distinguishable? Discuss.
3. “The task of defining a research problem often follows a sequential pattern”. Explain.
4. Discuss the role of review of literature in research.
5. What do you mean by research? Explain its significance in modern times.
6. Make an attempt to classify research.
7. Distinguish between
 - i. Pure and applied research.
 - ii. Descriptive and analytical research.
 - iii. Action research and pure research.
 - iv. Conceptual and empirical research.
 - v. Conclusion oriented and decision oriented research.
8. ‘Identification of research problem shall be after review of literature’ – Comment.
9. Evaluate survey method of research.
10. How will you define a research problem? Explain with an example.

UNIT II – RESEARCH AND SAMPLING DESIGN

1. Explain the steps involved in preparing a research design.
2. Discuss the contents of a research design.
3. What is simple random sampling? What are its advantages and disadvantages?
4. Under what circumstances stratified random sampling design is considered appropriate? How will you select such samples? Explain by means of an example.
5. Elaborate on the different methods of probability and non-probability sampling.
6. Discuss the various methods of probability sampling.
7. Discuss the various methods of non probability sampling with suitable examples.
8. Explain and illustrate the procedure of selecting a random sample.
9. Explain the important concepts relating to a research design.
10. Write a critical note on various methods of sampling in social science research.

UNIT III – COLLECTION OF DATA

1. Evaluate interviewing as a method of data collection.
2. Evaluate observation as a method of data collection.
3. Discuss the process of interviewing a respondent.
4. Evaluate mailing method of data collection.
5. Discuss the requirements for a successful interview for data collection
6. Enumerate different methods of collecting primary data.
7. Explain the merits and demerits of interview method.
8. Discuss the various stages in the interviewing process.
9. Interviews introduce more bias than does the use of questionnaire – Critically examine..
10. Clearly explain collection of data through questionnaires and schedules.

UNIT IV – PROCESSING AND ANALYSIS OF DATA

1. Explain any six commonly used statistical tools in research.
2. Explain important parametric tests used in research.
3. Explain important non-parametric tests used in research.
4. Explain the significance of chi-square test in research.
5. Explain the role of tabulation in research.
6. Explain the significance of coding and classification of data.
7. Describe processing of data.
8. Discuss any three multivariate techniques used in research.
9. Explain the measures of central tendency and their uses.
10. Briefly explain the various methods of analysis of data.

UNIT V – INTERPRETATION AND REPORT WRITING

1. Describe the layout of format of a research report.
2. Explain the significance of a research report and narrate the various steps involved in writing such a report.
3. What are the different forms in which a research work may be reported? Describe.
4. Explain the mechanics of writing a research report.
5. Discuss the steps involved in planning a report writing work.
6. Discuss the various types of research report.
7. “Report writing is more than an art that hinges upon practice and experience”. Discuss.
8. Mention the different types of report particularly pointing out the difference between a technical report and popular report.
9. Describe briefly how a research report should be presented.
10. Describe the importance of documentation and describe the modes for documenting sources.

4. list out any features of company
5. What is Charter Company?
6. What is memorandum of association?
7. Explain the term articles of association
8. what are the contents of articles of association?
9. What do you mean by prospectus?
10. write short notes on characteristics of prospectus?

UNIT- II

1. Write any four negotiable instruments
2. What do you mean by cheque?
3. explain about bills of exchange
4. write short notes on promissory note
5. explain about bank draft
6. what is crossed cheque?
7. explain about bearer's cheque
8. briefly explain about drawer
9. explain the term drawee
10. explain about crossed cheque

UNIT- III

1. what are the securities? explain
2. explain the procedure to remove the membership of SEBI
3. Mention any two functions of SEBI
4. Give any three powers of SEBI
5. what is SEBI? explain.
6. explain the appointment of members in SEBI
7. name any 4 objectives of SEBI
8. what are the role of SEBI?
9. what are the criticism of SEBI?
10. explain the SEBI regulations for meeting

UNIT- IV

1. What is restrictive trade practice?
2. briefly explain about district commission
3. who are all eligible for district commission?
4. explain about state commission
5. list out the members of state commission
6. what do you mean by central commission
7. explain the members of central commission
8. Write short notes on unfair trade practice
9. Explain the term 'complaint'
10. who can register complaint? explain

UNIT- V

1. what is regional grouping?
2. write any 2 functions of WTO
3. Write any two objectives of WTO
4. what is customs union?

5. what is common market?
6. what is economic union?
7. what is political union?
8. What is free trade area?
9. explain about WTO?
10. what is geographical union?

Section –C (5 marks)

Answer all questions choosing (a) or (b):

UNIT- I

1. state and explain the features of articles of association
2. Sort the types of companies
3. enumerate the features of the company
4. State the requirements of the memorandum of association
5. explain about the features of prospectus
6. explain the contents in the prospectus
7. Distinguish between memorandum of association and articles of association
8. distinguish the public company and private company
9. write the contents in prospectus
10. enumerate the important features of Memorandum of association

UNIT- II

1. state and explain about the types of cheques
2. list out and explain the features of promissory note
3. Give notes on characteristics of negotiable instruments
4. Draw the essentials of bill of exchange
5. Enumerate the features of cheques
6. Write the difference between bill of exchange and promissory note
7. write short notes on inland instruments
8. what is foreign instrument? explain
9. explain about the bearer instruments
10. explain the term ambiguous instruments

UNIT- III

1. Discuss the objectives of SEBI
2. What is the role of SEBI in controlling the securities market? Explain
3. state any 6 objectives of SEBI
4. state and explain the powers of SEBI
5. elucidate the SEBI issue powers
6. enumerate the functions of SEBI
7. give detailed notes on role of SEBI in controlling securities
8. explain the criticism posted against SEBI
9. list out the rules of SEBI
10. explain about the members appointment and cancellation

UNIT- IV

1. Write notes on “District Forum”
2. what is complaint?

3. who can register complaint? explain
4. what is unfair trade practices?
5. Briefly explain about "State Commission"
6. what is national commission?
7. explain the members of district forum
8. who are the members of state commission?
9. what are the unfair trade practice? explain
10. explain about consumer protections act?

UNIT- V

1. List out and explain the fundamental principles of WTO
2. What is regional grouping? explain any three features.
3. what is anti dumping? explain
4. what is doha declaration explain?
5. state and explain the objectives of WTO
6. enumerate the charter of WTO
7. state the fundamental principles of WTO
8. what is developing countries? give examples
9. explain about most favored nations
10. explain about free trade area

Section –D (10 marks)

Answer any THREE of the following:

UNIT- I

1. Sort the types of companies
2. Distinguish between memorandum of association and articles of association
3. characteristics of memorandum of association
4. characteristics of Articles of association
5. state the difference between public company and private companies
6. state the importance of prospectus
7. what are the important features of prospectus
8. explain the features of a companies act 1956
9. explain the schedule 1 of prospectus
10. elucidate the schedule 2 of prospectus content

UNIT- II

1. Define the term negotiable instruments? explain its characteristics.
2. What are the various negotiable instruments? discuss
3. What is promissory note? Explain its elements.
4. Give notes on characteristics of negotiable instruments
5. What are the requirements of bill of exchange
6. Give detailed notes on distinction between bill of exchange and promissory note
7. enumerate the requisite of promissory note
8. elucidate the essentials of bill of exchange
9. distinguish the cheque and bill of exchange
10. write notes on trade bill and accommodation bill

UNIT- III

1. Discuss the powers of SEBI transferred to it under the securities contract (regulation) act 1956
2. state and explain the objectives of SEBI
3. state and explain the powers of SEBI
4. elucidate the SEBI issue powers
5. enumerate the functions of SEBI
6. give detailed notes on role of SEBI in controlling securities
7. explain the criticism posted against SEBI
8. enumerate the history of SEBI
9. discuss the management of SEBI
10. explain the following:
 - securities
 - board
 - amendment of SEBI

UNIT- IV

1. Elucidate the central consumer protection council? And its objectives?
2. What are unfair trade practices? give examples
3. Write notes on “District Forum” and its regulations
4. what is complaint?
5. who can register complaint? explain
6. what is unfair trade practices?
7. what are the power of “State Commission”
8. give critical appraisal of consumer protection act
9. what are the procedure to register the complaint and appeal?
10. enumerate the consumer protection act 1986?

UNIT- V

1. Enumerate anti- dumping duties or measures devised at the level of WTO
2. state and explain the objectives of WTO
3. enumerate the charter of WTO
4. state the fundamental principles of WTO
5. what is developing countries? give examples
6. explain about most favored nations
7. explain about free trade area and explain about LAFTA
8. explain the following
 - customs union
 - common market
 - free trade area
9. write notes for the following
 - * economic union
 - * political union
10. enumerate the anti dumping measure agreements

St. Mary's College (Autonomous) Thuthookudi-628001
QUESTION BANK
M.Com - Semester – IV
CoreX111 - ADVANCED COST ACCOUNTING Sub.code:21PCOC41
(for those who joined in July 2021 and after)

Section -A

UNIT I:

1. In job costing, each cost is a _____ unit.
a) Contract **b)Job** c)Batch d) Service
2. In contract costing, cost unit is a
a) **Contract** b)Job c)Batch d) Service
3. In a contract, _____ clause provides that the contract price would be enhanced on the happening of a specified contingency.
a) Escalation b)Object c)Alteration d) Capital
4. Loss on incurred on the incomplete contract is transferred to _____ account.
a) P & L b) Capital c)Contract d) Job
5. In _____ contract, the contractor will get cost plus a stipulated profit.
a) Cost plus b) Construction c)Building d)All of these
6. When completion stage of the contract is more than half, the profit to be credited to _____.
a) 1/3rd **b)2/3rd** c)1/2 d)1/4th
7. When contract is debited with original cost of the plant, it should be credited with _____ value at the end of the year.
a)Original cost **b)Depreciated value** c)Sale value d) scrap value
8. _____ is a quantity to be considered in industries where job costing is employed.
a) Economic batch b) Reorder c) Economic order d) Order
9. If the contract is almost complete, the amount of profit transferred to profit and loss account is based on _____.
a) actual profit b) current profit **c) estimated** d)previous year
10. When the completion stage of the contract is less than one fourth, the total expenditure on contract is transferred to _____ account.
a)WIP b)Contract c)P & L A/c d)Job

UNIT II

1. When raw material is to pass certain stages before it is converted into finished goods the method of costing is used is -----
a) Job b) **Process** c) Uniform d) Standard
2. Normal output is equal to input minus _____.
(a)Normal loss (b) Abnormal loss c)Abnormal gain d)Normal gain
3. Scrap value of normal loss is _____.
(a)debited to **(b)credited to** (c)shown in (d)credited to
process A/c **process A/c** balance sheet P&L A/c
4. _____ is estimated on the basis of past years experience.
(a) Abnormal loss (b)Abnormal gain **(c)Normal loss** (d)Abnormal effectiveness
5. _____ products are relatively small value.

a) joint products **b) by products** c) co products d) equivalent products

6. All costs incurred prior to the split off point are called -----
a) Joint product cost b) By product cost c) Common cost d) Material cost.
7. The costs incurred up to the point of separation are called _____ costs
a) Joint product cost b) By product cost **c) Common cost** d) Material cost.
8. ----- costs relate to processes and incurred after split-off point.
a) Joint product cost b) By product cost c) Common cost **d) Subsequent cost.**
9. ----- product is usually produced in greater quantities than the byproducts.
a) Main b) Joint c) Common d) Equivalent products.
10. The method of costing applicable to textile industry is-----
a) Batch costing **b) Process costing** c) Job costing d) Contract costing.

Unit III

1. Fixed cost + Profit = -----
(a) Variable cost (b) **Contribution** (c) Selling price (d) Marginal cost
2. CVP analysis is otherwise known as -----
a) Cost Variance Analysis b) Contribution Variance Analysis c) Cost Variance Planning Analysis **d) cost Volume Profit Analysis**
3. Sales Rs. 1,00,000; Variable cost Rs.60,000. P/V ratio is equal to _____
a) **40%** b) 60% c) 10% d) 100%
4. At ----- total revenue is equal to total cost.
a) M/S **b) BEP** c) BUP d) ACP
5. If Variable cost ratio is 60%, P/V ratio is -----
a)50% **b)40%** c)20% d)25%
6. P/V ratio can be improved by decreasing _____.
a)variable cost b)fixed cost c)selling price d)total cost
7. _____ is otherwise known as marginal cost.
a)Material cost b)Fixed cost **c)Variable cost** d)Period cost
8. At Break Even point, profit will be _____.
a)low b)high **c)zero** d)moderate
9. _____ expresses the relationship between contribution and sales.
a)M/S b)BEP **c)P/V ratio** d)GPR
10. Marginal cost means-----cost.
a) Fixed b) **Variable** c) Total d) Indirect

UNIT IV

1. The Tamilnadu Transport Corporation must use _____
a) Batch costing b) Output costing **c) Operating costing** d) Contract costing.
2. Cinema houses must adopt-----
a) Batch costing b) Process costing c) Job costing **d) operating costing.**
3. Composite unit is a distinctive feature of -----

- a) **Operating costing** b) Process costing c) Job costing d) Single costing.
4. Classification and accumulation of costs by fixed and variable cost is of special importance in
 a) **Operating costing** b) Process costing c) Output costing d) marginal costing.
5. The method of costing applied to undertakings which render services is called -----
 a) **Operating costing** b) Process costing c) Output costing d) Batch costing.
6. Petrol expense in transport costing is -----
 a) Fixed cost b) **Running charge** c) Standing charge d) Administration overhead.
7. In transport costing Insurance paid is a -----
 a) Running charge b) maintenance c) **Fixed cost** d) Variable cost.
8. In lodging houses, costs are expressed in terms of _____.
 a) **room-day** (b) customer day (c) customer hour (d) cost per month
9. Operating costing is widely used in _____.
 a) **Transport industry** (b) Chemical industry (c) sugar industry (d) oil refineries
10. Operating costing is usually ascertained through _____.
 a) ledger account b) balance sheet c) P & L a/c d) **a statement of cost/ cost sheet**

Unit -V

1. To compare the achievements, costs, targets, profitability etc. of the different units of the same company, -----costing technique is used.
 a) **Uniform** b) Standard c) Marginal d) Process
2. Under----- costing technique all the member units use the same costing methods.
 a) **Uniform** b) Standard c) Marginal d) Process
3. To compare the achievements, costs, targets, profitability etc. of the different companies under the same industry, ----- technique is used.
 a) Uniform costing b) Standard costing c) Marginal costing d) **Inter-firm comparison**
4. Inter unit comparison of cost of production is facilitated under----- costing technique.
 a) **Uniform** b) Standard c) Marginal d) Process
5. The objective of uniform costing is _____.
 a) To maximise profits b) To control organisation c) To fix the uniform price
 d) **All of the above.**
6. Under-----costing technique all the member units use the same costing methods.
 a) **Uniform** b) Standard c) Marginal d) Process
7. To compare the achievements, costs, targets, profitability etc. of the different

- companies under the same industry, ----- technique is used.
- a) Uniform costing b) Standard costing c) Marginal costing d) **Inter-firm comparison**
- 8.----- is the main technique used in inter firm comparison.
- a) **Ratio analysis** b) Marginal Costing c) Process costing d) Budgetary control.
9. The figures under inter firm comparison may relate to -----
- a) Financial results b) Cost structure c) Operating performance d) **All of the above.**
10. The inter firm comparison techniques provides the management with a comparative picture of -----
- a) Financial results b) Cost structure c) Operating performance d) **All of the above.**

SECTION-B - (2 Marks each)

UNIT I

1. Name four such industries where job costing is employed.
2. What is Job costing.?
3. Give any two differences between job and contract costing.
4. Enumerate any two features of job order costing.
5. What is Escalation clause?
6. State the merits of cost-plus contracts.
7. What is Notional profit?
8. What is Retention money?
9. What is work in progress? How is it shown in the Contractor's balance sheet?

UNIT II- PROCESS COSTING

1. What do you mean by process costing?
2. Name four industries where process costing is applied.
3. State any two features of process costing.
4. What is meant by process loss?
5. Write a brief note on inter process profits.
6. What do you mean by joint products?
7. Write any two characteristics of joint products?
8. What is split-off point?
9. Write any two differences between joint products and by products.
10. What is meant by by-products?

UNIT III- MARGINAL COSTING

1. What is margin of safety?
2. What is CVP analysis?
3. Differentiate between Contribution and profit.
4. What do you mean by break-even point?
5. What is meant by P/V ratio?
6. Define marginal costing.
7. Define marginal cost.
8. What do you mean by key factor?
9. What do you mean by contribution?
10. How can you improve margin of safety?

UNIT IV - OPERATING COSTING

1. What is operating costing?
2. State four areas where operating costing is applied.
3. What are the objectives of transport costing?
4. Write a note on absolute tonne-kilometres.
5. What is a Daily Log Sheet?
6. What is Composite unit? Give two examples.
7. Write a note on cost units used in any three service undertakings.
8. Write a note on commercial tonne-kilometres
9. Give two examples of (a) Standing charges and (b) Maintenance charges in Transport costing.
10. Give two examples of (a) Standing charges and (b) Running expenses in Hotel costing.

UNIT V UNIFORM COSTING

1. Define the term Uniform costing.
2. State the two situations under which Uniform costing can be applied.
3. State the features of Uniform costing.
4. List two points on which uniformity should be ensured.
5. Explain any two advantages of Uniform costing.
6. State any two limitations of Uniform costing.
7. What do you mean by Inter firm comparison?
8. State any two objectives of Inter firm comparison.
9. State any two limitations of Inter firm comparison
10. What is uniform costing Manual?

SECTION-C (5 Marks each)

UNIT I

1. A firm of building contractors began to trade on 1st April 2004. The following was the expenditure on the contract for Rs. 3,00,000.
Materials issued to contract Rs. 51,000; Plant used for contract Rs. 15,000; Wages incurred Rs. 81,000; Other expenses incurred Rs. 5,000.
Cash received account to 31st March, 2005, amounted to Rs. 1,28,000 being 80% of the work certified. Of the plant and materials charged to the contract, plant which cost Rs. 3,000 and materials which cost Rs. 2,500 were lost. On 31st March, 2005 plant which

cost Rs. 2,000 was returned to stores, the cost of work done but uncertified was Rs. 1,000 and materials costing Rs.2,300 were in hand on site.

Charge 15% depreciation on plant and take to the profit and loss account 2/3 of the profit received. Prepare the contract account, contractee's account and extracts from balance sheet from the above particulars.

2. An expenditure of Rs. 1,92,000 has been incurred on a contract to the end of 31st March 2004. The value of work done and certified is Rs. 2,10,000. The cost of work done but not yet certified is Rs. 6,000. It is estimated that the contract will be completed by 30th June, 2004 and an additional expenditure of Rs. 18,000 will have to be incurred to complete the contract. The total estimated expenditure on the contract is to include a provision of 12 ½% for contingencies. The contract price is Rs. 2,80,000 and Rs. 1,68,000 has been realized in cash upto 31st March, 2004. Calculate the proportion of profit to be taken to Profit and loss account as on 31st March, 2004 under different methods.

3. The following was the expenditure on a contract for Rs.6,00,000 Materials Rs. 1,20,000; Wages Rs. 1,64,400 ; Plant Rs. 20,000; Business Charges Rs.8,600.
Cash received on account to 31st December, 2001 amounted to Rs. 2,40,000 being 80 per cent Work certified; the value of materials in hand on 31-12-2020 was Rs.10,000. Prepare the Contract Account for 2020 showing the profit to be credited to the year's Profit and Loss Account. Plant is be depreciated at 10%.

4. Following information is available for Job 4444 which is being produced at the request of a customer:

	Dept. A	Dept. B	Dept. C
Material Consumed (Rs.)	4000	1000	1500
Direct Labour:			
Wage rate Per Hour	3	4	5
Direct Labour Hour	300	200	400

In accordance with company policy the following are chargeable at jobs:

Fixed Production Overheads – Rs.5 per direct labour hour

Fixed Administration overheads – 80% of work cost

Profit Mark Up – 20% Margin on Selling Price.

Calculate the total cost and selling price of Job 4444

5. Modern printers undertook two jobs during the 1st week of June 2018. The following details are available:

Particulars	Job No.11 Rs.	Job No. 12 Rs.
Materials supplied	4,000	2,000
Wages paid	900	600
Direct expenses	200	100
Material transfer from Job No. 12 to 11	200	200
Material returned to store	---	100

Find out the cost of each job and profit (or) loss if any, assuming that Job 12 is completed and invoiced to the customer at Rs. 3,00

UNIT II- PROCESS COSTING

1. Explain the treatment of process losses and gains in process costing.
2. What are the features of process costing?
3. A product passes through three distinct processes to completion. These processes are numbered respectively I, II and III. During the week ended 15th Jan 2001, 500 units are produced.

The following information is obtained:

	Process I	Process II	Process III
	Rs.	Rs.	Rs.
Direct materials	3,500	1,600	1,500
Direct Labour	2,500	2,000	2,500

The overhead expenses for the period were Rs.1,400 apportioned to the processes on the basis of wages. No work in progress or process stocks existed at the beginning or at the end of the week. Prepare process accounts.

4. In Process A 100 units of raw materials were introduced at a cost of Rs.1,000. The other expenditure incurred by the process was Rs.602. Of the units introduced 10% are normally lost in the course of manufacture and they possess a scrap value of Rs.3 each. The output Process A was only 75 units. Prepare Process A Account and abnormal loss account.
5. The following data are available pertaining to a product after passing through two processes A and B.
Output transferred to Process C from Process B 9,120 units for Rs.49, 263
Expenses incurred in Process C:

Sundry materials -Rs.1, 480; Direct labour -Rs.6, 500; Direct expenses -Rs.1, 605. The wastage of Process C is sold at Re.1.00 per unit. The overhead charges were 168% of direct labour. The final product was sold at Rs.10.00 per unit fetching a profit of 20% on sales. Find the percentage of wastage in process C and Prepare process C account.

6. In Process B, 75 units of a commodity were transferred from Process A at a cost of Rs. 1,310. The additional expense incurred by the process were 190. 20% of the units entered are normally lost and sold @Rs.4 per unit. The output of the Process was 70 units. Prepare Process B Account and Abnormal Gain Account.
7. Input 3,800 units; Output 3,000 units; closing work in progress 800 units and degree of completion of Material 80%, Labour and Overhead 70 %. The process costs are Material Rs. 7,280, Labour and Overheads Rs. 17,800. Find out equivalent production, cost per unit of equivalent production and prepare the Process A account assuming that there is no opening work in progress and process loss.
8. AB Ltd is engaged in process engineering industry. During the month of April 2004, 2,000 units were introduced in Process 'X'. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to Process 'Y', 460 units were incomplete and 140 units, after passing through fully the entire process had to be scrapped. The incomplete units had reached the following stage of completion –

Material	75% completed
Labour	50% completed
Overhead	50% completed

 Following is the further information on the Process 'X'

Particulars	Rs.
Cost of 2,000 units	58,000
Additional Direct Materials	14,400
Direct Labour	33,400
Production overheads	16,700
Units scrapped realized Rs.10 each.	

Prepare Statement of equivalent production, statement of cost, statement of evaluation and the Process 'X' account.

9. The joint costs of making 40 units of product A, 120 units of product B and 140 units of Product C is Rs.2,250. The selling prices of products A, B and C are Rs.2, Rs.3 and Rs.4 respectively. The products did not require any further processing cost after split off point. You are required to apportion the joint costs (a) on sales price basis (b) on sales value basis.
10. Explain the note on Accounting of by-products .
11. Explain various methods of apportioning the joint costs among the joint products.

UNIT III - MARGINAL COSTING

1. What is CVP Analysis? State the assumptions underlying it.
2. What are the circumstances under which production can be continued even when selling price is below the marginal cost?
3. Calculate P/V ratio from the following information:
 - (i) Given: Selling price Rs.10 per unit .Variable cost per unit Rs.6
 - (ii) Given profits and sales of two periods are as under:

Year	Sales	Profit
2000	Rs. 1, 50,000	20,000
2001	Rs. 1, 20,000	25,000

4. From the following particulars calculate i) Contribution ii) P/V ratio iii) B.E.P in units and in rupees iv) What is the selling price per unit if the selling price is brought down to 25,000 units?

Fixed Expenses	Rs. 1, 50,000
Variable cost per unit	10
Selling price per unit	15

A company has fixed expenses of Rs.90,000 with sales at Rs.3,00,000 and a profit of Rs.60,000 during the first half year. If in the next year ,the company suffered a loss of Rs.30,000, Calculate (i)The P/V ratio ,break-even point and margin of safety for the first half year. (ii) The break even point and margin of safety for the whole year.

5. A.G.Ltd., furnishes you the following information related to the year 2006.

	First half of the year	Second half of the year
	Rs.	Rs.
Sales	45,000	50,000
Total cost	40,000	43,000

Assuming that there is no change in prices and variable cost and that the fixed expenses are incurred equally in the two half year period, calculate for the year 2006.

- i. The profit volume ratio.

- ii. Fixed cost.
- iii. Break even sales and
- iv. Margin of Safety ratio.

6. The selling price of a product was Rs.200 per unit, as against its variable cost of Rs. 100 per unit. The total fixed costs were Rs. 2,00,000. Calculate the effect of a reduction in price by Rs.40 on the P/V ratio, Break even point and margin of safety, if 4,000 units were produced and sold.
7. A radio manufacturing company finds that while it costs Rs. 6.25 each to make component X273Q the same was available in the market at Rs. 5.75 each with an assurance of continued supply.

The breakdown of cost is

Materials	Rs. 2.75 each
Labour	Rs. 1.75 each
Other Variable	Rs. 0.50 each
Depreciation and other fixed cost	Rs. 1.25 each
	Rs. <u>6.25</u>

- i) Should you make or buy?
- ii) What would be your decision if the supplier offered the component at Rs. 4.85 each?

8. From the following information, calculate

- i. Break Even Point
- ii. Number of units that must be sold to earn a profit of Rs.60, 000 per year.
- iii. Profit / loss when sales are Rs.2,00,000

Selling price	- Rs.20 per unit
Variable cost	- Rs.16 per unit
Fixed cost	- Rs.79,200

9. K Ltd. purchases a variety of products, each having a number of component parts. B takes 5 hrs to process on a machine working to full capacity. B has a selling price of Rs.50 and marginal cost of Rs.30 per unit. 'A-10' component part used for Product A could be made on the same machine in 2 hours for a marginal cost of Rs.5 per unit. The suppliers price is Rs.12.50. Should K Ltd. make or buy 'A-10'? Assume that machine hour is the limiting factor.
10. PQ Ltd. has been offered a choice to buy a machine between A and B. You are required to compute:

- a) BEP for each of the machines
- b) Level of sales at which both the machines earn equal profits
- c) Range of sales at which one is more profitable than the other.

Relevant data are given below.

Machine	A	B
Annual output in units	10,000	10,000
Fixed cost	30,000	16,000
Profit	30,000	24,000

Market price of the above product is expected to be Rs. 10 per unit.

UNIT IV - OPERATING COSTING

- The Road Transport Co. which keeps a fleet of lorries, gives the following information:

Kilometres run for April	30,000
Wages for April	Rs.2,000
Petrol, Oil etc; for April	Rs.4,000
Original cost of vehicles	Rs.1,00,000
Depreciation to be allowed @ 25% p.a. on original cost.	
Repairs for the month of April	Rs.6,000
Garage rent etc; for April	Rs.1,000
Licence, Insurance etc; for the year	Rs.6,000

Prepare a statement for April, showing the fixed and variable cost per running km.
- Draw a proforma cost sheet for a transport company.
- Draw a proforma cost sheet for a canteen.
- Write a note on Canteen costing.
- Write a note on Hotel costing.
- A transport company maintains a fleet of lorries for carrying goods from Delhi to Panipat, 100 kms. off. Each lorry , which operates 25 days on an average in a month, starts every day from Delhi with a load of 4 tonnes and returns from Panipat with a load of 2 tonnes. Calculate the commercial tonne-kms. and cost per commercial tonne-km.when total monthly charges for a lorry are Rs.27,000. What rate per tonne should the company charge if it plans to earn a gross profit of 20% on the freightage?
- From the following data pertaining to the year 1994 prepare an operating cost sheet showing the cost of electricity generated per Kwh.by Thermal Power Station:

Total units generated	10,00,000 Kwh.
Operating labour	Rs. 65,000
Repairs and maintenance	Rs. 55,000
Lubricants, spares and stores	Rs. 50,000
Plant supervision	Rs. 40,000
Administration overheads	Rs. 25,000

Coal consumed per Kwh. for the year is 2.5 kg. @ of Rs.0.05 per kg. Charge depreciation @ 10% on capital cost of Rs. 2,00,000.
- A transport service company is running four buses between two towns which are 50 kms. apart. Seating capacity of each bus is 40 passengers. Actual passengers carried were 75% of the seating capacity. All the four buses ran on all the days of the month April, 2001. Each bus made one round trip per day. Calculate total kms and total passenger kms. for the month.
- A lorry starts with a load of 20 tonnes of goods from station A. It unloads 8 tonnes at station B and rest of the goods at station C. It reaches back directly to station A after getting reloaded with 16 tonnes of goods at station C. The distance between A to B, B to C and then from C to A are 80 kms., 120 kms. And 160 kms. respectively. Compute absolute tonne-kms. and commercial tonne kms.
- A company runs a canteen for the benefit of employees and the employees are catered here at subsidized rates through coupon sales. From the following information calculate the increase in subsidy per head this month over that in the same month last year.

	This month	This month last year
i. Number of employees	4,000	3,500
ii. Sales realisation through coupons (Rs.)	35,000	30,000
iii. Materials consumed (Rs.)	30,000	25,000
iv. Labour and supervision (Rs.)	20,000	16,000
v. Overheads (Rs.)	29,000	24,000

UNIT V UNIFORM COSTING

1. Define Uniform costing. Explain its advantages.
2. Explain Uniform costing and its scope.
3. Briefly explain a few points on which uniformity is normally required to adopt Uniform costing.
4. What are the essential requirements for Installation of Uniform costing system.
5. Explain the need for Uniform costing.
6. Explain the objectives of Uniform costing.
7. What is uniform costing Manual? Explain its contents.
8. Explain the limitations of Inter firm comparison.
9. Explain the advantages of Inter firm comparison.
10. Write short notes on:
 - i) Uniform costing.
 - ii) Inter firm comparison

SECTION- D (10 marks each)

UNIT I

1. A firm of building contractors began to trade on 1-1-2004. The following was the expenditure on a contract for Rs. 6,00,000:

Particulars	Rs.	Particulars	Rs.
Materials issued from stores	1,50,000	Direct Expenses paid	22,000
Material purchased for the contract	40,000	Establishment expenses	10,000
Plant installed at cost	70,000	Direct expenses accrued due on 31-12-2004	3,000
Wages paid	2,40,000	Wages accrued due on 31-12-2004	4,000

Of the plant and materials charged to the contract, plant which cost Rs. 5,000 and materials costing Rs.4,000 were lost. Some part of the materials costing Rs.2,500 were sold at a profit of Rs. 500. On 31st December, 2004, plant which cost Rs.2,000 was returned to stores and plant which cost Rs.3,000 was transferred to some other contract.

The work certified was Rs. 4,80,000 and 80% of the same was received in cash. The cost of work done but uncertified was Rs. 3,000. Charge depreciation on plant at 10% p.a. You are required to prepare the contract account for the year ended 31st December, 2004 by transferring to the profit and loss account the portion of profit, if any, which you consider reasonable.

Also prepare the contractee's account, work in progress account and the balance sheet in the books of the contractor.

2. Ms New Century Builders have entered into a contract to build an office building complex for Rs. 480 lakhs. The work started in April 1997 and it is estimated that the contract will take 15 months to be completed. Work has progressed as per schedule and the actual costs charged till March 1998 are as follows:

Particulars	Rs. (in lakhs)
Materials	112.20
Labour	162.00
Hire charges for equipments and other expenses	36.00
Establishment charges	32.40

The following information is available:

Particulars	Rs. (in lakhs)
Materials in hand (March 31, 1998)	6.60
Work certified (of which Rs. 324 lakhs have been paid) at March 31, 1998	400.00
Work not yet certified at March 31, 1998, at cost	7.50

As per management estimates, the following further expenditure will be incurred to complete the work:

Particulars	Rs. (in lakhs)
Materials	10.50

Labour	16.00
Sub Contractors	20.00
Equipments hire and other charges	3.00
Establishment charges	6.90

You are required to compute the value of work in progress as on March 31, 1998 after considering a reasonable margin of profit and show the appropriate accounts. Make a provision for contingencies amounting to 5% of total costs.

3. A contractor commenced a building contract on October 1, 1997. The contract price is Rs.4,40,000. The following data pertaining to the contract for the year 1998-1999 has been compiled from his books and is as under:

Date	Particulars	Rs.
April 1, 1998	Work in progress not certified	55,000
	Materials at site	2,000
1998-1999	Expenses incurred:	
	Materials issued	1,12,000
	Wages paid	1,08,000
	Hire of plant	20,000
	Other expenses	34,000
March 31, 1999	Materials at site	4,000
	Work in progress: Not certified	8,000
	Work in progress: Certified	4,05,000

The cash received represents 80% of work certified. It has been estimated that further costs to complete the contract will be Rs. 23,000 including the materials at site as on March 31, 1999.

Required:

Determine the profit on the contract for the year 1998-1999 on prudent basis, which has to be credited to P & L A/c.

4. Prabhu Builders Ltd. Commenced work on 1st April 2003 on a contract of which the agreed price was Rs. 5 lakhs. The following expenditure was incurred during the year upto 31st March, 2004.

Particulars	Rs.
Wages	1,40,000
Plant	35,000
Materials	1,05,000
Head office expenses	12,500

Materials costing Rs. 10,000 proved unsuitable and were sold for Rs. 11,500 and a part of the plant was scrapped and sold for Rs. 1,700.

Of the contract price Rs. 2,40,000 representing 80% of the work certified had been received by 31st March, 2004 and on that date the value of the plant on the job was Rs.8,000 and the value of materials was Rs. 3,000. The cost of work done but not certified was Rs. 25,000.

It was decided to (a) estimate what further expenditure would be incurred in completing the contract; (b) compute from the estimate and the expenditure already incurred, the total profit that would be made on the contract; and (c) ascertain the amount of profit to be taken to the credit of profit and loss account for the year ending 31st March, 2004. While taking profit to the credit of profit and loss account that portion of the total profit should be taken which the value of work certified bears to the contract price. Details of the estimates are as follows:

- (i) That the contract would be completed by 30th September, 2004.
- (ii) The wages to complete would amount to Rs. 84,750.
- (iii) That materials in addition to those in stock on 31st March, 2004 would cost Rs. 50,000.
- (iv) That further Rs. 15,000 would have to be spent on plant and the residual value of the plant on 30th September, 2004 would be Rs. 6,000.
- (v) The head office expenses to the contract would be at the same annual rate as in 2003-2004.
- (vi) That claims, temporary maintenance and contingencies would require Rs. 9,000.

Prepare contract account for the year ended 31st March, 2004 and show your calculations of the sum to be credited to profit and loss account for the year.

5. Modern Construction Ltd., commenced a contract on 1st Jan, 2003. The total contract was for Rs. 10,00,000 (estimated by the contractor) and was accepted by Modern Construction Ltd., at 10% less. It was decided to estimate the total profit and to take to the credit of P & L A/c that proportion of estimated profit on cash basis which the work completed bore to the total contract. Actual expenditure in 2003 and estimated expenditure in 2004 are given below:

Particulars	2003(Actual) (Rs.)	2004 (Estimated) (Rs.)
Materials	1,50,000	2,60,000
Labour: Paid	1,00,000	1,20,000

Accrued	10,000	-
Plant purchased	80,000	-
Expenses	40,000	71,000
Plant returned at store on 31 st Dec(cost)	20,000	(on 30-09-2004) 50,000
Materials at site	10,000	-
Work certified	4,00,000	Full
Work uncertified	15,000	-
Cash received	3,00,000	Full

The plant is subject to annual depreciation @ 20% of cost. The contract is likely to be completed on 31st September 2004. Prepare the contract account. Assume that the plant costing Rs. 10,000 has been exhausted on the contract site during the course of second year and may be treated as normal loss.

6. A contractor secured a contract to supply and erect machinery for the sum of Rs. 7,50,000. He was to receive payments on account from time to time equal to 90% of the certified value of the work done.

He commenced work on 1st January, 2003 and incurred the following expenditure during the year- Plant & Tools Rs. 70,000; Machinery & Stores Rs. 2,00,000; Wages Rs. 1,50,000; Sundry Expenses Rs. 30,000 and Establishment charges Rs. 40,000.

A part of machinery costing Rs. 20,000 was unsuitable to the contract immediately sold at a profit of Rs. 5,000.

The value of Plant & Tools on 31st December, 2003 was Rs. 40,000 and the value of Machinery & Stores in hand Rs. 30,000.

By 31st January, 2004 he had received payments on account amounting to Rs. 4,38,750 being 90% of the certified value of work done upto 31st December 2003.

In order to calculate the profit made on the contract upto 31st December 2003, the contractor estimated the further expenditure that would be incurred in completing the contract and took to the credit of Profit and Loss A/c for the year that proportion of the estimated net profit to be realized on contract which the certified value of the work done bore to the contract price. He estimated:

- That the contract would be completed in a further period of six months.
- That plant & tools would have a residual value of Rs. 10,000 upon the completion of the contract.

- c) That the cost of Machinery and Stores required in addition to those in stock on 31st December 2003 would be Rs. 1,00,000 and that further Sundry expenses of Rs. 20,000 would be incurred.
- d) That the wages on the contract for 6 months to 30th June, 2004 would amount to Rs. 80,000.
- e) That the establishment would cost the same sum per month as in the previous year.
- f) That 2 ½% of the total cost of the contract (excluding the percentage) should be provided for contingencies.

Prepare the Contract account for the year ended 31st December, 2003 and show your calculations of the Profit and Loss Account for the year.

7. Construction Ltd., is engaged on two contracts A and B during the year. The following particulars are obtained at the year end (Dec 31).

Particulars	Contract A (April 1) (Rs)	Contract B (September 1)(Rs)
Contract price	6,00,000	5,00,000
Materials issued	1,60,000	60,000
Materials returned	4,000	2,000
Materials at site (Dec 31)	22,000	8,000
Direct Labour	1,50,000	42,000
Direct Expenses	66,000	35,000
Establishment expenses	25,000	7,000
Plant installed at site	80,000	70,000
Value of plant (Dec 31)	65,000	64,000
Cost of contract not yet certified	23,000	10,000
Value of contract certified	4,20,000	1,35,000
Cash received from contractees	3,78,000	1,25,000
Architect's fees	2,000	1,000

During the period materials amounting to Rs. 9,000 been transferred from Contract A to Contract B. You are required to show (a) Contract accounts, (b) Contractee's accounts and (c) Extract from balance sheet as on December 31, clearly showing the calculation of work in progress.

8. The following trial balance was extracted on 31st December, 2003 from the books of Swastik Co. Ltd., Contractors:

Particulars	Rs.	Rs.
Share Capital: Shares of Rs. 10 each		3,51,800
Profit and loss a/c on 1 st Jan 2004		25,000
Provision for depreciation of Machinery		63,000
Cash received on Account contract 7		12,80,000
Creditors		81,200
Land and Buildings (cost)	74,000	
Machinery (cost)	52,000	
Bank	45,000	
Contract 7:		
Materials	6,00,000	
Direct Labour	8,30,000	
Expenses	40,000	
Machinery at site (cost)	1,60,000	

Contract 7 was begun on 1st Jan, 2004. The contract price is Rs. 24,00,000 and the customer has so far paid Rs. 12,80,000, being 80% of the work certified.

The cost of the work done since certification is estimated at Rs. 16,000.

On 31st December, 2004, after the above trial balance was extracted, machinery costing Rs. 32,000 was returned to stores and materials at site were valued at Rs. 27,000.

Provision is to be made for direct labour due Rs. 6,000 and for depreciation of all machinery at 12 ½% on cost.

You are required to prepare (a) the contract account (b) a statement of profit, if any, to be properly credited to Profit & Loss A/ c for 2004 and (c) the balance sheet of Swastik Co Ltd., as on 31st December 2004.

9. The expenses of a machine cost centre, in respect of a month, are as follows:

- (a) Power Rs. 25,000
- (b) Maintenance and Repairs Rs. 5,000
- © Operator's Wages Rs. 1,000
- (d) General shop labour and supervision allowance Rs. 500

Product	Rate of production	Production
A	15 units per hour	900
B	5 units per hour	250
C	3 units per hour	150
D	2 units per hour	130
	Budgeted hours - 250	
	Actual hours - 220	

Depreciation per annum at the rate of 15 percent was Rs. 50,000 per month. The entire production was to be supplied to the Government in terms of a 'Cost plus' basis. Prepare a cost statement, assuming Material costs per unit being A = Rs. 20, B = Rs. 30, C = Rs. 50, D = Rs. 150.

10. A car manufacturing company undertook on cost plus basis an order from a transport company for the overhead of 100 engines. Spare parts of engines were to be supplied by the transport company. It was agreed that the basic cost would be negotiated on the basis of the actual cost of overhead of the first ten engines.

The manufacturing company submitted the following actual cost after overhauling the first ten engines:

Particulars	Cost per engine (Rs.)
Direct Labour cost	150
Variable overhead @100% on direct labour	150
Miscellaneous supplies	10
Stores overhead	50
Fixed overhead @100 percent on direct labour	150

Total	510
-------	-----

The variable, fixed and stores overhead rates are those normally applied by the company. In reviewing the items of expenses included in the various classes of overhead it was noticed.

- Variable overhead included advertisement expenses of Rs. 3 lakhs and share of tooling expenses of Re. 1 lakh for its own make of cars.
- Fixed overhead included depreciation amounting to Rs. 5 lakhs for a special purpose plant solely used for the manufacture of bodies of its own make of car.
- Stores overhead included expenses of purchases department and stores organization. As the cost accountant of the transport company, what advice would you give to your Managing Director about the reasonableness or otherwise of the cost claimed by the manufacturing company?

UNIT II - PROCESS COSTING

1. The product of a company passes through three distinct processes to completion. They are known as A, B and C. From past experience it is ascertained that loss is incurred in each process as: Process A – 25%, Process B – 5%, Process C – 10%.

In each case the percentage of loss is computed on the number of units entering the process concerned.

The loss of each process has a scrap value. The loss of processes A and B is sold at Rs. 5 per 100 units and that of process C at Rs. 20 per 100 units.

The output of each process passes immediately to the next process and the finished units are passed from process C into stock.

The following information is obtained:

Particulars	Process A (Rs.)	Process B (Rs.)	Process C (Rs.)
Materials consumed	6,000	4,000	2,000
Direct Labour	8,000	6,000	3,000
Manufacturing expenses	1,000	1,000	1,500

20,000 units have been issued to Process A at a cost of Rs. 10,000. The output of each process has been as under:

Process A 19,500; Process B 18,800; Process C 16,000

There is no work in progress in any process.

Prepare process accounts and also normal loss account, abnormal loss account and abnormal gain account. Calculations should be made to the nearest rupee.

2. The product of a manufacturing unit passess through two distinct processes. From past experience the incidence of loss is ascertained as under:

Process A – 2%

Process B – 10%

In each case the percentage of loss is computed on the number of units entering the process concerned. The sales realization of loss in Process A and B are Rs. 25 per 100 units and Rs. 50 per 100 units respectively. The following information is obtained for the month of April 2006:

40,000 units of crude material were introduced in Process A at a cost of Rs.16,000.

Particulars	Process A (Rs.)	Process B (Rs.)
Other materials	16,000	5,000
Direct Labour	9,000	8,000
Direct Expenses	8,200	1,500
	Units	Units
Output	39,000	36,500
Finished product stock:		
April 1	6,000	5,000
April 30	5,000	8,000
Value of stock per unit on April 1	Rs. 1.20	Rs. 1.60

Stocks are valued and transferred to subsequent process at weighted average costs. Prepare respective process accounts and stock accounts.

3. A certain product passess through three processes before it is transferred to finished stock. The following information is obtained for the month of December:

Items	Process I (Rs.)	Process II (Rs.)	Process III (Rs.)	Finished stock (Rs.)
Opening stock	2,000	12,000	10,000	25,000
Direct Material	13,000	20,000	40,000	-

Direct Wages	10,000	10,500	50,000	-
Production overheads	10,000	25,000	25,000	-
Closing stock	5,000	6,000	32,000	33,000
Profit % on transfer price to the next process profit	20%	25%	10%	-
Inter profits for opening stock	-	2,000	2,800	10,000

Stocks in processes are valued at prime cost and finished stock has been valued at the price at which it was received from Process III. Sales during the period were Rs. 3,00,000.

Prepare and compute:

Process cost accounts showing profit element at each stage;

- a) Actual realized profit; and
- b) Stock valuation for balance sheet purpose.

4. AB Ltd is engaged in process engineering industry. During the month of April 2004, 2,000 units were introduced in Process 'X'. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to Process 'Y', 460 units were incomplete and 140 units, after passing through fully the entire process had to be scrapped. The incomplete units had reached the following stage of completion –

Material	75% completed
Labour	50% completed
Overhead	50% completed

Following is the further information on the Process 'X'

Particulars	Rs.
Cost of 2,000 units	58,000
Additional Direct Materials	14,400
Direct Labour	33,400
Production overheads	16,700
Units scrapped realized Rs.10 each.	

Prepare Statement of equivalent production, statement of cost, statement of evaluation and the Process 'X' account.

5. R.P.Ltd furnishes you the following information relating to process 'B' for the month of October 2006:

(i) Opening work in progress Nil

(ii) Units introduced 10,000 units @ Rs. 3 per unit.

(iii) Expenses debited to the process:

Direct Material Rs.14,650;

Labour Rs. 21,148;

Overheads Rs.42,000.

(iv) Normal loss in process – One percent of input.

(v) Closing work in progress – 350 units – Degree of completion:

Material – 100%,

Labour and Overheads – 50%

(vi) Finished output – 9,500 units

(vii) Degree of completion of abnormal loss:

Material – 100%,

Labour and Overheads – 80%.

(viii) Units scrapped as normal loss were sold at Re.1 per unit.

(ix) All the units of abnormal loss were sold at Rs. 2.50 per unit.

Prepare:

1) Statement of Equivalent Production.

2) Statement of cost of finished goods, abnormal loss and closing work in progress.

3) Process 'B' account.

6. X Ltd. manufactures product A which yields two by-products B and C. In the period the amount spent up to the point of separation was Rs. 20, 600. Subsequent expenses are:

	(Rs)	B (Rs)	C (Rs)
Materials	300	200	150
Wages	400	300	200
Overheads	300	270	280
	1000	770	630

Gross sale value of product A, B, C was Rs. 15000, Rs. 10000, and Rs. 5000. It was estimated that the net profit as a percent of sales in B and C is 25% and 20% respectively. Find out the profit earned by A.

7. A company operates a chemical process which produces 4 products: K, L, M, and N for the basic raw material. The company's budget for the month is as under:

	Raw material consumption		Rs. 17,520
	Initial processing wages		Rs. 16,240
	Initial processing overheads		Rs. 16,240
Product	Production (kg)	Sales (kg)	Additional processing after split off (Rs.)
K	16000	109600	28800
L	200	5600	-
M	2000	30000	16000
N	360	21600	6600

The company presently intends to sell product L at the point of split off without further processing. The remaining products K, M, N are to be further process and sold. However the management has been advised that it would be possible to sell the product at the split off without further processing and if the course was adopted, the selling price would be under:

Products	K	L	M	N
Selling price per kg	4.00	28.00	8.00	40.00

The joint costs are to be apportioned on the basis of sales value realization at the point of split off.

- Prepare the apportionment of joint cost.
 - Present a statement showing the product wise total budgeted profit or loss based on proposal to sell product L at split off and K, M and N after further processing.
 - Present a statement showing the product wise the total budgeted profit or loss if the alternative strategy to sell all the products at split off stage was adopted.
8. From the following information for May 2004, prepare process cost accounts for Process II (Apply FIFO Method).

Opening stock: 600 units Rs.1,050.

Degree of completion: Materials 80%, Labour 60%, Overhead 60%.

Transfer from Process I: 11,000 units at Rs. 5,500.

Transfer to Process III: 8,800 units.

Direct Materials added in Process II: Rs.2,410.

Direct Labour amounted to Rs.7,155.

Production overhead incurred Rs.9,540

Units scrapped:1,200

Degree of completion: Materials 100%, Labour 70%, Overhead 70%.

Closing stock: 1,600 units.

Degree of completion: Materials 70%, Labour 60%, Overhead 60%.

There was a normal loss in the process of 10% of production. Units scrapped realized at 50 paise per unit.

9. State the features of process costing and also differentiate it from job costing.

10. A certain chemical process yields 75% of material introduced as main product, 20% as by product and 5% being lost. In the process one unit of main product requires double the material required for a unit of by product. Further one unit of main product needs 1 1/2 times the time needed for one unit of by product. Overheads are absorbed in the ratio of 3 : 1.

During a week 1000 units of raw material at a cost of Rs. 17,000 were introduced. Labour amounted to Rs. 5,300. Overheads came to Rs. 2,700. Wastage realized Rs. 300. Ascertain the cost of two products.

UNIT III - MARGINAL COSTING

1. Assuming that the cost structure and selling price remain the same in Periods I and II find out:

- Profit Volume Ratio
- Fixed Cost
- Break Even Point for sales
- Profit when sales are of Rs.1, 00,000
- Sales required to earn a profit of Rs.20, 000
- Margin of safety at a profit of Rs.15, 000
- Variable cost in Period II

Period	Sales (Rs.)	Cost (Rs.)
I	1, 20,000	1, 11,000
II	1, 40,000	1, 27,000

2. Tarus Ltd. produced three products: A, B, and C from the same manufacturing facilities. The cost and other details of the three products are as follows:

	A	B	C
Selling price per unit (Rs.)	200	160	100
Variable cost per unit (Rs.)	120	120	40
Fixed expenses per month (Rs.)			2,76,000
Maximum production per month (Units)	5,000	8,000	6,000
Total hours available for the month (Hours)			200
Maximum demand for the month (Units)	2,000	4,000	2,400

The processing hours cannot be increased beyond 200 hours per month. You are required to calculate the most profitable product mix and the maximum possible income.

3. An umbrella manufacturer makes an average profit of Rs. 2.50 per unit on a selling price of Rs. 14.30 by producing and selling 60,000 units at 60 per cent of potential capacity. The cost of sales per unit is as follows:

Direct Material	Rs. 3.50
Direct Wages	Rs. 1.25
Factory Overhead	Rs. 6.25(50% fixed)
Sales Overhead	Rs. 0.80(25% variable)

During the current year, he intends to produce the same number but estimates that his fixed cost would go up by 10 per cent while the rate of direct wages and direct materials will increase by 8% and 6% respectively. However the selling price cannot be changed.

Under this situation he obtains an offer for a further 20% of his potential capacity.

What minimum price would you recommend for acceptance of the offer to ensure the manufacture the overall profit of Rs. 1, 67,300?

4. From the following information recommend the best sales mix:

Sales mix :

250 units of X and 250 units of Y

400 units of X and 100 units of Y

400 units of Y only.

Information :

Direct Materials : X - Rs. 8 per unit, Y- Rs.6 per unit

Direct Wages: X - Rs. 6 per unit, Y- Rs.4 per unit

Variable overhead - 150% of direct wages

Fixed Overheads – Rs.750

Selling Price : X – Rs.25 per unit Y – Rs.20 per unit.

5. Small Tools Factory has a plant capacity to provide 19,800 hours of machine use. The plant can produce all A type tools or B type tools or the mixtures of both the types. The following information is relevant:

Per type	A	B
Selling Price	Rs. 10	Rs. 15
Variable cost	Rs. 8	Rs. 12
Hours require to produce	3	4

Market conditions are such that no more than 4000 A type tools 3000 B type tools can be sold in a year. Annual fixed costs are Rs. 9900. Compute the product mix that will maximize the net income to the company and find that maximum net income.

6. A Company budgets for a production of 150000 units. The variable cost per unit is Rs.14 and fixed cost per unit is Rs.2 per unit. The company fixes the selling price to fetch a profit of 15% on cost. Required,

(i)What is the break- even point? (ii) What is the profit/volume ratio? (iii) If the selling price is reduced by 5%, how does the revised selling price affects the Break Even Point and the Profit/Volume Ratio? (iv) If profit increase of 10% is desired more than the budget, what should be the sales at the reduced price?

7. A, B and C are three similar plants under the same management who want them to be merged for better operation. The details are as under:

Plant	A	B	C
Capacity operated	100%	70%	50%
Turnover	Rs.300 Lakhs	Rs.280 Lakhs	Rs.150 Lakhs
Variable costs	Rs.200 Lakhs	Rs.210 Lakhs	Rs.75 Lakhs
Fixed costs	Rs.70 Lakhs	Rs.50 Lakhs	Rs.62 Lakhs

Find out –

- (i) Capacity of the Merged Plant for Break Even.
(ii) Profit at 75% capacity of the merged plant
(iii) Turnover from Merged Plant to give a profit of Rs.28 Lakhs.
8. Two businesses, Y Ltd. And Z Ltd. Sell the same type of product in the same type of market. Their budgeted Profit and Loss accounts for the coming year are as follows:

	Y Ltd.	Z Ltd.
	Rs.	Rs.
Sales	1,50,000	1,50,000
Less: Variable cost	<u>1,20,000</u>	<u>1,00,000</u>
Contribution	30,000	50,000
Less: Fixed cost	<u>15,000</u>	<u>35,000</u>
Budgeted profit	<u>15,000</u>	<u>15,000</u>

You are required to :

- (i) Calculate the break even point of each business;
(ii) Calculate the sales volume at which each business will earn Rs.5, 000 profits.
(iii) Calculate at which sales volume both the firms will earn equal profits.
(iv) State which business is likely to earn greater profits in conditions of (I) heavy demand for the product and (II) low demand for the product and briefly give the reasons.
9. A company produces and markets industrial containers and packing cases. Due to competition the company proposes to reduce the selling price. If the present level of profit is to be maintained, indicate the number of units to be sold if the proposed reduction in selling price is:

(i) 5%	(ii) 10%	(iii) 15%	(iv) 20%		
The following additional information is available:				Rs.	Rs.
Present sales turnover (30,000 units)					3,00,000
Variable cost (30,000 units)				1,80,000	
Fixed cost				70,000	
				-----	2,50,000
Net Profit					----- 50,000 -----

10. From the following information recommend the best sales mix:

Sales mix :

250 units of X and 250 units of Y

400 units of X and 100 units of Y

400 units of Y only.

Information :

Direct Materials : X - Rs. 8 per unit, Y- Rs.6 per unit

Direct Wages: X - Rs. 6 per unit, Y- Rs.4 per unit

Variable overhead - 150% of direct wages

Fixed Overheads – Rs.750

Selling Price : X – Rs.25 per unit Y – Rs.20 per unit.

UNIT IV - OPERATING COSTING

1. Mr. H owns a fleet of taxis and the following information is available from the records maintained by him:

No of taxis	10	
Cost of each taxi	Rs. 54,600	
Salary of Manager	Rs. 700	p.m
Salary of accountant	Rs. 500	p.m
Salary of cleaner	Rs. 200	p.m
Salary of mechanics	Rs. 400	p.m
Garage rent	Rs. 600	p.m
Insurance premium	5%	p.a
Annual tax	Rs. 900	per taxi
Driver's salary	Rs. 350	p.m per taxi
Annual repairs	Rs. 1,000	per taxi

Total life of a taxi is about 2,00,000 kms. A taxi runs, in all 3,000 kms. in a month and 30% of this distance has to be run without any passenger. Petrol consumption is one litre for every 10 kms. @ Rs. 4.41 per litre. Oil and other sundries are Rs.10.50 per 100 kms. Calculate the cost of running a taxi per km.

2. Work out in appropriate cost sheet the unit cost per passenger km. for the year 1984-85 for a fleet of passenger buses run by a transport company from the following figures extracted from the books:

5 passenger buses costing Rs.50,000, Rs.1,20,000, Rs.45,000, Rs.55,000 and Rs.80,000 respectively. Yearly depreciation of vehicles - 20% of the cost. Annual repairs, maintenance and spare parts – 80 % of depreciation. Wages of 10 drivers @ Rs. 100 each per month, wages of 20 cleaners @ Rs. 50 each per month. Yearly rate of interest @ 4 % on capital. Rent of six garages @ Rs. 50 each per month. Director's fees @ Rs. 400 per month, office establishment @ Rs. 1,000 per month, Licence and taxes Rs.1,000 every six months, Realization by sale of old tyres and tubes @ Rs.3,200 every six months. 900 passengers were carried over 1,600 kms. during the year.

3. From the following data, calculate the cost per mile of a vehicle:

Value of vehicle	Rs.15,000
Road license for the year	Rs. 500
Insurance charges for the year	Rs.100
Garage rent per year	Rs. 600
Driver's wage per month	Rs.200
Cost of petrol per litre	Re. 0.80
Miles per litre	8
Proportionate charge for tyre and maintenance per mile	Re 0.20
Estimated life	1,50,000 miles
Estimated annual mileage	6,000 miles

Ignore interest on capital.

4. You are required to calculate a suggested fare per passenger/ km from the following information for a Mini Bus:

Length of route: 30 kms

Purchase price Rs.4,00,000.

Part of above cost met by loan, annual interest of which is Rs.10,000 p.a.

Other annual charges: Insurance Rs. 15,000; Garage rent Rs.9,000; Road tax Rs.3,000; Repairs and Maintenance Rs.15,000; Administrative charges Rs.5,000.

Running expenses: Driver & Conductor Rs.5,000 p.m; Repairs/ Replacement of tyres tubes Rs.3,600 p.a; Diesel and oil cost per km Rs.5

Effective life of vehicle is estimated at 5 years at the end of which it will have a scrap value of Rs.10,000.

Mini bus has 20 seats and is planned to make six two way trips for 25 days/p.m

Provide profit @20% of total revenue.

5. ABC Transport Company has given a route 40 kilometers long to run bus. The bus costs the company a sum of Rs.1, 00,000. It has been insured at 3% p.a. and the annual tax will amount to Rs.2, 000. Garage rent is Rs.200 per month. Annual repairs will be Rs.2, 000 and the bus is likely to last for 5 years. The driver's salary will be Rs.300 per month and the conductor's salary will be Rs.200 per month in addition to 10% of takings as commission [To be shared by the driver and conductor equally]. Cost of stationery will be Rs.100 per month. Manager-cum-accountant's salary is Rs.700 per month. Petrol and oil will be Rs.50 per 100 kilometers. The bus will make 3 up and down trips carrying on an average 40 passengers on each trip. Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger. The bus will run on an average 25 days in a month.
6. A hotel has a capacity of 100 single rooms and 20 double rooms. The average occupancy of both single and double room is expected to be 80% throughout the year of 365 days. The rent for the double room has been fixed at 125% of the rent of the single room. The costs are as under:
Variable costs: Single room Rs.220 each per day, double room Rs.350 each per day
Fixed costs: Single room Rs.120 each per day, double room Rs.250 each per day
Calculate the rent chargeable for single and double rooms per day in such a way that the hotel earns a margin of safety of 20% on hire of room.
7. The New Thermal Power Generating Plant gives you the following data. Find out in an appropriate form, the cost of electricity produced per unit, during the month of August.
 - a. Coal: Annual contract for supply of coal and inputs from a supplier F.O.R colliery at Rs. 1,000 per tonne.
Stock of coal on 1st August:500 tonnes, Supplies received during August: 1,100 tonnes. Stock of coal at the end of the month – 400 tonnes.
 - b. Oil 10 tonnes at Rs. 25,000 per tonne.
 - c. Water:5,00,000 litres, Pumping charges at Rs.2.50 per 100 litres.
 - d. Depreciation of steam boiler: Capital value Rs.24,00,000 and the rate of depreciation is 12.5% p.a.
 - e. Wages of the Boiler House – 10 Men at Rs.10,000 p.m. each, 40 Ancillary workers at Rs.2,000 p.m. each.
 - f. Wages of the Generating Station – 50 Men at Rs.10,000 p.m. each, 20 Ancillary workers at Rs.2,000 p.m. each.
 - g. Recovery on account of sale of Ashes: 100 tonnes at Rs.75 per tonne.
 - h. Repairs and Maintenance of Generating Equipment Rs.2,60,000.
 - i. Depreciation of the Generating Equipment to be charged on Capital value Rs.12,00,000 at 12.5% p.a.

- j. Share of Administration charges Rs. 1,75,000 for the month of August.
 k. Number of units generated – 7,00,000; Loss in the process: 20,000 units generated.
8. Progressive Enterprises Ltd. runs a canteen for the benefit of its workmen and provides necessary subsidy to the canteen.

During the month of August 1981 the following purchases are made:

Commodity	Quantity (Kg.)	Rate per Kg. (Rs.)
Tea	4	10
Sugar	50	3
Milk	60	2
Atta	210	2
Flour	20	3
Vegetable Ghee	30	11
Beson	12	4
Dal	30	3.50
Potato	90	2
Green Vegetable	20	1.50
Spices	2	24

The other expenses for the month were: Rickshaw fare Rs.20; salary to cook Rs.250 per month each. Wages to waiters Rs. 150 per month each. Supervisor's salary Rs. 300 per month.

Fuel, gas, coal etc. Rs.400. Miscellaneous expenses crockery and glassware Rs.100. depreciation utensils and furnitures Rs.50.

Sale of Coupons 7,800 @Re. 0.15 per coupon.

Prepare Trading and Profit & Loss account of the canteen for the month of August and find out the amount of subsidy paid by the company.

	Tea	Sugar	Atta
Opening balance	2 kg.	10 kg.	30 kg
Closing balance	1 kg.	5 kg.	20 kg

9. Rajdutt Hotel has three category of accommodation - one room suites, two room suites and three room suites.

The following are the details of information pertaining to the operation of the Hotel:

- a) Annual expenses are as thus:

	Rs.
Staff salaries	10,00,000
Repairs and renovations	1,72,000
Interior decoration	4,00,000
Sundries	1,31,040
Laundry contract cost	2,00,000

Room attendant's salary:

Rs. 8 per day per single room, Rs. 12 per day per double room and Rs. 16 per day per three room suite occupied in summer.

Rs. 12 per day per single room, Rs. 18 per day per double room and Rs. 24 per day per three room suite occupied during winter.

Lighting: Rs. 40 for one room suite per month if occupied for full month for both summer and winter. Rs. 60 for two room suite per month and Rs. 80 for three room suite per month, if occupied for full month, both summer and winter.

Power: Rs. 20 for one room suite, Rs. 30 for two room suites and Rs.40 for three room suite, per month if occupied for full month both summer and winter.

Depreciation:

Building @ 5% on Rs. 56, 00,000

Furniture and fixture @ 10% on Rs. 4,00,000

Air-conditioning equipment @ 10% on Rs. 8, 00,000

b) There are 200 one room suites, 60 two rooms to suites and 40 three rooms suites in the hotel

c) Normally 80% of one room, 60% of two room and 50% of three rooms are occupied in summer.

During winter 50% of one room, 40% of two room and 20% of three suites are occupied

d) Summer may be assumed for 8 months and winter for 4 month duration. Normal days in a month may be taken at 30.

e) Profit on cost is to be taken 25% so that interest on investment may also be covered such profits.

The rent of two room suits is to be fixed at 1 1/2 times of one room suits and that of three room suits at double the one room suits.

You are required to prepare an operating cost statement of Rajdut Hotel for a year and suggest the rent which should be charged for each type of suite on the basis of above information.

10. A transport company is running four buses between two places 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books:

Wages of drivers, conductors and cleaners Rs.2,400

Salaries of office and supervisory staff	Rs.1,000
Diesel oil and other oils	Rs.4,000
Depreciation	Rs.2,600
Repairs and maintenance	Rs. 800
Interest and other charges	Rs.2,000
Taxation, Insurance etc;	Rs.1,600
	14,400

Actual passengers carried were 75% of the seating capacity. All the four buses ran on all the days of the month. Find out the cost per passenger mile.

UNIT V UNIFORM COSTING

1. Explain the essential requisites for installation of a Uniform costing system in a company.
2. What is uniform costing. Explain its merits and demerits.
3. Explain the meaning of Inter firm comparison. Describe the requisites to be considered while installing a system of Inter firm comparison.
4. What is Inter firm comparison. Give its advantages and disadvantages.
5. What is uniform costing ? What are the items you would seek uniformity in Uniform Cost accounting system.
6. What is uniform costing Manual? Explain its contents.
- 7 . Explain the objectives and scope of Uniform costing.
8. Explain the different types of Inter-firm comparison scheme.
9. Explain the pre-requisites of an Inter firm comparison scheme.
10. Write notes on :
 - i) Uniform costing.
 - ii) Inter firm comparison.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI – 628001.
II M.COM SEMESTER – IV
CORE 2 –TAXATION AND TAX PLANNING 21PCOC42
(For those who joined in July 2021 and after)
QUESTION BANK

Section A (one mark each)

Choose the correct answer

UNIT I

1. The year in which the income of an assessee is taxable is known as _____ year.
a. accounting b. previous c. assessment d. academic
2. Under the Income Tax Act, the incidence of taxation depends on the _____ of the tax payer.
a. age b. citizenship c. religion d. residential status
3. On which income, income tax is not levied?
a. Income from salary b. Income from HP c. Business income d. Agricultural income
4. The total income of an assessee is classified into
a. six heads b. four heads c. five heads d. two heads
5. If the total income exceeds Rs.10, 00,000 surcharges is
a. 2% b.15% c. 10% d. 20%
6. Income tax is computed on
a. capital b. fixed assets c. income d. business income
7. Income tax is a.....
a. business tax b. profession tax c. direct tax d. indirect tax
8. A person is said to be an ordinarily Resident when the person is satisfying _____.
a. both basic and additional conditions b. only basic conditions
c. only additional conditions d. not basic and additional conditions
9. A person is said to be a non-resident when he is _____.
a. not fulfilling any one of the basic conditions b. fulfilling only basic conditions
c. fulfilling only additional conditions d. fulfilling both basic and additional conditions
10. Who is assessee in case of a HUF?
a. father b. spouse c. karta d. demed karta

UNIT II

11. Education allowance is exempted for:
a. One person b. Four person c. Two person d. None of the person
12. The periodic payment of money for the past service is known as
a. Pension b. Commuted pension c. Gratuity d. None of the above
13. Gratuity received by a government employee is _____.
a. fully exempted b. partly taxable c. fully taxable d. exempted upto Rs. 1 lakh
14. Educational allowance is exempt upto
a. Rs.200 p.m per child b. Rs.100 p.m per child c. Rs. 150 p.m per child
d. Rs. 250 p.m per child
15. Income from subletting a house property is
a. House property b. exempted c. Income from other sources
16. The standard deduction for income from house property is
a. 20% b.10% c.30% d. 15%
17. Tax paid on house to Municipality is called as
a. Income tax b. Excise duty c. Sales tax d. House tax

18. Gifts from clients are _____
 a. Salary b. Professional incomes c. Capital gains d. Other sources
19. Share of income from firm is.....
 a. Taxable in the hands of partner b. Exempted in the hands of partner.
 c. Exempted in the hands of firm. d. Capital gain.
20. Preliminary expenses shall be allowed as deduction in....
 a. 5 Installments. b. 10 Installments. c. 15 Installments d. 12 Installments

UNIT III

21. Any profits arising from the transfer of a capital asset is called _____
 a. net profit b. gross profit c. capital gain d. none of the above
22. Capital assets does not include
 a. stock in trade b. gold bonds c. gold deposit bonds d. all of the above
23. The term capital asset includes
 a. jewellery b. car in case of car dealer c. television in case of television dealer
 d. cash
24. Capital gain arises from the transfer of
 a. cash b. any capital asset c. stock d. none of the above
25. Income from sub- letting of House Property is
 a. Income from other sources b. property income c. exempted d. capital gain
26. Under which head pension is taxable?
 a. Salaries b. Income from other sources c. Capital gains d. Profits and gains
27. Which of the following is not chargeable to tax under the head 'Income from other sources'?
 a. Dividend from a cooperative society b. Prize on crossword puzzles
 c. Profit on sale of goodwill of a business d. Interest from bank
28. Dividends received from an Indian company is
 a. taxable b. non taxable c. deducted d. added
29. No clubbing in case of transfer of asset is revocable
 a. during the life time of the transferee b. within six years of transfer
 c. after the life time of transferee d. at will of transferor
30. The income from sale of Household Furniture is
 a. Taxable Income b. Exempted Income c. Capital Gains d. Revenue Gain

UNIT IV

31. Short term capital loss can be set off from
 a. capital gain b. short term capital gain only c. long term capital gain only
 d. not from any income
32. Income of a minor child is included in the total income of
 a. transfer of asset b. father c. parent whose income is greater d. none of the above
33. Loss from speculation business can be set off from
 a. Income of speculative business b. Income of non speculative business
 c. Income of any head d. not from any income
34. Speculation loss can be set off against
 a. Income of speculative business b. Income of non speculative business
 c. Income of any head d. not from any income
35. Loss from house property can be carried forward for _____ assessment years.
 a. 8 b. 10 c. 5 d. 1
36. Section 80 C applies on
 a. individual and Hindu undivided family b. firm c. co-operative societies d. company
37. Deduction under section 80 P is available to a
 a. Co operative Society b. Indian Company c. Individual d. Hindu Undivided Family

38. The age of woman should be less than how many years to avail the deduction u/s 88 C
 a. 65 b. 60 c. 55 d. 50
39. Section 80 D applies on
 a. Individual and Hindu undivided family b. Firm c. Company d. Societies
40. What amount is accepted for deduction under Section 80 DD regarding disability?
 a. Rs.30,000 b.Rs. 50,000 c. Zero d. Actual expenses

UNIT V

41. Commissioner of income Tax is appointed by ___ Government.
 a. central b. state c. both central and state d. none of the above
42. A charitable institution is required to file return of income in Form No. _____.
 a. No. ITR- 7 b. ITR- 6 c. ITR- 5 d. ITR 4
43. A belated return for the A.Y. 2018 – 2019 can be filed till _____.
 a. 31.03.2019 b. 31.03.2020 c. 30.04.2020 d. 30.04.2019
44. Tax deducted at source is _____
 a. treated as receipt b. treated as expense c. both receipt and expenses d deducted at source
45. Education cess is at the rate of _____%
 a. 3 b. 2 c. 1 d. 4
46. An individual resident in India and non resident in India pay tax at the _____ rate
 a. same b. different c. both a and b d. none of the above
47. Tax amount shall be round off to the nearest multiple of _____ rupee
 a. ten b. five c. one d. two
48. The tax liability of an assessee is determined with reference to his
 a.total income b. tax income c. gross income d. net income
49. The share of profit of a partner in a firm is exempted under sec ____
 a. 10 b. 10(2A) c. 9 d. 10 2(A)
50. In case of co operative society or local authority or firm the surcharge is
 a. nil b. 100 c.50 d.10

Section B (Two marks each)

Answer the following in about 50 words each:

UNIT I

51. What is income?
 52. What is casual income?
 53. Who is called as assessee?
 54. What is assessment year?
 55. What is tax avoidance?
 56. What is tax evasion?
 57. What is tax planning?
 58. Write any two differences between tax planning and tax avoidance?
 59. What is agricultural income?
 60. Who is called as residence?

UNIT II

61. Define salary.
 62. What is transferred balance?
 63. What is meant by house rent allowance?
 64. What is annual value?
 65. What is composite rent?
 66. What is gross annual value?
 67. Define business.

68. Define profession.
69. What is Demerger Company?
70. What is emblezzment? How it is treated in income tax?

UNIT III

71. What is transfer of capital asset?
72. What is normal dividend?
73. What is interim dividend?
74. Define the term security.
75. What is cum-interest transaction?
76. What is ex-interest transaction?
77. Mention the Income which is chargeable under the head Income from other Sources.
78. What is Bond Washing Transaction?
79. What are the deductions available for Dividend under the head Income from other Sources?
80. Mention the Income which can be clubbed

UNIT IV

81. What do you mean by Speculation business?
82. How the long term capital loss can be set off?
83. What do you mean by Cash Credits?
84. Write any five items under section 80 C of Income Tax Act, 1961.
85. What is Total income?
86. What is Sec 80 D?
87. What do you mean by donation?
88. What deductions are given under Sec 80 CC?
89. Write the tax rate for the Assessment Year 2018-19?
90. What do you mean by surcharge?

UNIT V

91. What is Advance payment of tax?
92. What is Return of income?
93. What is TDS?
94. When do we file the return?
95. What is E- Filing?
96. Who is an individual?
97. How do you determine the tax liability of an individual?
98. Mention the exempted amount of taxation allowed to an individual.
99. What do you mean by illegal business?
100. What is book profit?

Section C (Five marks each)

UNIT I

101. What are the conditions to become an ordinarily resident of an individual under the provisions of Income Tax Act?
102. Explain the following terms (i) Assessee (ii) Previous year (iii) Income (iv) Assessment year
103. Briefly give the basic conditions and additional conditions to decide the residential status.
104. Explain the partly agricultural income.
105. What do you mean by Deemed to Accrue or Arise? – Explain.
106. Mr. X, a foreign citizen, comes to India for the first time on July 23, 2019. On September 26, 2019, he leaves India for Sri Lanka on a business trip. He comes back on January 10, 2020. On January 19, 2020 he left for Sri Lanka again. Determine his residential status for the assessment year 2022-23.
107. Mr. Y, a foreign citizen (not being a person of Indian origin), leaves India for the first time in the last 10 years on November 28, 2017. During the calendar year 2018, he comes to India on October 1 for

- a period of 50 days. During the calendar year 2019, he does not visit India at all but comes to India on January 10, 2020. Determine the residential status of NG for the assessment 2022-23.
108. N comes to India, for the first time, on April 17, 2013. During his stay in India upto Oct 4, 2019, he stays in Surat upto May 23, 2019 and thereafter remain in Chennai till his departure from India. Determine his residential status for the assessment year 2022-23.
109. N, a UK citizen, comes to India for the first time (after 24 years) on May 25, 2019 and stays upto November 22, 2019. During his stay he visited 5 different cities. He worked for few days and balance days he was just in holiday. Determine his residential status for A/Y 2022-23.
110. Who is a non-resident individual?

UNIT II

111. Compute the salary income of Mr. Kandan, who is working as driver in a transport company for the assessment year 2022-23.
- Salary @ Rs. 7,200 p.m.
 - Dearness allowance @ Rs. 3,000 p.m.
 - Remote locality allowance @ Rs. 3,000 p.m. (Notified to be exempted upto Rs. 200 p.m.)
 - Running allowance Rs. 2,000 p.m.
 - Entertainment allowance Rs. 700 p.m.
112. Compute salary income of Mr. Nagarajan from the following:
- Salary received (after deduction of Income Tax and RPF) Rs. 1,00,000.
 - Income tax paid Rs. 10,000.
 - RPF deducted Rs. 12,000.
 - Dearness Allowance at 20% of salary.
 - Bonus Rs. 15,000.
 - Leave salary Rs. 13,000
 - House Rent Allowance Rs. 1,000 p.m.
 - Rent paid house in Chennai Rs. 1,300 p.m.
113. After serving for 33 years and 9 months in Bharat chemicals ltd, Mr. X, who is covered under the payment of gratuity act retires from services on 30th November 2014. The employer pays him a gratuity of Rs. 3,00,000. His monthly basic salary at the time of retirement was Rs. 10,000, D.A. Rs. 3000 and HRA Rs. 1300. You are required to determine the amount of gratuity exempt under Section 10(10) of the Income Tax Act.
114. What is the Provision for earned Leave Salary?
115. How does the rent control act affect the annual value?
116. X owns a house. The municipal value is Rs. 18,000. Standard rent Rs. 30,000. He occupied a House for residence from 1.4.2022 to 30.9.2022 and from 1.10.2022 let it out on rent at Rs. 2,000 p.m. Determine its annual value if municipal tax paid Rs. 2,000.
117. Calculate annual value from the following information:
Actual Rent Rs. 24,000 p.a: Fair Rent Rs. 28,000 p.a: Standard Rent Rs. 20,000 p.a
118. Define speculative transactions.
119. State whether the following items are deductible or not and why, under the head business income.
- Fees paid to the lawyer of drafting partnership deed.
 - Donation to a political party.
 - Legal expenses paid to protect the building of business.
120. Profit and loss a/c of business shows a profit of Rs. 50,000 after debiting the following expenses:
- | | |
|------------------------|------------|
| Personal expenses | Rs. 5,000 |
| Life insurance premium | Rs. 8,000 |
| Income Tax | Rs. 11,000 |
| House municipal tax | Rs. 700. |
- Compute the taxable income of business.

UNIT III

121. Which assets are not considered as capital assets, while computing capital gains?
122. Define the term “Index cost of acquisition”
123. Ramu purchased a residential house in 1984 for Rs. 2,00,000 which he sold in October 2017 for Rs. 20,10,000. Fair market value of the house as on 1.4.97 was Rs. 3,00,000. He purchased a new house on 31.12.2021 for Rs. 4,10,000. Compute his taxable capital gain.
124. Mr. Balaji purchased a house for Rs. 2,00,000 in 1995 – 96 and paid Rs. 18,000 as registration charges. He sold this for Rs. 12 lacs on 31.05.19. The market value of this house on 15.09.19 was Rs. 10 lacs. Compute the capital gains for the A.Y 2022 – 23.
125. A non-resident remitted U.S.\$ 25,000 to India to purchase in an Indian Company. At the time of purchase of shares the prescribed rate of exchange was Rs 30. The shares are sold for Rs. 11,27,000. At the time of sale the prescribed rate of exchange was Rs. 49. Compute the capital gains.
126. Compute the income for the year ending 31st March, 2022 under the head ‘Income from other sources’ of Mr. Abinay Johri. His investments were:
- i) 5% Government securities Rs.70,000
 - ii) 7.5% Agra Municipal bonds Rs.50,000
 - iii) 9% debentures of a company Rs. 30,000
 - iv) 7% capital investment bonds Rs.20,000
127. Calculate income from other sources from the information given below:
- i) Winnings from lottery Rs.1,00,000
 - ii) Amount received from race winnings Rs. 35,000
 - iii) Gifts received
 - a) Received Rs.20,000 as gift from his friend
 - a) Received Rs. 1,00,000 as gift from his elder brother
 - b) Received Rs.1,40,000 as gift on his marriage
 - c) Received Rs.80,000 as gift from his NRI friend.
128. What do you understand by aggregation of income?
129. From the following particulars submitted by Shri Gaurav, compute his income from other sources for the Assessment Year 2022-2023
- i) He was a director in a company from which he received Rs.13,000 as director
 - ii) Interest received on deposits with a cooperative Bank Rs.2,000
 - iii) Dividends received from a foreign company Rs.6,000
 - iv) Received winnings from lottery Rs.28,000
 - v) Income from agriculture in England Rs. 78,000
 - vi) Honorarium for delivering lectures in a registered society Rs. 1,200
130. Enumerate on the concept of clubbing of income.

UNIT IV

131. What is tax holiday?
132. What is section 80C of the Income Tax Act?
133. From the following particulars in respect of Mr. Adarsh an author of books, find out the deduction allowable to him u/s 80C for A.Y 2022-23:

	Rs.
Life Insurance Premium (on his own life)	22,000
Sum assured on the above policy	2,00,000
Contribution to unrecognized provident fund	1,000
Contribution to public provident fund	45,000
Subscription to National Savings Certificate (VIII issue)	8,000
Accrued interest for one year completed N.S.C (VIII issue)	8,000
Life Insurance premium (on his mother’s life policy)	5,000
Repayment of Bank Loan borrowed for construction of these house	21,000

134. Calculate the qualified amount under section 80C for the assessment year 2022-23 from the information given below :

- a) Life Insurance premium paid Rs.20,000 on his own policy
- b) His own contribution to R.P.F Rs.5,000 and employer's contribution to R.P.F Rs.4,000
- c) Repayment of loan taken for construction of residential house Rs.80,000 out of which Rs. 30,000 is interest.
- d) Purchased NSC of Rs.10, 000.
- e) Contribution to family Benefit fund Rs.1, 000.
- f) Accrued interest on NSC (VII issue) amounted to Rs.1,000
- g) Life insurance premium paid by him on his brother's life policy was Rs.5, 000.

135. Following are the particulars of income of Shri Amarnath for the previous year 2021-22:

	Rs.
Income from Salary (Gross)	1,60,000
Rental Income from House Property	36,000
Profits of Business	1,20,000

During the previous year he paid Rs.17, 000 as premium on the insurance of the health of himself and wife. During the year the assessee claimed Rs.1, 500 for the illness of his wife, which were duly received from the insurance company. The unmarried disabled sister of Shri Amarnath is dependant wholly on him. Shri Amarnath spent Rs.19, 000 on her treatment and training during the previous year.

Compute the total income of Shri Amarnath for the assessment year 2022-23

UNIT V

136. What is Self Assessment?

137. Mr. D is an employee of a company of a company at Udaipur (Population exceeding 25 lakh).

He would receive the following during financial year 2021-2022:

	Rs
Salary	9,60,000
Dearness Allowance	2,40,000
Bonus	80,000

Children education allowance Rs. p.m for one child.

Rent- free house- F.R.V Rs.1, 50,000.

His annual contribution to Provident Fund is Rs.96, 000

He has paid Life Insurance Premium of Rs.12, 000

Donation to Prime Minister's National Relief Fund Rs.10, 000

Compute his income from salary liable to deduction of tax at source and the amount of tax to be deducted

138. X's income under the head 'Salary' is completed at Rs. 6, 57,000. The contribution in Recognized Provident fund and Public is Rs.50, 000. He has paid Life Insurance Premium of Rs.15, 000 on a policy of Rs.60, 000 and purchased shares of eligible issue of capital Rs.5, 000. Compute the amount of tax to be deducted at source during the financial year 2021-22. He has informed to the employer that there is loss under the head 'Income from house Property' on account of interest payment in relation to self-occupied house Rs.30, 000.

139. During the financial year 2021-22 find out the tax to be deducted at source in the following cases, if the recipient is an individual and resident in India:

	Rs.
i. Income from interest on Securities (listed)	6,000
ii. Payment regarding lottery winnings	500
iii. Dividends from domestic company	40,000
iv. Winnings from a horse race	10,000

- | | | |
|------|----------------------------------|--------|
| v. | Winnings from another horse race | 2,000 |
| vi. | Commission to lottery agent | 15,000 |
| vii. | Insurance Commission | 34,000 |
140. The following are the incomes received by Mr. Kumar during the financial year 2021-2022
Directors' fees Rs.2, 000
Income from Agricultural Land in Pakistan Rs.5, 000
Ground rent received from Land in Mumbai Rs.10, 000
Interest on Post office savings Bank Rs. 1,250
Bank interest received (Gross) Rs.15, 000
Interest on deposits with Industrial Finance Corporation Rs.500
Compute his total income.
141. Following are the details available in respect of Mrs.Maya relating to the previous year 2021- 2022
Long term capital gains (indexed) Rs. 2, 20,000
Interest on Bank deposits Rs.10, 000
Dividend from Co-operative Society Rs. 5,000
Life insurance premium paid Rs. 10,000
Contribution to public Provident Fund Rs. 10,000
Calculate tax payable by Mrs. Maya for the Assessment Year 2022-2023.
142. The following details are available in respect of Ashok relating to the previous Year 2021 -2022
Agricultural income Rs. 10,000: Non-agricultural income Rs. 3, 50,000: contribution to Public Provident fund Rs.10, 000. Compute tax payable by Ashok.
143. State the rates of income tax for individuals.
144. The business income of a firm before charging the following is Rs.2,20,000:
- | | |
|---|----------|
| | Rs. |
| Remuneration to working partners as per deed | 1,20,000 |
| Brought forward business loss | 1,50,000 |
| Unabsorbed depreciation | 50,000 |
| Unabsorbed capital expenditure on scientific research | 30,000 |
- Compute the total income of the firm
145. A, B and C are members of an Association of Persons. They share profit or loss equally. During the previous year the income of AOP is Rs. 2, 20,000 and the income of A, B and C is Rs.40,000, Rs. 1, 90,000 and Rs. 2, 00,000 respectively. Compute tax liability of AOP and A, B and C for the A. Y. 2022-23

Section D (Ten marks each)

Answer the following in about 400 words each:

UNIT I

146. Discuss the evolution of Income Tax Law in India.
147. (i) Determine the residential status of Mr. X for the previous year 2021-22, assuming That he did not go out of India before this and come back to India on 10th April 2021 in the following cases:
1. Sponsored by his employer in India for training in U.K. and he leaves (a) on 15th Jun 2019 or (b) on 10th May 2020.
2. He goes for employment purpose to U.K. and leaves to India on 15th September 2020.
(ii) Shri Ramesh who was born and brought up in India, went for further studies to U.K. on 1st March 2018 and came back to India on 1st October 2019 early in the morning. Find out his residential status for the assessment year 2022-23.
148. How do you determine the Total Income and Gross Total income?
149. The following are the incomes of Shri Ram Prasad for the 2022- 23:
(i) Profit from business in Iran received in India Rs. 5,000;
(ii) Income from house property in Iran received in India Rs.500;
(iii) Income from house property in Pakistan deposited in a bank there Rs.1, 000

- (iv) Profits of business established in Pakistan deposited in a bank there Rs.20, 000(out of Rs.20,000 a sum of Rs. 10,000 is brought into India) this business is controlled from India;
- (v) Accrued in India but received in England Rs. 2000
- (vi) Profit earned from business in Kanpur Rs.6, 000
- (vii) Income from agriculture in England – it is all spent on the education of children in London Rs.5000 and
- (ix) Past untaxed foreign income brought into India during the previous year Rs.10, 000.

From the above particulars ascertain the taxable income of Shri Ram Prasad for the previous year 2021 – 2022 if Shri Ram Prasad is (i) a resident (ii) a not ordinarily resident and (iii) a non-resident.

150. Shankar a foreign national furnishes the following particulars of his income relevant for the previous year 2021- 2022;

1. Profit on sale of Plant at London (one half is received in India) Rs. 1, 46,000
 2. Profit on sale of Plant at Delhi (one half is received in London) Rs. 1, 02,000
 3. Salary from an Indian Company received in London (one half is paid for rendering services in India) Rs. 60,000
 4. Interest on U.K. Development Bonds (entire amount is received in London) Rs. 40,000
 5. Income from property in London received there Rs. 30,000
 6. Profit from a business in Delhi managed from India Rs. 49,000
 7. Income from agriculture in London received there, half of which is used for meeting hostel expenses of Shankar's son in England and remaining amount is later on remitted to India Rs. 25,000
 8. Dividend (Gross) received in London from a company registered in India but mainly operating in U.K. Rs. 17,000
 9. Rental Income from a property in Nepal deposited by the tenant in a foreign branch of an Indian bank operating there Rs. 12,000
 10. Gift from a relative in a foreign currency (one third of which is received in India and remaining amount is used for meeting education expenses of Shankar's son in USA)
- Determine gross total income of Shankar for the assessment year 2022 -2023, if he is a (i) resident (ii) non-resident (iii) not ordinarily a resident What are the various conditions to determine the residential status of the individuals?

UNIT II

151. Mr. X is employed in Mumbai. His particulars of income for the assessment year 2022– 2023

Basic Salary Rs. 6000 p.m

Dearness Allowance Rs.2000 p.m (40% is computed for retirement benefits)

Bonus Rs. 5000 p.a

Commission Rs. 4000 p.a

Entertainment allowance Rs. 500 p.m. Fair rental value of free house provided by the employer Rs. 30,000 p.a. Value of furniture provided Rs. 20,000. Find out Mr.X's income salary if the population is more than 25 lakhs.

152. Explain the composition of salary from income tax point of view.

153. Mr. Sakthivel owns a house property which is let out for residence. He submits then following details to compute gross annual value of the property.

	Rs
Municipal value	1, 40,000
Fair rent	1, 45,000
Standard rent under Rent control Act	1, 42,000
Annual rent if property is let out throughout the previous year	1, 68,000
Unrealized rent	14,000
Loss due to vacancy	7,000

154. Mr. Raja, owner of two houses, occupied one for his own residence and the other he lets to a tenant at a monthly rent of Rs. 500. The municipal valuation of the house occupied is Rs. 2,600 and of the other is Rs. 5,200. The municipal tax of the two amounted to Rs. 600. The other expense in respect of the two houses are as follows:

Insurance premium (for both houses)	Rs. 1,200
Repairs of the house occupied	Rs. 700
Interest of loan taken to repair the two houses	Rs. 400

Calculate Mr. Raja's income from house property

155. Given below is the profit & loss account of a Timber Merchant for the year ended 31st March 2022: Compute his taxable income

	Rs		Rs
Opening Stock	25,000	Sales	5,00,000
Purchases	2,50,000	Rent of Property	15,000
Wages	1,00,000	Closing Stock	35,000
Audit fees	1,000		
Repairs (House Property)	2,000		
General Charges	1,500		
Commission for Raising loan	1,000		
Bad debts reserve	500		
Bad debts	2,000		
Interest on Capital	1,500		
Contribution to Staff			
Welfare Fund	2,500		
Provision for Income Tax	10,500		
Depreciation Allowable	2,500		
Net Profits	1,50,000		
	5,50,000		5,50,000

UNIT III

156. From the following information of Mr. Gowthaman, compute the capital gains for the assessment year 2022-2023.
- Cost of acquisition of residential house in 1993-94 Rs. 2,00,000
 - Sale consideration on 2.6.2021 Rs. 18,00,000
 - Cost of acquisition of new house for residential purposes by due date of filing the return Rs. 3,50,000
 - Amount deposited in capital gains a/c scheme by due date of filing the return for the A.Y. 2022-23 Rs. 1,00,000 ; The C.I.I. is 1993 – 94 = 244 and 2021 – 2022 = 317
157. Mr.A provides the following data regarding his transaction for the sale of his residential house for the assessment year 2022-2023. Compute capital gains taxable for the A.Yr. 2022 – 23.
- House purchased in 1992- 93 Rs.4,00,000
Sold in November 2021 Rs. 40,00,000
Purchased another house in September 2021 Rs.6,50,000
Deposited in the capital Gains a/c scheme, in January 2022 Rs. 3,00,000
Cost inflation index 1992 – 93 = 223 ; 2021 – 22 = 317
158. From the following information of Mr. A, compute the capital gains for the assessment year 2022-2023.
- Cost of acquisition of a building in 2008-09 Rs. 1,00,000
 - Sale consideration on 2.6.2021 Rs. 9,00,000
 - Cost of acquisition of new house for residential purposes by due date of filing the return Rs. 1,75,000

iv) Amount deposited in capital gains a/c scheme by due date of filing the return for the A.Y.
159. Mr. Basavaraju furnishes the following particulars of his investments for the P.Y. ended 31.3.2022

- i) Rs. 20,000 8% municipal debentures
- ii) Rs.30,000 10% Karnataka State Government Loan.
- iii) Rs.20,000 18% tax free debentures of X co Ltd., listed in a recognised stock exchange.
- iv) Rs.20,000 7% Capital Investment Bonds of Government of India.

He also received during the same P.Y. :

- i) Rs.2,000 as interest on Central Government Securities.
- ii) Rs.2,000 as interest on State Government Securities.
- iii) Rs. 900 as interest on Debentures of X Co. Ltd. (not listed in a recognised Stock Exchange)
- iv) Rs.1,500 as interest on bank deposit.
- v) Rs.1,000 interest on loan given to a relative.

He paid 100 as commission to his bankers for collecting interest on securities.

Compute his income from other sources.

160. Mr. Lalit an ordinary resident in India earned the following incomes during the financial year 2021-22:

- Director's fees Rs. 2,000
- Income from agricultural land in Pakistan Rs. 5,000
- Ground rent for land in Pathankot Rs.10,000
- Interest on postal savings bank account Rs.100
- Inteest on deposit with industrial finance corporation of India Rs. 500
- Dividend from a foreign company Rs.700
- Rent from sub letting a house Rs.26,250
- Rent payable by Mr. Lalit for the sub let house Rs.12,000
- Other expenses incurred on this sub let house Rs.1,000
- Winnings from race course Rs.12,300
- Interest on securities Rs. 4,000

You are required to calculate 'Income from other Sources' of Mr. Lalit for the A.Y. 2022 -2023

UNIT IV

161. What are the provisions governing the set off of losses?

162. What are the provisions of Income Tax Act regarding the following?

- i) Cash credits ii) Unexplained money, etc. iii) Unexplained expenditure
- iv) Amount borrowed or repaid on Hundi v) Unexplained investments.

163. What are the provisions of Income Tax Act regarding the following?

- i) Long term capital losses ii) Short term capital losses iii) Speculation losses
- iv) Losses of lottery and card games. v) Loss of house property

164. Explain the deduction under section 80 G.

165. What re the deduction available for an individual?

UNIT V

166. Under Section 139, who should sign the Income Tax Returns?

167. What are the payments on which tax is deducted at source?

168. What is meant by the expression 'Best Judgment Assessment'?

169. The following are the particulars of income of Smt. Manorama Devi:

- (i) She is getting a salary of Rs.15, 000 p.m. Her employer had provided her with an unfurnished accommodation in Delhi at Rs.6,000 per annum, the fair rent of which is Rs.30,000 per annum.

(ii) Her investments were:

(a) 10% Rajasthan Government Loan Rs.50, 000

(b) 10% Govt. Bonds Rs.24, 000

(c) Rs.60,000 in 10% Fixed Deposit Account in a bank for 5years

(iii) She owns a house which had been let at Rs. 2,000 p.m. but its fair rent is Rs. 2,250 p.m. Municipal taxes of Rs. 3,000 were paid by her. She spent Rs.100 on collection of rent and paid 3,000 as interest on loan taken for renewing the house.

(iv) She earned a profit of Rs. 10,000 from speculation business.

(v) She received Rs. 900 as interest on Capital Investment Bonds.

Smt. Manorama Devi claims that last year's carried forward speculation loss of Rs.4,000 allowed being set-off this year.

Compute Smt. Manorama Devi's total income for the assessment year 2022-23.

170. From the following information compute the total income of the firm and tax payable by it for the assessment year 2022-23:

	Rs.
(i) Profit from an industrial undertaking establishment in backward State in Feb.2014	40,000
(ii) Profit from business of Poultry breeding	30,000
(iii) Short-term capital gains	20,000
(iv) Long-term capital gains	40,000
(v) Interest from bank	6,000
(vi) Loss from house property Rs. 10,000 on account of interest on loan taken to construct the property	
(vii) Donation to approved Charitable Institution	15,000

St. Mary's College (Autonomous) Thuthookudi-628001
QUESTION BANK
M.Com - Semester – IV
Core - Retail Marketing Sub.code:21PCOC43
(for those who joined in July 2021 and after)

Section A

Unit :I

1. The word Retail is derived from the----- word.
A. Latin. B. French. C. English. D. German.
2. Retailer is a person who sells the goods in a-----.
A. large quantities. **B. small quantities.** C. both a & b. D. none of these.
3. The main objective of the management is-----
A. profitability. B. sales growth. C. return on investment **D. all of these.**
4. In retailing there is a direct interaction with-----
A. producer. B. customer. C. wholesaler. **D. all of these.**
5. Retailing creates-----.
A. time utility. B. place utility. C. ownership utility. **D. all of these.**
6. -----activities performed by the retailers.
A. assortment of offerings. B. holding stock. C. extending services. **D. all of these.**
7. The term stakeholders which includes-----
A. stock holders B. consumers. C. suppliers. **D. all the above.**
8. -----represents how a retailer is perceived by consumers and others.
A. image. B. sales. C. profit. D. none of these.
9. Retailing is a marketing function which ----.
A. sells products to other business. B. sells products to a company that resells them.
C. sells products to final consumers. D. sells products for ones own use
10. The wheel of retailing explains the emergence of new retailing forms by ----.
A. retailers cycle through peaks of high cost price and troughs of low cost price.
B. whole sellers see retailing opportunity, enter retailing, then turn to wholesaling again.
C. new retailers emerge, grow, mature and decline.
D. low margin, low price retailers enter to compete with retailers who are high margin and high price.

Unit II

1. Consumer buying process in retailing involves ----
A. need recognition. B. search for information.
C. evaluation of retailers. **D. all the above.**
2. Atmosphere in retailing refers to ----
A. the weather outside a store.
B. The ambience, music, color scent in a store.
C. assortment of products in the store. D. display of items in a store. ANSWER: B
3. Departmental store is an example of
(a) Second hand goods seller (b) **Large scale retailer** (c) Multiple shop (d) None of these
4. If the product passes through a longer channel of distribution, the marketer will have to give importance to
(a) **Advertising** (b) Personal selling (c) Direct selling (d) None of these

5. What two major communication channels do marketers use to convey their product to consumers?
 (a) Word-of-mouth and commercials **(b) Personal and non-personal channels**
 (c) Message source and feedback (d) Print media and events
6. Promotional material located in and around retail outlets is known as
(a) Retail Advertising (b) Direct Advertising (c) POP advertising (d) Personal Advertising
7. The three major types of non store retailing are direct selling, direct marketing and ___
(a) Automatic vending (b) Self service store (c) Retail chain (d) None of these
8. _____ is a retailer who has fixed place of business in a locality but goes on changing his place to exploit the market opportunities.
(a) Cheap-jacks (b) Hawkers (c) Market traders (d) None of these
9. ___ is direct communications with carefully targeted individual consumers to an immediate response
 (a) Personal selling (b) Public relations **(c) Direct marketing** (d) Sales promotion
10. Which of the following is not a non store retailing ?
 (a) Kiosk marketing (b) retail chains (c) Direct marketing **(d) telemarketing**

Unit III

1. ___ retailers open their shops on fixed days or dates in a specified area.
 (a) Hawkers (b) Kiosks **(c) Market traders** (d) None of these
2. Transport system creates ___ utility.
 (a) Place utility **(b) Time utility** (c) Customer utility (d) All of these
3. Diversification is useful for _____.
 (a) attaching more customers (b) retaining existing customers
 (c) increasing sales volume **(d) All of these**
4. The retailer sells goods in ___
 (a) Huge quantity **(b) Small quantity** (c) Not sufficient (d) None of these
5. ___ are generally food stores that are much smaller in size than in supermarkets.
(a) Convenient store (b) Discount store (c) Specialty store (d) None of these
6. Wendy's Burgers which has its only outlet at Jackson is all set to open its retail outlets in Portland and Atlanta. Which stage of the PLC is it in?
(a) Introduction (b) Growth (c) Maturity (d) Decline
7. ___ are retail stores owned by a group of consumers themselves
 (a) departmental Store (b) Shopping mall
(c) Consumer co-operative store (d) None of these
8. The ability of the service provider to accurately perform the promised service is referred to as:
(a) Assurance (b) Responsiveness (c) Reliability (d) Tangibles
9. If marketing is done through information and ordering machine placed in stores, it is known as
(a) Kiosk marketing (b) Television marketing (c) Telemarketing (d) All of these
10. Identify the risk that arises from a bad product/service choice, that harms one's self image.
 (a) Psychological risk **(b) Physical risk** (c) Social risk (d) Time risk

Unit :IV

1. E-tailing refers to ----.
 A. sale of electronic items in a store. B. catalog shopping.

- C. music store. **D. retailing shopping using the inter.**
2. A multi channel retailer sells merchandise _____
 A. over the telephone B. through personal selling and retail store only.
 C. over the internet. **D. through more than one channel.**
3. All of the following are possible types of service that a retailer can offer except ----.
 A. self service. **B. Business segment, group or diversion**
 C. Business scope. D. Diversified business.
4. This is the most preferred mode through which foreign players have entered the Indian market.
 It is the easiest route to enter the Indian market
 A. fii B. **franchising** C. fdi D. iip
5. Business composition is the term used while framing the following strategies. What are they?
 A. Corporate strategy. B. Marketing strategy.
 C. Business strategy. **D. Both a and b.**
6. What is the term used if management wants to audit the key management functions like sales force, advertising or pricing?
A. Vertical audit B. Horizontal audit. C. External audit. D. None of the above
7. The best way for a retailer to differentiate itself in the eyes of the consumer from the competitions is to.
 A. increase advertising of sale items.
 B. offer the lowest prices in town.
C. always be well stocked with the basic items that customers would expect to find in your store.
 D. not sell any of the brand names the competition is selling.
8. What word best describes the relationship between a retailer's pricing decisions and the merchandise, location, promotion, credit, services, image and legal decisions that retailers must make?
 A. independent. B. separate. **C. interactive.** D. competitive.
9. If a retailer is offering the same products and quantities to different customers at different prices, the retailer has what kind of pricing policy?
 A. two-price B. customary. **C. flexible.** D. leader.
10. The process by which a retailer attempts to offer the right quantity of the right merchandise in the right place at the right time and meet the company's financial goals is known as
 A. **merchandise management** B. procurement
 C. distribution D. sales

Unit :V

1. Many retailers have improved their operation productivity through -----.
 A. **computerization.** B. outsourcing.
 C. both a & b. D. none of these.
2. The computerized check out is used by -----.
 A. **self service.** B. **cashier.** C. **customer.** D. **sales.**

- A. **large retailers.** B. small retailers. C. multi retailers D. all of these.
3. With the help of-----a retailer pays an outsider party to undertake one or more of its operating functions
A.**outsourcing.** B. credit management C. computerization. D. none of these.
4. ----- helps the retailers to face the crisis situations.
A. **risk management.** B. credit management.
C. financial management. D. all of these
5. ----- is a key task for both large &small retailers.
A. risk management. B. crisis management.
C. inventory management D. **all of these.**
6. ----- helps the retailers to complete the tasks within the short period of time.
A. **computerization.** B. outsourcing. C. both a & b D.none of these.
7. Consumer buying process in retailing involves ----.
A. need recognition. B. search for information.
C. evaluation of retailers. D. **all the above.**
8. Merchandise availability is an example of a.
A. cost of sales B. pretransaction service.
C. operating cost. D. **transaction service.**
9. Which of the following is not part of a visual communications program
A. store name and logo. B. institutional signage.
C. lifestyles graphics. D. **television advertising**
- 69.
10. In which of the following behavioral models there will be no product differentiation and brands as a factor plays very little role in the purchase preferences.
A. complex buying behavior. B. variety seeking behavior.
C. dissonance reducing behavior. D. **habitual buying behavior**

Section : B

Unit :I

- 1.What is Retailing.
2. What are the challenges of retailing?
3. What are the opportunities of retailing?
4. Discuss the trends in brief in retailing
5. Define policy.
6. What are the government policies in retail sector?
7. What is global retailing?
8. Give the advantages of global retail marketing.
9. List the socio-economic factors in retail marketing.
10. How will you classify retail sector in India?

Unit :II

1. What are organized sectors?
2. What are unorganized sectors?
3. Define retail format.

4. What are the types of retail format?
5. Write a note on Franchising.
6. What are the characteristics of retail format?
7. Define Organised sector.
8. Give the importance of retail formats
9. What are the ethical issues in marketing decision?
10. Explain the impact of the internet on markets?

Unit :III

1. Define retail location.
2. What are internal atmospheric?
3. What are external atmospheric?
4. Define positioning.
5. What are the factors to be considered for positioning the retail shop?
6. Define service quality
7. Give Importance of Retail store image
8. Define supply chain management.
9. Define Service.
10. What is a quality of service?

Unit :IV

1. Define Pricing,
- 2 Give the decision-making process
3. Define retail positioning
4. What is supply chain?
5. What is retail service? Give Importance of Retail store image.
6. What is impulse buying?
7. Define Service.
8. What is a quality of service?
9. Define retail location.
10. What are atmospheric?

Unit :V

1. Define merchandise.
2. Enumerate stages in retail merchandising
3. What is economic order
4. What is advertising?
5. Explain service retailing.
6. Give a short note on "Grid Layout"
7. Spell out the elements of "Retail Mix"
8. Difference between service and merchandise retailing.
9. What is ABC Analysis?
10. What is online marketing?

Section :C

Unit :I

1. Explain the meaning and definition of retailing.
2. Explain the retailer's role in a distribution channel.

3. Explain the functions performed by Retailers.
4. Explain the prospects of retailing in India
5. Explain the characteristics of retailers.
6. Explain the types of retailers.
7. Write a note on Multi-Channel Retailing.
8. Give the advantages of global retail marketing.
9. List the socio-economic factors in retail marketing.
10. List the trends in retail formats.

Unit :II

- 1.Explain customer driven organization?
2. Discuss the techniques of acquiring the customers on the web,
- 3.Discuss the advantages and limitations of online marketing,
- 4.Define MNC"s.
5. Why is retail formats important?
- 6.What are the ethical issues in marketing decision?
- 7.Explain the impact of the internet on markets?
- 8,Explain customer driven organization?
- 9.Define organized sectors?
10. Why is retail format needed in retail organization?

Unit :III

1. How do you choose the Choice of retail locations?
- 2.Explain the internal and external atmospherics in retail sector.
3. How will you Position of retail shops as to improve it in better manner?
- 4.How will you Building retail store Image?
- 5.Explain in detail about Retail service quality management and its process.
- 6.Explain the Retail Supply Chain Management.
- A 7. What are the factors to be considered to have an effective Retail Pricing Decisions.
8. How will you Position of retail shops as to improve it in better manner?
9. How will you Building retail store Image?
- 10.Explain in detail about Retail service quality management and its process.

Unit :IV

- 1.What can you say about retail location?
2. What are types of retail locations?
- 3.Explain in detail about the characteristics of Retail Service Quality Management.
- 4.Briefly discuss about the gap model for improving retail service quality.
5. Explain in detail about the checklist, site evaluation and issues regarding selection of retail location.
6. Discuss about how you will build a retail store image.
7. Explain in detail about the different types of pricing strategies followed in retailing.
8. Describe the various factors to be considered for positioning retail shop and improve it in a better manner.
9. Examine various types of retail locations.
- 10.Discuss about the steps involved in choosing retail location.

Unit :V

- 1.Explain internal atmospherics used in retail shops in detail.
2. How would you summarize the steps to be followed for building retail store image?
3. What are the factors to be considered to have an effective Retail pricing decision?
- 4.Elaborate in detail the External Atmospherics which would influence the retail customers?
5. Explain in detail the steps involved in selecting an appropriate location for a retailer.
6. Explain the retail supply chain in detail.
7. Explain in detail about the principles of Merchandise Management.
- 8.What are the different types of merchandise mix?
- 9.What are the positioning options for retail units?
- 10.State the requisites of retail positioning?

Section :D

Unit :I

1. Give an overview of Global Retailing
2. What are the Challenges and opportunities retailing?
3. Give in detail about Retail trends in India
4. What is Socio economic and technological Influences on retail ma
5. Explain the Government of India policy implications on retails
6. What is Socio economic and technological Influences on retail management.
7. Explain the Government of India policy implications on retails
8. What are the Challenges and opportunities retailing?
9. Give in detail about Retail trends in India
10. Give the overview on involvement of government on retail marketing.

Unit :II

1. What are the Organized and unorganized formats available in retail sector?
2. What are the different types of organized retail format?
3. Enumerate the Characteristics of each format.
4. Explain the emerging trends in retail formats
5. Explain the MNC Role in organized retail formats.
6. Enumerate the Characteristics of each format.
7. Write in detail about online marketing. State the advantages of online marketing
8. Discuss in detail about the types of retail stores in India.
9. Discuss about the origin of retailing in India.
10. Discuss about the advantages and disadvantages of organized and un-organised retail stores in India.

Unit IV

1. Explain the role of Information Technology in retailing.
2. Explain Retail Market Strategy.
3. Explain the Strategic Retail Planning Process.
4. Write a note on Merchandise Management

5. Write a note on Buying Merchandise
6. Write a note on Price Adjustments
7. Write a note on Store Management
8. Explain the responsibilities of Store Managers.
9. Explain Store Planning and Location Planning.
10. Explain Store Design, Retail Image Mix and Space Mix.

Unit :V

- 1.Explain briefly about Visual Merchandise Management.
- 2 Enumerate the Space Management in retail sector.
- 3.How the Retail Inventory Management will be executed in retailing
4. How the Retail accounting and audits plays vital role in retail s
5. What are Retail store brands? Explain in details.
6. Discuss how retail accounting is used in retailing business.
- 7.Discuss about the popularity of Wal-Mart in India.
8. What are Retail advertising and promotions in retail marketing
9. Explain in detail about Retail Management Information System
- 10.Give an importance of online retail - Emerging trends.

St. Mary's College (Autonomous)

(Re-accredited with 'A+' Grade by NAAC)

Thoothukudi



PG Department of Computer Science (SSC)

QUESTION BANK

2021 – 2023 Syllabus

ST MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI – 628001
QUESTION BANK

I M.Sc. Computer Science
Semester I

Core I

DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code: 21PCSC11

UNIT - I

Section – A (One Mark)

Choose the correct answer:

- _____ is a particular set of instructions that accomplishes a particular task.
a) **Algorithm** b) Procedure c) Program d) subroutine
- _____ means each of the instructions should be clear and unambiguous.
a) Finiteness b) Effectiveness c) **Definiteness** d) Performance
- An Algorithm is composed of _____ set of steps, each of which may require one or more operations.
a) Number of b) Infinite c) **Finite** d) Excess
- A _____ is an expression of an algorithm in a programming language.
a) Algorithm b) Procedure c) **Program** d) subroutine
- _____ refers to the task of determining how much computing time and storage an algorithm requires.
a) **Performance analysis** b) Performance measurement c) Definiteness d) Finiteness
- _____ is the process of checking the program for faulty results.
a) Programming b) Analyzing c) **Debugging** d) Specifying
- Performance measurement is otherwise known as _____.
a) **Profiling** b) Performance Specification c) Performance Analysis d) Debugging
- The amount of memory an algorithm needs to run to completion is called _____.
a) Time Complexity b) **Space Complexity** c) Complexity d) Space measurement
- The time taken $T(P)$ by a program is the sum of the _____ time and the _____ time.
a) **Compile, Debugging** b) Compile, Run c) Compile, Execution d) Debugging, Run
- Divide and Conquer strategy suggests splitting the inputs into k distinct subsets $1 < k \leq n$ giving _____ sub problems.
a) $k-1$ b) $k+1$ c) **k** d) $2k$
- The recurrence relation $T(n) =$ _____ when n is small.
a) **$g(n)$** b) $O(n)$ c) $g(\log n)$ d) $O(\log n)$

12. The recurrence relation can be solved using _____ method.
 a) Subsets b) ordering c) **substitution** d) combination
13. For _____ algorithm, the input list should be sorted.
 a) Linear Search b) Knapsack c) **Binary Search** d) N queen
14. For each n, the complexity of Binary Search is _____.
 a) $2n$ b) **$2n+1$** c) $2n-1$ d) $n+1$
15. To find the maximum and minimum _____ comparisons are needed
 a) $3n/2$ b) **$3n/2-2$** c) $3n-2$ d) $3n-2/2$
16. The worst case complexity of merge sort is _____.
 a) **$O(n \log n)$** b) $O(n^2)$ c) $O(\log n)$ d) $\Omega(\log n)$
17. In _____ a pivot element is used to perform sorting.
 a) Merge Sort b) Insertion Sort c) **Quick Sort** d) Bubble Sort
18. Quick Sort uses _____ comparisons .
 a) $O(n^2)$ b) $\Theta(n^2)$ c) **$\Omega(n^2)$** d) $O(\log n^2)$

Section – B (Two Marks)

Answer in about 50 words each:

1. Write the control abstraction for Divide and Conquer method.
2. Define the term algorithm and state the criteria the algorithm should satisfy.
3. Write an algorithm to add matrices using counting statements
4. Define Performance Analysis
5. Describe the role of space complexity and time complexity of a program?
6. What is binary search?
7. Define merge sort.
8. Define Quick sort.
9. What is randomized quick sort?
10. What is divide and conquer method?
11. Define O-notation.
12. Define Ω -notation.
13. Define θ -notation.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Explain the different Asymptotic Notations.
2. Write a C++ program to search a given number using binary search.
3. Write an algorithm to find the maximum and the minimum number in a list using Divide and Conquer strategy.

4. Explain about the time complexity.
5. Write the short notes on Divide and Conquer method.
6. Explain about the Randomized quick sort with an algorithm.

Section – D

Answer in about 400 words:

1. Explain the various circumstances of Space Complexity.
2. Explain the basic methodology of divide and conquer algorithm. List the advantages of divide and conquer algorithm.
3. Explain quick sort algorithm and simulate it for the following data 20, 5,10,16 ,54 ,21
4. Explain the Performance Analysis.
5. Illustrate merge sort algorithm and discuss time complexity
6. Explain about the Binary Search with an algorithm.
7. Sort the list of numbers using merge sort: 78, 32, 42, 62, 98, 12, 34, 83.
8. What is the time complexity of following function fun ()? Explain

```
int fun(int n)
{
    for (int i = 1; i <= n; i++)
    {
        for (int j = 1; j < n; j += i)
        {
            Sum = Sum +i*j;
        }
    }
    return(Sum);
}
```

UNIT - II

Section – A (One Mark)

Choose the correct answer:

1. A solution that either maximizes or minimizes an objective function is called _____.
 a) Optimal Solution b) Feasible Solution **c) Greedy Solution** d) Infeasible Solution
2. The filling of the knapsack should increase the total _____.
 a) Weight b) Size **c) Profit** d) Function
3. To solve the knapsack problem, the objects are considered in the order of the ratio _____.
a) p_i/w_i b) $p_i * w_i$ c) w_i/p_i d) $w_i * p_i$
4. A spanning tree has n vertices and _____ edges.
 a) n+1 **b) n-1** c) 2n d)n

5. The algorithm to find the minimum cost spanning tree is _____.
 a) **Prim** b) Knapsack c) Warshall d) Dijkstra
6. In Kruskal's Algorithm _____ are constructed to arrange the edges in the increasing order of their costs.
 a) Trees **b) Heaps** c) Graphs d) Lists
7. The length of the path is defined as the _____ of the weights of the edges on that path.
 a) **sum** b) product c) modulus d) square
8. Prim's algorithm is based on _____ method.
 a) Divide and conquer b) Dynamic programming **c) Greedy** d) Branch and bound
9. Minimum cost spanning tree is based on _____ algorithm.
 a) Kruskal's Algorithm **b) Prim's Algorithm** c) Dijkstra's Algorithm d) square
10. Single Source Shortest Path is based on _____ algorithm.
 a) Kruskal's Algorithm b) Prim's Algorithm **c) Dijkstra's Algorithm** d) square

Section – B (Two Marks)

Answer in about 50 words each:

1. Write the control abstraction for the greedy method.
2. How is greedy method being used in solving problems? Enumerate.
3. State prim's algorithm.
4. Describe the logic behind optimal storage on tapes.
5. State Kruskal's algorithm.
6. Define Knapsack problem.
7. What is Dijkstra's algorithm?
8. What are the two basic algorithms for finding minimum-cost spanning trees?
9. Define spanning tree.

Section – C

Answer in above 200 words each choosing either (a) or (b):

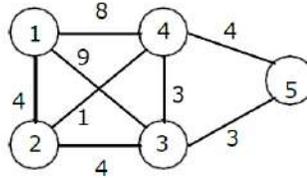
1. Explain optimal storage on tapes with algorithm.
2. Explain knapsack problem using Greedy method.
3. Draw and explain the strategy used in the Kruskal's Algorithm to generate the minimum cost spanning tree.
4. Explain prim's algorithm with an example.
5. Write down the algorithm for assigning programs to tapes.

Section – D

Answer in about 400 words:

1. Write an algorithm to find the shortest path from a single source using Greedy method. Give example.
2. Write an algorithm to find a minimum cost spanning tree in a connected graph G.

3. Compute the optimal solution for knapsack problem using greedy method $N=3$, $M=20$, $(p_1, p_2, p_3) = (25, 24, 15)$, $(w_1, w_2, w_3) = (18, 15, 10)$.
4. Let $n = 3$, $(l_1, l_2, l_3) = (5, 10, 3)$. Then find the optimal ordering?
5. Considering the following graph, find the minimal spanning tree using prim's algorithm.



UNIT - III

Section – A (One Mark)

Choose the correct answer:

1. An optimal sequence of decisions maximizes the objective function in _____ method.
 - a) Divide and Conquer
 - b) Greedy
 - c) Branch and Bound
 - d) **Dynamic Programming**
2. A _____ graph is a directed graph in which the vertices are partitioned into $k \geq 2$ disjoint sets.
 - a) **Multistage**
 - b) Biconnected
 - c) Disconnected
 - d) Spanning
3. A _____ is a directed simple cycle that includes every vertex in V .
 - a) Graph G
 - b) Vertex Set
 - c) **Tour**
 - d) Tree
4. Examining each node in the data object instance is called _____.
 - a) Searching
 - b) Examining
 - c) **Traversal**
 - d) Travelling
5. There are _____ possible ways to traverse a binary tree.
 - a) 3
 - b) 4
 - c) **5**
 - d) 6
6. Each traversal can be regarded as a _____ through the binary tree.
 - a) Visit
 - b) tour
 - c) **walk**
 - d) cycle
7. In _____ traversal, the data is traversed first.
 - a) Inorder
 - b) **preorder**
 - c) postorder
 - d) ordered
8. In _____ search, the exploration of the vertex v is suspended as soon as a new vertex is reached.
 - a) BFS
 - b) **DFS**
 - c) Binary
 - d) FIFO
9. The _____ of a tree is the maximum distance between two vertices
 - a) **length**
 - b) edge
 - c) diameter
 - d) Path
10. If the deletion of one vertex along with its edges disconnects the graph then the vertex is called _____.
 - a) disconnected point
 - b) **articulation point**
 - c) biconnected point
 - d) joints

11. A graph G is said to be _____ if there are no articulation points.
a) **Biconnected** b) Disconnected c) Directed d) Bidirectional
12. BFS easily identifies the existence of a _____.
a) heap b) Tree c) Cycle d) **Spanning tree**
13. Which method of traversal does not use stack to hold nodes that are waiting to be processed?
a) Depth First b) D-search c) **Breadth first** d) Back-tracking
14. The optimal solution to a problem is a combination of optimal solutions to its sub-problems. This is known as
a) Principle of Duality b) Principle of Feasibility
c) **Principle of Optimality** d) Principle of Dynamicity
15. Search necessarily involves the examination of every vertex in the object being searched, it is called _____.
a) searching b) tour c) **traversal** d) none

Section – B (Two Marks)

Answer in about 50 words each:

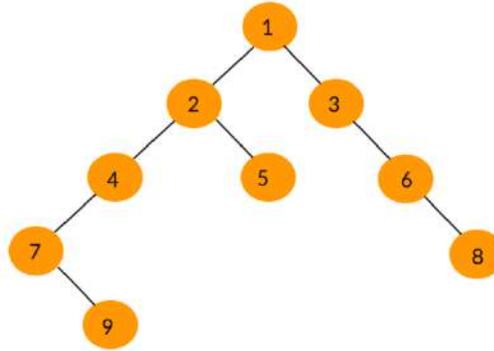
1. Define dynamic programming.
2. What are the features of dynamic programming?
3. Define traversal through binary trees.
4. Define Principle of Optimality.
5. Define travelling salesman problem.
6. What is 0/1 knapsack problem?
7. Define DFS.
8. Define BFS.
9. Define an articulation point.
10. Define spanning tree.
11. What is greedy method?
12. What is the use of Dijkstra's algorithm?

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Write down the working of Breadth First Search with an example.
2. Write down the working of Depth First Search with an example.
3. Explain connected components and spanning tree.
4. Compare and contrast BFS and DFS.
5. Explain Biconnected Components.

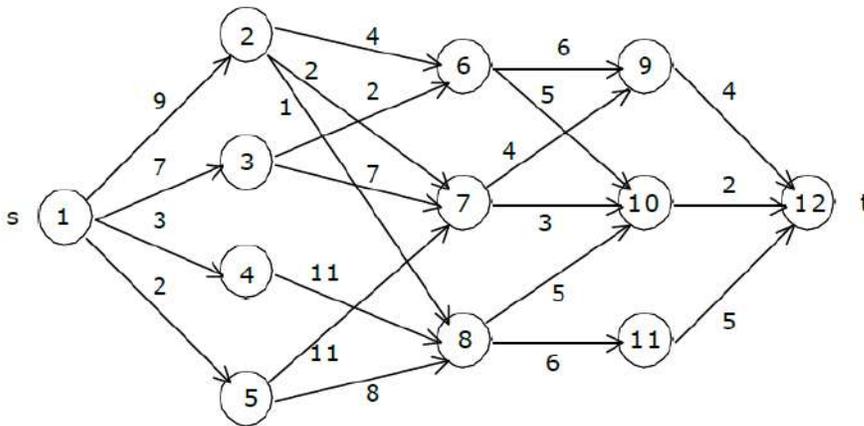
6. Write down the inorder, preorder, postorder traversal for given below graph.



Section – D

Answer in about 400 words:

1. Explain Multistage Graphs and a way to measure the shortest path through the vertex sets.
2. Explain 0/1 Knapsack problem and its solution through Dynamic Programming.
3. Write a CPP program for Biconnected components.
4. Describe the travelling salesman problem and discuss how to solve it using dynamic programming?
5. Solve the solution for 0/1 knapsack problem using dynamic programming $(p_1, p_2, p_3, p_4) = (11, 21, 31, 33)$, $(w_1, w_2, w_3, w_4) = (2, 11, 22, 15)$, $M=40$, $n=4$.
6. Find the minimum cost path from s to t in the multistage graph of five stages shown below using forward approach.



UNIT - IV

Section – A (One Mark)

Choose the correct answer:

1. In backtrack method, the desired solution is expressible in the form of _____ tuple.
 - a) **n**
 - b) x
 - c) 2n
 - d) n+1
2. The total number of nodes in a 8 queen space tree is _____.
 - a) **69281**
 - b) 62981
 - c) 68291
 - d) 68921

3. The smallest integer for which the graph can be colored is called _____ number.
a) **Chromatic** b) Chromal c) Chromosomal d) Coloring
4. If d is the degree of the given graph then it can be colored with _____ colors.
a) $d-1$ b) d c) **$d+1$** d) $2d$
5. What is the type of the algorithm used in solving the 8 Queens problem?
a) **Backtracking** b) Dynamic programming c) Branch and Bound d) Greedy
6. _____ is used to solve problem in which a sequence of objects is chosen from a specified set so that the sequence satisfies some criterion.
a) **Backtracking** b) Dynamic programming c) Branch and Bound d) Greedy
7. A _____ is a round-trip path along n edges of G that visits every vertex once and returns to its starting position.
a) Hamiltonian path **b) Hamiltonian cycle** c) Euler line d) Euler Circuit
8. Backtracking algorithm is implemented by constructing a tree of choices called as?
a) **State-space tree** b) State-chart tree c) Node tree d) Backtracking tree
9. Which one of the following is an application of the backtracking algorithm?
a) Finding the shortest path b) Finding the efficient quantity to shop c) Ludo **d) Crossword**
10. The problem of finding a subset of positive integers whose sum is equal to a given positive integer is called as?
a) n - queen problem **b) subset sum problem** c) knapsack problem d) hamiltonian circuit problem

Section – B (Two Marks)

Answer in about 50 words each:

1. Define the Hamiltonian circuit.
2. Define chromatic number.
3. Define backtracking.
4. Define 8 Queens problem.
5. What is N -Queens problem?
6. Define problem state, solution state, answer state.
7. Write the concept of sum of subsets.
8. Define Knapsack Problem.
9. Define Subset-Sum Problem.
10. Define implicit and explicit constraints.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Give solution to Hamiltonian circuit using Backtracking technique.
2. How is backtracking used in various applications?

- Write an algorithm to find all the m-colorings of a graph.
- Explain the knapsack problem with an algorithm.
- Using backtracking technique solve the following instance for the subset problem $s=(1,3,4,5)$ and $d=11$.

Section – D

Answer in about 400 words:

- Write and explain the algorithm to solve the 8-queen problem.
- What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.
- Write a CPP program to color a Graph G with n vertices.
- Write and explain the algorithm to solve Sum of Subsets problem.
- Explain the backtracking algorithm for 8-queens problem.
- Explain the Graph – coloring problem. And draw the state space tree for $m= 3$ colors $n=4$ vertices graph.

UNIT - V

Section – A (One Mark)

Choose the correct answer:

- An LC branch and bound Search of the tree will begin with upper = _____.
 a) ∞ b) $-\infty$ c) 1 d) 0
- A row or column is said to be reduced iff it contains atleast ____ and all the other entries are non – negative.
 a) **0** b) 5 c) 1 d) 2
- In the LC branch and bound the search begins at the _____ as E-node.
 a) terminal b) root c) leaf **d) child**
- In a 0/1 Knapsack algorithm, the node x is a solution node iff $level(x) =$ _____.
 a) n b) n-1 **c) n+1** d) 1
- A _____ graph is used to solve travelling salesman problem
 a) undirected b) bidirected c) spanning **d) directed**
- Name the node which has been generated but none of its children nodes have been generated in state space tree of backtracking method.
 a) Dead node **b) Live node** c) E-Node d) State Node
- _____ is a live node whose children are currently being explored.
 a) F-node **b) E-node** c) G-node d) D-node

8. The travelling salesperson problem (TSP) is to find a tour of _____ cost.
 a) **minimal** b) maximal c) actual d) average
9. _____ is a method to systematically search a solution space.
 a) Divide and conquer method b) Dynamic programming c) Greedy method **d) Branch and bound**
10. _____ is a generated node that is not to be expanded or explored any further.
 a) **Dead node** b) Live node c) E-Node d) State Node

Section – B (Two Marks)

Answer in about 50 words each:

1. What is LC Search?
2. What is Bounding?
3. Define LC Branch and Bound.
4. What are all the types of Bounding?
5. Define FIFO Branch and Bound.
6. Define a dead node.
7. Define E-node.
8. Differentiate live node and dead node.
9. Define live node.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Write note on LC Branch-and-Bound solution for 0/1 knapsack problem.
2. Write the Control Abstraction for LC Search.
3. What are the various problems that can be solved using Branch and Bound method.
4. Explain the LC Branch and Bound.

Section – D

Answer in about 400 words:

1. Explain the Travelling Salesperson problem using branch and bound.
2. Write down the working of FIFO Branch-and-Bound solution for 0/1 knapsack problem.
3. Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for $n=4$, $m=15$, $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$ $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$.
4. Find the LC branch and bound solution for the traveling sale person problem whose cost matrix is as follows:

The cost matrix is

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

QUESTION BANK

I M.Sc. Computer Science Subject Code: 21PCSC12

Semester I

Core II – Digital Image Processing using MATLAB

Unit-I

Part A

1. The command window displays a _____ and a cursor where commands are entered.
a) >> b)<< c)k>> d)None
2. The figure window has a default _____ background.
a) Black b) **transparent** c)white d) grey
3. There are _____ fundamental data types in MATLAB.
a) 12 b)**14** c)16 d)256
4. Which among the following stores dissimilar kinds of data?
a) Cell b)data c)array d)**cell array**
5. Integer constants contain a set of _____
a) Strings b) **digits** c) exponents d) data
6. Which of the following is not an escape sequence?
a) \n b)\t c)*/ d) \b
7. The complex conjugate transpose is denoted by _____
a) T" b) T c) ' d)l/T
8. The assignment operator is _____
a) = b)**==** c)+= d)::
9. A scalar is represented by _____
a) Row vector b)column vector c)**(1x1) matrix** d)(1x1)rows
10. Returns 1 if the element of the vector is positive
a) Positive(x) b) find(x) c) min(x) d)**sign(x)**
11. In mod(x,y), the quotient is rounded to _____
a) +cx b)0 c)**-∞** d)11
12. Line continuation is given by _____
a) (.) b) **(...)** c)(:) d)d(::)
13. The command B=A(:) converts the matrix A into a _____
a) Row vector b)**column vector** c)square matrix d)rectangular matrix

14. The _____ function will generate a (2x3) matrix with all its diagonal elements equal to 1
 a) eye(0,2) b)eye(1 x2) c)**eye(2x3)** d)diag(2x3)
15. rand(m,n) command generates a matrix A with random entries within the interval
 a) [-1, 1] b) **(-1,1)** c)(0,1) d)[0,1]
16. _____ commands give the sum of the diagonal elements of the rectangular matrix A
 a) rank(A) b)diag(A) c)**trace(A)** d)sum(A)
17. A polynomial is represented by _____ .
 a) column b)row c)**row vector** d)column vector
18. The product of two polynomials is obtained by the MATLAB function _____
 a) deconv(x,y) b) **conv(x,y)** c)mul(x,y) d)prod(x,y)
19. The characteristic polynomial of a matrix is obtained by solving _____
 a) $\det(SI-A) = 0$ b) **$\det(A-SI)=0$** c) $\det(SI-A)=1$ d) $\det(SI-A)=1$
20. Two polynomials can be added or subtracted only if they have the same _____
 a) **Dimensions** b)No. of columns c) Elements d)inverse
21. When keyboard command is used, the command prompt is prefixed with the letter
 a) **K** b) Z c)key d) D
22. The command temporarily halts the current computation and waits for the user to resume.
 a) Keyboard b)input c)**pause** d)menu
23. The default representation format for any non-integer value in MATLAB is _____ after the decimal point.
 a) 1 b)2 c)3 d)**4**
24. The format string used to display $x=0.4000$ as 0.4 is _____
 a) %16.3f b)**%06.3f** c)%g d)%6.3ef
25. The function is used to read from the binary file.
 a) fscanf b)**fread** c)fgetl d)fgetl
26. Selects the specific blocks of program depending on the condition to be satisfied
 a) Looping Structures b)**Branching structure** c) conditional loop d)unconditional loop
27. In a for loop, _____ is assigned an initial value.
 a) Intial b)increment c)initialize d)**index**
28. The expression in an if statement is a _____
 a) **Conditional statement** b)branching statement c)logical expression d)continue
29. A _____ is used for multiway branching.
 a) if b)break c)**switch** d)while
30. _____ is used to terminate a program due to incorrect input
 a)break b)loop c)**error** d)try-catch
31. _____ repeats the statement if the condition is true or non zero.
 a)if b)**while** c)for d)continue
32. The _____ is also known as the debugger.
 a) **Editor** b) drawing c)figure window d)Handle

33. The files that are created using the MATLAB editor has the extension
a).m b).mat c).mmlab d).mex
34. To compute the Inverse Fast Fourier Transforms, the _____ function is used.
a)inv **b)ifft** c)ift d)ifft
35. The_____ function is used to simplify the product terms in the form of sums.
a) collect() **b)expand()** c) sum() d) product()
36. _____variables retain their value between function calls.
a)persistent b)dynamic c)character d)static

Part B

1. What are M-files?
2. What are MAT files?
3. Write about any two Termination commands in MATLAB.
4. Define MATLAB character set.
5. What are complex constants?
6. Define vector. What are its kinds?
7. What are cell arrays?
8. What is the function used to evaluate a polynomial?
9. What are the binary input/output functions?
10. What are the kinds of control structures?
11. Mention the parts of amfile.
12. What are inline functions?
13. What are the kinds of errors?
14. Define ODE solvers?
15. What are the different forms in which a function can be represented?
16. Write about any 2 ODE solvers.

Part C

1. What are the different kinds of files available in MATLAB?
2. Write about the help features in MATLAB.
3. List out the hierarchy of operations in an expression.
4. How will you extend matrix dimensions?
5. What are the arithmetic operations that can be performed with matrices?
6. Explain the evaluation of a polynomial with matrix arguments.
7. List out the various methods of implementing interactive inputs.
8. Write about the different looping structures.
9. Explain about MATLAB debugger.
10. What are the different kinds of errors?
11. What are the various simplification functions available?
12. What are ODE solvers? Explain with syntax and example?

Part D

1. Explain the different methods used to generate special matrices
2. Explain the different methods used for matrix manipulations

3. Mention any 6 methods used with polynomials. Explain with examples.
4. Explain the various ways of reading /saving file data.
5. Explain the low level input-output functions.
6. Explain about the program control constructs.
7. Explain the parts of a function and its usage with examples.
8. What is symbolic mathematics? Explain in detail of how its used with MATLAB.
9. Demonstrate the use of MATLAB in solving Z transforms and Fourier Transforms.

Unit II

Part A

1. _____ is elements of a digital image.
 a) Picture Element b) Image Element c) Pixel d) **All**
2. First application of digital image is _____.
 a) **Newspaper Industry** b) Telegraph c) Military d) None
3. PET means _____
 a) **Positron Emission Tomography** b) Positron Emission Topology
 c) Positive Emitting Topology d) None
4. _____ is used to obtain images of blood vessels.
 a) **Angiography** b) X-Ray c) CAT d) UV
5. Major application of imaging in radio band is in _____.
 a) Medicine b) Astronomy c) **Both a and b** d) None
6. _____ deals with the tools in extracting image components.
 a) **Morphological Processing** b) Segmentation c) Compression d) Wavelets
7. Mechanical digitizers are referred to as _____.
 a) Sensors b) **Micro Densitometer** c) Scanner d) Strip
8. Digitizing the coordinate value is called _____.
 a) **Sampling** b) Quantization c) Illuminance d) Reflectance
9. Digitizing the amplitude value is called _____.
 a) Sampling b) **Quantization** c) Illuminance d) Reflectance
10. The section of real plane spanned by the coordinates of an image is _____.
 a) Spatial coordinates b) spatial variable c) **spatial domain** d) None
11. _____ resolution is a measure of the smallest discernible detail in an image.
 a) **Spatial** b) Intensity c) Saturation d) Noise

12. _____ resolution refers to the smallest discernible change in intensity level.
 a) Spatial b) **Intensity** c) Saturation d) Noise
13. The effect caused by the use of insufficient number of intensity level in smooth area of digital image.
 a) ridges b) edges c) **false contouring** d) None
14. _____ is a tool used in zooming, shrinking, rotating.
 a) Projection b) **Interpolation** c) Resampling d) Scanning
15. _____ interpolation assigns to each location the intensity of its nearest neighbour
 a) **Nearest Neighbour** b) Bilinear c) Bicubic d) Isopreference Curve
16. _____ interpolation use 4 nearest neighbour to estimate the intensity.
 a) Nearest Neighbour b) **Bilinear** c) Bicubic d) Isopreference Curve
17. _____ interpolation use 16 nearest neighbour to estimate the intensity.
 a) Nearest Neighbour b) Bilinear c) **Bicubic** d) Isopreference Curve
18. The boundary is called _____.
 a) Border b) Contour c) **Both a and b** d) None
19. D_4 distance called as _____ distance
 a) Euclidean b) City-Block c) **Chessboard** d) None
20. Color model is also called as _____
 a) Color Space b) Color System c) **Both a and b** d) None
21. Which of the following is the function of the image enhancement?
 a) Linear b) Logarithmic c) Power law d) **All**
22. Exponent in the power law equation is _____.
 a) gamma correction b) **gamma** c) power d) exponent
23. Process used to correct power law response is _____.
 a) **gamma correction** b) power correction c) gamma d) None
24. Method used to generate a processed image, that has specified histogram is _____.
 a) histogram matching b) histogram specification c) **Both a and b** d) None
25. If the operation performed on the image pixel is linear, then the filter is _____.
 a) **linear spatial filter** b) non-linear spatial filter c) neighbour d) predefined
26. _____ filters are used for blurry and for noise reduction.
 a) Mask b) Sharpening c) **Smoothing** d) All

27. A spatial averaging filter in which all coefficients are equal is called _____
a) **box filter** b) average filter c) low pass filter d) weighted average
28. _____ filter replaces the value of pixel by median of intensity value in neighbourhood .
a) **Median** b) Order c) Statistic d) Mean
29. Median filter in presence of impulse noise is called _____
a) impulse b) noise c) **salt and pepper noise** d) median

Part B

1. What is Digital Image Processing?
2. What are the 2 key concepts of John Von Neumann?
3. Sketch electromagnetic spectrum to energy per photon
4. State 2 methods obtaining digital images in digital radio graphy
5. How digital image processing used in micro wave band?
6. How digital image processing used in radio band?
7. What is TEM and SEM?
8. Define spatial domain and spatial variables
9. What is micro densitometer?
10. Define Image element
11. What is Noise in case of image?
12. Define Sampling
13. Define Quantization
14. What is dots per unit distance?
15. Define Intensity Resolution?
16. Write about false contouring?
17. Define Interpolation?
18. List out 3 types of adjacency
19. What is pixel depth?
20. Write the 3 basic types of functions in image enhancement
21. What is Gamma?
22. What is gamma Correction?
23. Describe Intensity-level slicing.
24. Define Histogram

25. Define Histogram Linearization.
26. Explain Global mean and variance
27. Explain Local mean and variance
28. Define Filtering
29. Define Correlation
30. What is Convolution?
31. Write about median filter
32. Explain Salt pepper noise
33. What is max and min filter?

Part C

1. Write the fundamental steps in digital image processing
2. What is the basic relationship between pixels?
3. What are the key advantages of digital Image Processing?
4. How Digital Image Processing used in
(a)Gamma Ray (b)X-Ray
5. How Digital Image Processing used in
6. (a)Ultra Violet Band (b)Infrared Ray
7. Explain Image Interpolation
8. Explain Distance Measures
9. Write about enhancement using arithmetic operation
10. Write about enhancement using logical operation
11. Explain smoothing spatial filters
12. Explain about correlation and convolution.

Part D

1. Explain basic grey level transformation
2. Explain Histogram processing

3. Describe the fundamentals of spatial filtering

Unit III

Part A

1. DFT means _____
a) Distributed Function Transform b) **Discrete Fourier Transform**
c) Dynamic Fourier Transform d) Discrete Fourier Transaction
2. Parameter _____ specifies the shape of the curve that maps the intensity values in f to create g
(a) **Gamma** (b) Alpha (c) Beta (d) Theta
3. Median Filter corresponds to _____ percentile
(a) **50** (b) 0 (c) 100 (d) None
4. Filters operate by leaving the phase angle unchanged is called _____ filters
(a) **Zero phase Shift** (b) Finite Impulse Response (c) Shift (d) Ideal Low Pass
5. Default value of view point is _____
(a) 2 (b) **3** (c) 0 (d) None
6. _____ expands the range of intensity levels in an image
a) **Contrast Stretching** b) Threshold c) Enhancement d) Compression
7. Transformation of $T(r_k)$ is called _____.
a) histogram equalization b) histogram linearization c) **Both a and b** d) None
8. _____ mean and variance are computed over an entire image
a) **Global** b) Local c) Both a and b d) None
9. _____ mean and variance are used as the basis for making changes that depend on Image
a) Global b) **Local** c) Both a and b d) None
10. Spatial filters are also called as _____.
a) spatial mask b) kernels c) templates d) **All**
11. _____ is the process of moving a filter mask over the image and computing sum of Products
a) **Correlation** b) Convolution c) Zero Padding d) None
12. _____ is the process of moving a filter mask over the image, where the filter is rotated by 180° .
a) Correlation b) **Convolution** c) Zero Padding d) None

13. 2-D Gaussian function has a _____ shape.
a) **bell** b) tight c) square d) rectangle
14. _____ is to increase the size of an image an integer number of times
a) Zooming b) **Pixel Replication** c) Sampling d) Correlation
15. Which of the following are low pass filters?
a) Ideal b) Butterworth c) Gaussian d) **All**
16. The point of transaction between $H(u,v)=1$ and $H(u,v)=0$ is _____
a) transition b) **cut off frequency** c) frequency d) filter
17. Sharpening in frequency domain is achieved by _____
a) low pass filter b) **high pass filter** c) attenuation d) replication

PART-B

1. State the steps in Neighbourhood Processing
2. List out the boundary options used in `imfilter()`
3. Say about utility M-Functions for Intensity Transformation
4. Write about `gscale()`
5. What is Histogram Matching?
6. What is Histogram Equalization?
7. State the functions for performing general nonlinear filtering
8. What are the options for `padarray()` function?
9. What are the types of order statistics filter?
10. Discuss about `imnoise()` function
11. Define filter transfer function
12. Say about Lowpass filters
13. What is ILPF?
14. What is GLPF?
15. Say about Butterworth filter
16. Write about Wraparound error
17. What is Zero Phase Shift Filter?

PART-C

13. Histogram Equalization
14. Histogram Specification
15. How will you implement `imadjust()` function
16. Explain Logarithmic and Contrast Stretching Transformations
17. Discuss M-Utility function for image scaling
18. Explain Linear spatial Filtering
19. Explain Non-Linear spatial Filtering

20. What are the spatial filters supported by fspecial() function?
21. Write a command in MATLAB to perform filtering without padding
22. Explain Basic steps in DFT filtering
23. How will you obtain frequency domain filters from spatial filter
24. How will you plot 3-D wireframe and surface plots

PART-D

1. Explain Histogram Processing and Function plotting
2. Illustrate the Intensity Transformation functions
3. Explain the standard spatial filters supported by IPT
4. Describe about 2D-Discrete Fourier Transform
5. Compute and Visualize 2D-DFT in MATLAB
6. Explain filtering in Frequency domain
7. How will you Generate Filters Directly in the Frequency Domain
8. Examine Sharpening Frequency Domain Filters

Unit IV

PART-A

1. PDF means _____
 a)Probability Density Function b) Portable Document Format
 c) **Both a and b** d) Picture Data Format
2. Reducing noise content of an image is image_____.
 a) **denoising** b)reduction c)degradation d)restoration
3. Fourier spectrum of noise is constant, then noise is _____
 a) **white noise** b) black noise c)light noise d) none
4. Bipolar impulse noise is called as _____.
 a) salt and pepper noise b)data drop out c)spike noise d)**All**
5. Harmonic mean filter work well for ____ noise but fails for ____ noise.
 a) **salt,pepper** b)pepper, salt c)Both a and b d) None
6. _____ ordering filter's response based on ordering the values of pixels.
 a)Mean b) Average c)**Order-Statistic** d)Median
7. _____ filter replaces the value of a pixel by median of intensity.
 a) **Median** b) Max c) Min d) Midpoint

8. _____ is used to compute the linear combination of inputs
(a)imnoise (b) **imlincomb**(c)imshow (d)imfilter
9. Which of the following function duplicates every pixel?
(a)**Pixeldup** (b)fspecial (c)imfilter (d)None
10. Adaptive Median Filtering is implemented using ____ function
(a)Max (b)**adpmedian** (c)Median (d)Mean
11. Which of the following is the random variables?
(a)Gaussian (b)Rayleigh (c)Erlang (d)**All**
12. An RGB image can be viewed as _____of three gray-scale images
(a)**stack** (b)Queue (c)List (d)All
13. The number of bits used to represent the pixel values of the component images determines _____
(a)**bit depth** (b)Pixel depth (c)intensity (d)Impixel
14. Indexed images uses _____ of pixel intensity values to colour map values
(a)Indirect (b) **direct mapping** (c)Indexed (d)None
15. _____ is a process used mostly in the printing and publishing industry
(a)**Dither** (b)Publish (c)Print (d)None
16. _____ is an attribute that describes the pure color
(a)saturation (b)**hue** (c)Brightness (d)Color
17. A filter formed by averaging the remaining pixel is _____
a)max b) min c)**alpha trimmed mean** d) median
18. _____ gives a measure of average intensity in the region.
(a)**Mean** b) Variance c) Adaptive d) None

PART-B

1. Sketch the model of image degradation/restoration process
2. What is Optical Transfer function?
3. What is Point spread function?
4. Say about random number generator equation
5. What is PDF?
6. What is CDF?
7. List out the random numbers of Noise models
8. What is pseudo inverse filtering?

9. State the noise to signal power ratio
10. What is parametric Weiner filter
11. What are the component images?
12. What is bit depth?
13. Define Dithering
14. List some of the MATLAB predefined color maps
15. Mention some IPT functions for converting between RGB,indexed, and grayscale intensity images
16. Say about NTSC color space
17. Say about YCbCr color space
18. Say about HSV color space
19. State three principal areas of color image processing
20. What is Pseudo color mapping?

PART-C

1. Explain about model of image degradation/restoration process
2. Write down the syntax forms of imnoise() function
3. How will you Generate Spatial Random Noise with a Specified Distribution
4. Describe Periodic Noise
5. How will you estimate Noise Parameter
6. Discuss Spatial Noise Filters
7. Explain Adaptive Spatial filter
8. Explain Direct Inverse Filtering
9. Discuss some IPT functions RGB and Indexed images in MATLAB
10. How will you convert Colors from HSI to RGB
11. Explain the Basics of Color Image Processing
12. Discuss about the functions of checkboxes and pushbuttons in ice GUI

PART-D

1. Explain Noise models
2. Describe the periodic noise reduction by frequency domain filtering
3. Explain Restoration of image in the Presence of Noise Only-Spatial Filtering

4. Explain Color image representation in MATLAB
5. Illustrate Converting to other Color Spaces
6. Explain Color transformation

Unit V

PART-A

1. _____ refers the process of reducing the amount of data.
a) **Data Compression** b) Data Reducing c) Both a and b d) None
2. _____ is a system of symbols.
a) **Code** b) Data c) Character d) Program
3. Each piece of information or event is assigned a sequence of code symbols called _____
a) code b) symbol c) **code word** d) None
4. Which of the following is the type of data redundancies
a) Coding redundancy b) Spatial c) Irrelevant Information d) **All**
5. Transformation of run length or the differences between adjacent pixels are called _____
a) **mapping** b) Transformation c) Both a and b d) None
6. Mapping is _____ if the pixels of 2-D intensity array can be reconstructed without error from transformed data set
a) **reversible** b) irreversible c) Both a and b d) None
7. _____ transforms input into a format to reduce inter pixel redundancies
(a) Decoder (b) **Mapper** (c) Encoder (d) Quanizer
8. Psychovisual redundant data results in loss of quantitative information, it is called _____
(a) Lossy (b) lossless (c) **quantization** (d) Redundancy
9. Which of the following are edge detector?
(a) Sobel (b) Prewitt (c) Canny (d) **All**
10. _____ is used to perform Line detection and linking
(a) sparse (b) Imfilter (c) **Hough Transform** (d) None
11. A reconstructed image is the exact representation of $f(x,y)$, it is called -----
(a) Error Free (b) Lossless (c) Information Preserving (d) **All**

12. Average information per source output is _____
a)source b)output c)**entropy** d)All
13. Source symbols are statistically independent, then source is called _____
a) dependent b)**zero-memory space** c) statistical d) independent
14. Shannon's first theorem is called as _____
a) Noisy coding b)**Noise Less Coding** c)Source d)None
15. When the output of source information depends on finite number of preceding outputs, then it is called _____
a)markov source b)finite memory source c)**Both a and b** d)None
16. Which of the following criteria used to assess loss of real image information?
a)Objective Fidelity b) Subjective c) **Both a and b** d) None
17. _____ is a device or a program capable of both encoding and decoding.
a)Encoder b)Decoder c)**Codec** d)Modulation
18. _____ performs compression.
a) **Encoder** b)Decoder c)Codec d)Modulation
19. _____ is a standard way to organize and store image data.
a)**Image Format** b)Container c)Compression Standard d)All
20. _____ handles multiple types of image data.
a) Image Format b)**Container** c)Compression Standard d)All
21. Minimizing the block-like appearance called _____ artifact
a)**blocking** b)DCT c)WHT d)KLT
22. Coefficients are selected on the basis of max-variance is _____
a)Threshold Coding b)**Zonal Coding** c)Both a and b d)None
23. Coefficients are selected on the basis of max-magnitude is _____
a)**Threshold Coding** b)Zonal Coding c)Both a and b d)None
24. The overall process of _____ is called bit allocation.
a)Truncating b)Quantizing c)Coding d)**All**
25. $F(x,y) > T$ is _____
a) **object point** b) background point c) function d)zero
26. The toolbox provides a function called _____ that computes a thresholding.
using Otsu's method
(a) Thres (b)**graythresh** (c)widget (d)object

27. _____ is a procedure that groups pixel or sub regions into larger regions
a) **Region Growing** b) Region Integration c) Shrinking d) All
28. _____ is trees in which each node has exactly has four descendants.
a) **Quad Trees** b) Quad Regions c) Quad Images d) None

PART-B

1. Define Compression Ratio
2. State 3 basic types of data redundancies
3. Sketch the image compression system block diagram
4. Say about Lossless Compression
5. Say about Lossy Compression
6. What is mapper?
7. What is Quantizer?
8. Define Symbol coder
9. Say about Information Theory
10. What is entropy?
11. What is Mex files?
12. What is previous pixel predictor?
13. What is differential coding?
14. Define Quantization
15. What is Implicit Quantization?
16. What is Explicit Quantization?
17. Define Segmentation
18. List the main properties of image intensity values, does segmentation rely on
19. Say about Line Detection
20. Say about Point Detection

PART-C

1. Explain Huffman Encoding
2. Explain Huffman Decoding
3. Describe Lossless predictive coding with a diagram
4. Explain Psychovisual Redundancy
5. Discuss about JPEG 2000

6. Explain Line detection using Hough Transform

PART-D

7. Explain Coding Redundancy

8. Explain JPEG Compression

9. Explain Edge Detection

10. Explain Thresholding

11. Explain Region-Based Segmentation

QUESTION BANK
I M.Sc. Computer Science
Semester I

Core III

Mathematical Foundations of Computer Science

Sub Code: 21PCSC13

UNIT – I
Section – A (One Mark)

Choose the correct answer:

- Kurtosis is measured by the coefficient ____
a) β_2 b) β_3 c) β_1 d) β_4
- _____ = $A + \mu_1$
a) x b) y c) h d) \bar{x}
- If β_2 is < 0 then the curve is named as ____
a) **Platykurtic** b) Messokurtic c) Leptokurtic d) Linokurtic
- The process of finding a functional relationship between the variables x_i and y_i is called _____
a) Moment b) Skewness c) **Curve fitting** d) Kurtosis
- If the points (x_i, y_i) ; $i = 1, 2, \dots, n$ are plotted on a graph paper and we obtain _____ diagram
a) Curve b) **Scatter** c) Graph d) X axis
- Lack of symmetry means _____
a) Moment b) Negative Skewness c) **Skewness** d) Positive Skewness
- In _____ distribution the mean, median and mode coincide.
a) Probability b) Statistical c) **Symmetric** d) asymmetric
- $\gamma_2 =$ ____
a) $\beta_2 / 3$ b) $\beta_2 + 3$ c) **$\beta_2 - 3$** d) $\beta_2 * 3$
- A Curve which is flatter than the normal curve that is called _____
a) Leptokurtic b) Normal c) messokurtic d) **Platykurtic**
- The r^{th} moment about any point is _____
a) $\mu'_r = \frac{\sum f_i (x_i - A)^r}{N}$ b) $\mu_r = \sum f_i (x_i - \bar{x})^r$ c) $\mu'_r = \frac{\sum f_i x_i}{N}$ d) $\mu'_r = \frac{\sum f_i x_i^r}{N}$
- The Principle of least square states that the parameters involved in $f(x)$ should be chosen in such a way that $\sum d^2$ is _____
a) 0 b) maximum c) **minimum** d) equal

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Moment.
2. Describe the Karl Pearson's and Bowley's coefficient of skewness.
3. What do you mean by Kurtosis?
4. List out any 2 features of symmetric distribution.
5. What are the normal equations of a straight line.
6. What are the normal equations of a second degree parabola.
7. Define r^{th} moment about any point and about the origin.
8. Define r^{th} central moment.
9. Prove that $\mu_1' = \bar{x} - A$
10. What do you mean by Scatter diagram?
11. For a frequency distribution of (f_i / x_i) show that $\beta_2 \geq 1$.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Prove that $\mu_r = \mu_r' - r\mu_1'\mu_{r-1}' + r\mu_2'\mu_{r-2}' - \dots + (-1)^{r-1} (r-1) (\mu_1')^r$
2. The first four moments of a distribution about $x=2$, are 1,2.5,5.5 and 16 calculate the four moments. (i) about the mean ii) about zero
3. The first three moments about the origin are given by $\mu_1 = \frac{1}{2}(n+1)$;
 $\mu_2 = \frac{1}{6}(n+1)(2n+1)$; $\mu_3 = \frac{1}{4}n(n+1)^2$ Examine the skewness of the distribution.
4. The first three moments of a distribution about the value 3 of the variables are 2, 10 and 30 respectively. Obtain the first three moments about zero.
5. Karl Pearson's coefficient of skewness of a distribution is 0.4, its S.D is 8 and mean 30. Find the mode and median.
6. Calculate the Karl Pearson's coefficient of the skewness to the following data.

Size	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

7. Fit a second degree parabola by taking x_i as the independent variable.
8. Fit a straight line to the following data.

X	0	1	2	3	4
Y	2.1	3.5	5.4	7.3	8.2

9. Fit the curve $y = ae^{bx}$ to the following data

X	5	6	7	8	9	10
Y	133	55	23	7	2	2

10. Fit a curve $y = ax^b$ for the following data

X	1	2	3	4
Y	2.99	4.25	5.22	6.10

11. Find the best fitting straight line to the following data.

X	1	2	3	4	5
Y	4	3	6	7	11

12. Fit a parabola to the following data

X	1	2	3	4	5
Y	2	3	5	8	10

13. Fit the exponential curve $Y = ab^X$ from the following data.

X	2	4	6	8	10
Y	1	3	6	12	24

14. Calculate Karl Pearson coefficient of skewness of the following data set (Std. dev. = 1.7)

Value (x)	1	2	3	4	5	6	7
Frequency (f)	2	3	4	4	6	4	2

Section – D

Answer in about 400 words:

1. Calculate the first four central moments from the following data to find β_1 and β_2 and discuss the nature of the distribution.

X	0	1	2	3	4	5	6
F	5	15	17	25	19	14	5

2. Calculate the values of β_1 and β_2 for the distribution given in the following table.

Size	0-9	10-19	20-29	30-39	40-49
Frequency	11	20	16	36	17

3. Fit the second degree parabola to the following data taking x as the independent variable.

X	1	2	3	4	5	6	7
Y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

4. Fit the curve $y = bx^a$ to the following data

X	1	2	3	4	5	6
Y	1200	900	600	200	110	50

5. Fit a curve of the form $y = ab^x$ to the following data

Year (x)	1951	1952	1953	1954	1955	1956	1957
Production in tons (y)	201	263	314	395	427	504	612

6. Calculate the first four central moments from the following data to find β_1 and β_2 and discuss the nature of the distribution.

X	0	1	2	3	4	5	6	7	8
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F	1	8	28	56	70	56	28	8	1
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UNIT – II
Section – A (One Mark)

Choose the correct answer:

- If the variables x and y are uncorrelated then $Cov(x,y) =$ _____
 a. $a) >1$ b) -1 c) 1 **d) 0**
- Rank correlation coefficient is denoted by _____
 a. $a) \#$ b) \wedge c) $\$$ **d) ρ**
- _____ is used to examine the relationship between one dependent and one independent variable.
 a. independent variable.
 b. a) correlation **b) regression** c) curve fitting d) skewness
- The regression coefficient of x on y is given by $b_{xy} =$ _____
 a. **a) $\gamma \frac{\sigma_x}{\sigma_y}$** b) $1/\gamma \frac{\sigma_x}{\sigma_y}$ c) $-\gamma \frac{\sigma_x}{\sigma_y}$ d) $\gamma \frac{\sigma_y}{\sigma_x}$
- If one of the regression coefficients is greater than unity the other is _____ than unity.
 a. a) greater b) equal **c) less** d) less & equal
- If $\gamma = 1$ then correlation is _____
 a. a) Perfect **b) Perfect & positive** c) Positive & negative d) uncorrelation
- In Rank correlation correction factor is _____
 a. **a) $\frac{1}{12} m(m^2 - 1)$** b) $\frac{1}{16} m(m^2 - 1)$ c) $\frac{1}{12} m(m^2 + 1)$ d) $\frac{1}{12} m^2(m - 1)$
- The covariance between x and y is defined by _____
 a. **a) $\frac{\sum (x - \bar{x})(y - \bar{y})}{n}$** b) $\frac{\sum (x - \bar{x})(y - \bar{y})}{2n}$ c) $\frac{2\sum (x - \bar{x})(y - \bar{y})}{N}$ d) $\frac{\sum (x - \bar{x})}{N}$
- The regression line y on x is _____
 a) **a) $y - \bar{y} = \gamma \frac{\sigma_y}{\sigma_x} (x - \bar{x})$** b) $y - \bar{y} = 1/\gamma \frac{\sigma_y}{\sigma_x} (x - \bar{x})$
 c) $y - \bar{y} = \gamma \frac{\sigma_x}{\sigma_y} (x - \bar{x})$ d) $x - \bar{x} = \gamma \frac{\sigma_x}{\sigma_y} (y - \bar{y})$
- In Rank correlation, mean \bar{x} is _____
 a) $\frac{n-1}{2}$ b) $\frac{n-2}{2}$ **c) $\frac{n+1}{2}$** d) $\frac{n+2}{2}$

Section – B (Two Marks)

Answer in about 50 words each:

- Define Correlation and Covariance.
- Define Karl Pearson's coefficient of Correlation.
- Show that $-1 \leq \gamma \leq 1$.
- Suppose $n = 1000$, $\bar{x} = 65$, $\bar{y} = 83$, $\sigma_x = 4.5$, $\sigma_y = 3.6$ and the sum of the products of the deviations from the mean of x and y is 4800. Find γ_{xy}
- Define Rank Correlation ρ .
- Show that $\gamma_{xy} = \sigma_x^2 + \sigma_y^2 - (\sigma_x - \sigma_y)^2 / 2 \sigma_x \sigma_y$

7. Give the Regression equation of y on x and x on y.
8. Define the regression coefficients of y on x and x on y.
9. Show that $\gamma = \pm\sqrt{b_{xy}b_{yx}}$.
10. If θ is the angle between the two regression lines then what is the value of θ if (i) θ is acute and (ii) θ is obtuse

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Find the correlation coefficient for the following data

X	10	12	18	24	23	27
Y	13	18	12	25	30	10

2. Find the rank correlation coefficient of the following data of marks obtained by 10 students in physics and chemistry.

Physics (P)	35	56	50	65	44	38	44	50	15	6
Chemistry (Q)	50	35	70	25	35	58	75	60	55	35

3. Prove that the equation of regression line of x on y is given by $x - \bar{x} = \gamma \frac{\sigma_x}{\sigma_y} (y - \bar{y})$
4. Prove that the angle between the two regression lines is given by $\theta = \tan^{-1} \left[\left(\frac{\gamma^2 - 1}{\gamma} \right) \left(\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right) \right]$
5. The correlation coefficient is independent of the change of origin and scale.
6. Show that $\gamma = \frac{\sigma_{x+y}^2 - \sigma_x^2 - \sigma_y^2}{2 \sigma_x \sigma_y}$
7. A programmer while writing a program for correlation coefficient between two variables x and y from 30 pairs of observations obtained the following results $\Sigma x = 300$; $\Sigma x^2 = 3718$; $\Sigma y = 210$; $\Sigma y^2 = 2000$; $\Sigma xy = 2100$. At the time of checking it was found that he had copied down two pairs (xi,yi) as (18,20) and (12,10) instead of the correct values (10,15) and (20,15). Obtain the correct value of the correlation coefficient.
8. If θ is the acute angle between the two regression lines show that $\theta \leq 1 - \gamma^2$
9. The regression lines of two variables x and y are $x = 1.4y - 12.3$ and $y = 0.6x + 32.6$. Find the arithmetic means of x and y and also the correlation coefficient between x and y
10. From the following regression equations find the mean values of x and y; $3x + 12y = 19$; $3y + 9x = 46$.
11. The following table shows the distribution of 128 families according to the number of children.

No. of. Children	0	1	2	3	4	5	6	7	8
Frequency (f)	20	15	25	30	18	10	6	3	1

12. Find the Kelly's measure of skewness for the given data.

No. of. Children	0	1	2	3	4	5	6	7	8
Frequency (f)	20	15	25	30	18	10	6	3	1

13. Compute the first four moments from the following data.

Value (x)	5-15	15-25	25-35	35-45	45-55	55-65
Frequency (f)	10	20	25	20	15	10

14. Calculate the regression coefficient and obtain the lines of regression for the following data.

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

- i) Find Regression coefficient of X on Y
- ii) Find Regression equation of X on Y

Section – D

Answer in about 400 words:

1. Prove that the angle between the two regression lines is given by $\theta = \tan^{-1} \left[\left(\frac{\gamma^2 - 1}{\gamma} \right) \left(\frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \right) \right]$

2. Show that the variables $u = x \cos \alpha + y \sin \alpha$ and $V = y \cos \alpha - x \sin \alpha$ are uncorrelated if,

$$\alpha = \frac{1}{2} \tan^{-1} \left(\frac{2\gamma_{xy} \sigma_x \sigma_y}{\sigma_x^2 - \sigma_y^2} \right)$$

3. Three judges assign the ranks to 8 entries in a beauty contest.

Judge Mr.X	1	2	4	3	7	6	5	8
Judge Mr.Y.	3	2	1	5	4	7	6	8
Judge Mr.Z	1	2	3	4	5	7	8	6

4. The two variables x and y have the regression lines $3x+2y-26=0$, and $6x+y-31=0$

- Find (i) the mean values of x and y
 (ii) The correlation co-efficient between x and y
 (iii) The Variance of y if the variance of x is 25

5. The following data relate to the ages of husbands and wives.

Ages of Husband	26	29	31	33	35	34	38	39	41	45
Ages of Wife	22	26	27	31	28	19	29	36	35	46

Obtain the regression equations and determine.

- (i) The most likely age of husband for age of wife 30 years.
- (ii) The most likely age of wife for age of husband 32 years.

6. The average daily wage for working class in Madras is Rs.12 and for that in Delhi is Rs.18; their respective standard deviations are Rs.2 and Rs.3 and the coefficient of correlation is 0.67. Find the most likely wage in Delhi corresponding to the wage of Rs.20 in Madras.

7. If $x = 4y + 5$ and $y = kx + 4$ are the regression lines of x on y and y on x respectively (i) show that $0 \leq k \leq \frac{1}{4}$

UNIT – III
Section – A (One Mark)

Choose the correct answer:

1. Which of the following propositions is tautology?
A. $(p \vee q) \rightarrow q$ B. $p \vee (q \rightarrow p)$ **C. $p \vee (p \rightarrow q)$** D. Both (b) & (c)
2. Which of the proposition is $p \wedge (\sim p \vee q)$ is
A. Tautology B. Contradiction **C. Logically equivalent to $p \wedge q$** D. All of above
3. Which of the following is/are tautology?
A. $a \vee b \rightarrow b \wedge c$ **B. $a \wedge b \rightarrow b \vee c$** C. $a \vee b \rightarrow (b \rightarrow c)$ D. None of these
4. Logical expression $(A \wedge B) \rightarrow (C' \wedge A) \rightarrow (A \equiv 1)$ is
A. Contradiction B. Valid C. Well-formed formula **D. None of these**
5. Identify the valid conclusion from the premises $P \vee Q, Q \rightarrow R, P \rightarrow M, \neg M$
A. $P \wedge (R \vee R)$ B. $P \wedge (P \wedge R)$ C. $R \wedge (P \vee Q)$ **D. $Q \wedge (P \vee R)$**
6. Let a, b, c, d be propositions. Assume that the equivalence $a \leftrightarrow (b \vee \neg b)$ and $b \leftrightarrow c$ hold. Then truth value of the formula $(a \wedge b) \rightarrow ((a \wedge c) \vee d)$ is always
A. True B. False C. Same as the truth value of a D. Same as the truth value of b
7. Which of the following is a declarative statement?
A. It's right **B. He says** C. Two may not be an even integer D. I like you
8. $P \rightarrow (Q \rightarrow R)$ is equivalent to
A. $(P \wedge Q) \rightarrow R$ B. $(P \vee Q) \rightarrow R$ C. $(P \vee Q) \rightarrow \neg R$ D. None of these
9. Which of the following are tautologies?
A. $((P \vee Q) \wedge Q) \leftrightarrow Q$ B. $((P \vee Q) \wedge \neg P) \rightarrow Q$
C. $((P \vee Q) \wedge P) \rightarrow P$ **D. Both (a) & (b)**
10. If F_1, F_2 and F_3 are propositional formulae such that $F_1 \wedge F_2 \rightarrow F_3$ and $F_1 \wedge F_2 \rightarrow F_3$ are both tautologies, then which of the following is TRUE?
A. Both F_1 and F_2 are tautologies **B. The conjunction $F_1 \wedge F_2$ is not satisfiable**
C. Neither is tautologies D. None of these
11. Consider two well-formed formulas in propositional logic $F_1 : P \rightarrow \neg P$ $F_2 : (P \rightarrow \neg P) \vee (\neg P \rightarrow P)$
Which of the following statement is correct?
A. F_1 is satisfiable, F_2 is unsatisfiable B. F_1 is unsatisfiable, F_2 is satisfiable
C. F_1 is unsatisfiable, F_2 is valid D. F_1 & F_2 are both satisfiable
12. What can we correctly say about proposition $P_1 : (p \vee \neg q) \wedge (q \rightarrow r) \vee (r \vee p)$
A. P_1 is tautology B. P_1 is satisfiable
C. If p is true and q is false and r is false, the P_1 is true
D. If p as true and q is true and r is false, then P_1 is true
13. $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ is equivalent to
A. $S \wedge R$ B. $S \rightarrow R$ **C. $S \vee R$** D. All of above
14. The functionally complete set is
A. $\{ \neg, \wedge, \vee \}$ B. $\{ \neg, \wedge \}$ **C. $\{ \neg \}$** D. None of these
15. $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow R)$ is equivalent to
A. P B. Q **C. R** D. True = T
16. $\neg(P \rightarrow Q)$ is equivalent to
A. $P \wedge \neg Q$ B. $P \wedge Q$ C. $\neg P \vee Q$ D. None of these

17. In propositional logic, which of the following is equivalent to $p \rightarrow q$?
 A. $\sim p \rightarrow q$ **B. $\sim p \vee q$** C. $\sim p \vee \sim q$ D. $p \rightarrow q$
18. Which of the following is FALSE? Read \wedge as And, \vee as OR, \sim as NOT, \rightarrow as one way implication and \leftrightarrow as two way implication?
 A. $((x \rightarrow y) \wedge x) \rightarrow y$ B. $((\sim x \rightarrow y) \wedge (\sim x \wedge \sim y)) \rightarrow y$
 C. $(x \rightarrow (x \vee y))$ **D. $((x \vee y) \leftrightarrow (\sim x \vee \sim y))$**
19. Which of the following well-formed formula(s) are valid?
A. $((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$ B. $(P \rightarrow Q) \rightarrow (\neg P \rightarrow \neg Q)$
 C. $(P \vee (\neg P \vee \neg Q)) \rightarrow P$ D. $((P \rightarrow R) \vee (Q \rightarrow R)) \rightarrow (P \vee Q) \rightarrow R$
20. Let p and q be propositions. Using only the truth table decide whether $p \leftrightarrow q$ does not imply $p \rightarrow \neg q$ is
A. True B. False C. None D. Both A and B

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Proposition.
2. Define Connectives.
3. Write down the truth table for conjunction.
4. Write down the truth table for disjunction.
5. Write down the truth table for conditional.
6. Translate the following statement: 'The crop will be destroyed if there is a flood' into symbolic form using conditional connective.
7. Write down the truth table for Biconditional proposition.
8. Define Tautology.
9. Define Contradiction.
10. Define Contingency.
11. What is meant by disjunctive normal form?
12. What is meant by conjunctive normal form?
13. Define Inference Theory.
14. Define Predicate logic
15. Define Quantifiers.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Test the Validity of the Following argument: "All dogs are barking. Some animals are dogs. Therefore, some animals are barking".
2. Test the Validity of the Following argument: "Some cats are animals. Some dogs are animals. Therefore, some cats are dogs".
3. Symbolizes and prove the validity of the following arguments :
 - i. Himalaya is large. Therefore everything is large.
 - ii. Not everything is edible. Therefore nothing is edible.
4. Find the PCNF of $(\sim p \leftrightarrow r) \wedge (q \leftrightarrow p)$?
5. Explain in brief about duality Law?
6. Construct the Truth table for $\sim(\sim p \wedge \sim q)$?
7. Find the disjunctive Normal form of $\sim(p \rightarrow (q \wedge r))$?
8. Define Well Formed Formula? Explain about Tautology with example?

9. Explain in detail about the Logical Connectives with Examples?
10. Obtain the principal conjunctive normal form of the formula $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$
11. Show that the following set of premises are inconsistent, using proof by contradiction
 $P \rightarrow (Q \vee R), Q \rightarrow \neg P, S \rightarrow \neg R, P \Rightarrow P \rightarrow \neg S$
12. Using the indirect method of proof, show that $P \rightarrow Q, Q \rightarrow R, \neg(P \wedge R), P \vee R \Rightarrow R$.
13. Prove that $\neg(P \wedge Q) \rightarrow (\neg P \vee (\neg P \vee Q)) \Leftrightarrow (\neg P \vee Q)$
14. Prove that $(P \vee Q) \wedge (\neg P \wedge (\neg P \wedge Q)) \Leftrightarrow (\neg P \wedge Q)$
15. Obtain disjunctive normal forms of a) $P \wedge (P \rightarrow Q)$; b) $\neg(P \vee Q) \leftrightarrow (P \wedge Q)$

Section – D

Answer in about 400 words:

1. Obtain the principal conjunctive normal form of the formula $(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$
2. Prove that $(\exists x)P(x) \wedge Q(x) \rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$. Does the converse hold?
3. Show that from i) $(\exists x)(F(x) \wedge S(x)) \rightarrow (y)(M(y) \rightarrow W(y))$
 ii) $(\exists y) (M(y) \wedge \neg W(y))$ the conclusion $(x)(F(x) \rightarrow \neg S(x))$ follows
4. Obtain the principal disjunctive and conjunctive normal forms of $(P \rightarrow (Q \wedge R)) \wedge (\neg P \rightarrow (\neg Q \wedge \neg R))$. Is this formula a tautology?
5. Prove that the following argument is valid: No Mathematicians are fools. No one who is not a fool is an administrator. Sitha is a mathematician. Therefore Sitha is not an administrator.
6. Test the Validity of the Following argument: If you work hard, you will pass the exam. You did not pass. Therefore you did not work hard.
7. Without constructing the Truth Table prove that $(p \rightarrow q) \rightarrow q = p \vee q$
8. Using normal forms, show that the formula $Q \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$ is a tautology.
9. Show that $(x) (P(x) \vee Q(x)) \rightarrow (x)P(x) \vee (\exists x)Q(x)$
10. Show that $\neg(P \wedge Q) \rightarrow (\neg P \vee (\neg P \vee Q)) \Leftrightarrow (\neg P \vee Q)$
 $(P \vee Q) \wedge (\neg P \wedge (\neg P \wedge Q)) \Leftrightarrow (\neg P \wedge Q)$
11. Prove that $(\exists x) (P(x) \wedge Q(x)) \rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$
12. Example: Prove or disprove the validity of the following arguments using the rules of inference. (i) All men are fallible (ii) All kings are men (iii) Therefore, all kings are fallible.
13. Test the Validity of the Following argument: “Lions are dangerous animals, there are lions, and therefore there are dangerous animals”.

UNIT – IV

Section – A (One Mark)

Choose the correct answer:

1. A graph $G = (V, E)$ consists of a set of objects $V = \{v_1, v_2, v_3, \dots\}$ called _____
 A. arcs B. curve **C. vertices** D. edges
2. A graph $G = (V, E)$ consists of a set of objects $E = \{e_1, e_2, e_3, \dots\}$ called _____
 A. lines B. points C. vertices **D. edges**
3. A graph with p -vertices and q -edges is called a (p, q) graph. The $(1, 0)$ graph is called _____
 A. simple graph B. finite graph C. complete graph **D. trivial graph**

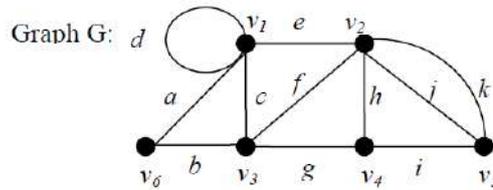
4. A graph that has neither self-loops nor parallel edges is called _____
A. simple graph B. finite graph C. complete graph D. trivial graph
5. When a vertex v_i is an end vertex of some edge e_j , v_i and e_j are said to be ___ with each other.
 A. regular graph **B. incident** C. degree D. adjacent
6. Two non-parallel edges are said to be _____ if they are incident on a common vertex.
 A. regular graph B. incident C. degree **D. adjacent**
7. The number of edges incident on a vertex v_i , with self-loops counted twice, is called
 A. regular graph B. incident **C. degree** D. adjacent
8. A vertex having no incident edge is called _____
 A. start vertex B. end vertex C. pendant vertex **D. isolated vertex**
9. A vertex having one incident edge is called _____
 A. start vertex B. null vertex **C. pendant vertex** D. isolated vertex
10. In a graph $G=(V, E)$, If E is empty, then G is called a _____
A. null graph B. finite graph C. complete graph D. simple graph
11. More than one edge associated a given pair of vertices called _____
A. parallel edges B. self loop C. curve D. arcs
12. A simple graph G is said to be _____ if every vertex in G is connected with every other vertex.
 A. infinite graph B. finite graph **C. complete graph** D. simple graph
13. A graph in which all vertices are of equal degree, is called a _____
A. regular graph B. finite graph C. simple graph D. complete graph
14. A _____ is defined as a finite alternating sequence of vertices and edges, beginning and ending with vertices
 A. travel **B. walk** C. tour D. train
15. A disconnected graph consists of two or more connected graphs. Each of these connected subgraphs is called a _____
 A. mixer B. fusion C. simple graph **D. component**
16. The _____ of a vertex v in a graph G is the distance from v to the vertex farthest from v in G .
 A. center B. distance **C. eccentricity** D. metric
17. A vertex with minimum eccentricity in graph G is called a _____ of G .
A. center B. distance C. eccentricity D. metric
18. The length of the longest path in a tree is called the _____ of tree.
 A. radius B. center C. area **D. diameter**
19. A tree in which one vertex is distinguished from all the others is called a _____.
 A. binary tree B. branch **C. rooted tree** D. free tree
20. An edge of G is not in a given spanning tree T is called a _____.

- A. branch B. chord C. root D. leaf

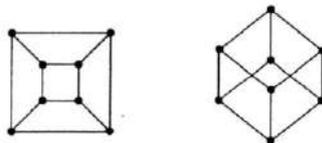
Section – B (Two Marks)

Answer in about 50 words each:

1. Define Graph.
2. What is meant by Isolated and pendent vertex?
3. Define Isomorphism.
4. Define Cycles.
5. Define Multigraph.
6. Define Walk, Path and Circuit.
7. What is component of graph?
8. Define Euler Graph.
9. Define Hamiltonian circuits and paths.
10. What is Distance in a tree?
11. Define rooted binary tree.
12. Define spanning trees.
13. Draw all simple graphs of one, two, three, and four vertices.
14. Find out the distance between v_6 and v_2 in the given graph.



15. Verify that the two graphs are isomorphic. Label the corresponding vertices and edges.



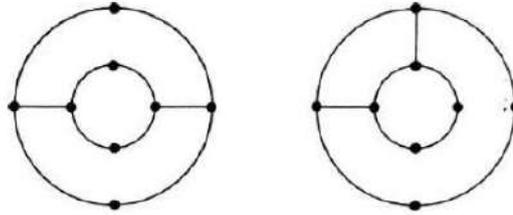
16. Draw a connected graph that becomes disconnected when any edge is removed from it.
17. Draw a graph that has a Hamiltonian path but does not have a Hamiltonian circuit.
18. Draw all trees of n labeled vertices for $n = 1, 2, 3, 4,$ and 5 .

Section – C

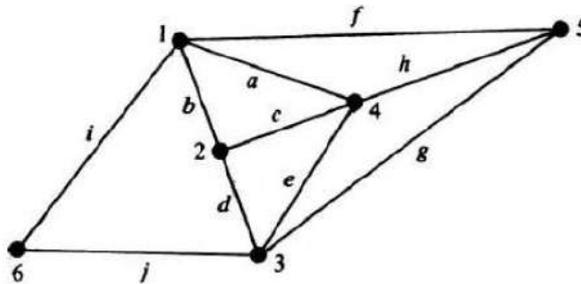
Answer in above 200 words each choosing either (a) or (b):

1. Draw a connected graph that becomes disconnected when any edge is removed from it.
2. Prove that the number of vertices of odd degree in a graph is always even.
3. Prove that a graph G is disconnected if and only if its vertex set V can be partitioned into two nonempty, disjoint subsets V_1 and V_2 such that there exists no edge in G whose one end vertex is in subset V_1 and the other in subset V_2 .
4. Prove: If a graph (connected or disconnected) has exactly two vertices of odd degree, there must be a path joining these two vertices.
5. Show that a simple graph with n vertices and k components can have at most $(n - k)(n - k + 1)/2$ edges.
6. Explain the operations of graph with an example.
7. Prove that an Euler graph G is arbitrarily traceable from vertex v in G if and only if every circuit in G contains v .
8. List out some properties of tree.
9. Show that a graph G with n vertices, $n - 1$ edges, and no circuits is connected.

10. Prove that the distance between vertices of a connected graph is a metric.
11. Prove that every tree has either one or two centers.
12. Prove that a connected graph G is a tree if and only if adding an edge between any two vertices in G creates exactly one circuit.
13. Are the two graphs given below are isomorphic? Why?



14. List all the different paths between vertices 5 and 6 in Figure. Give the length of each of these paths.



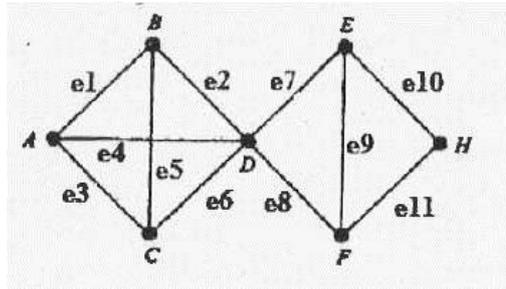
15. Draw all unlabeled rooted trees of n vertices for $n = 1, 2, 3, 4,$ and 5 .

Section – D

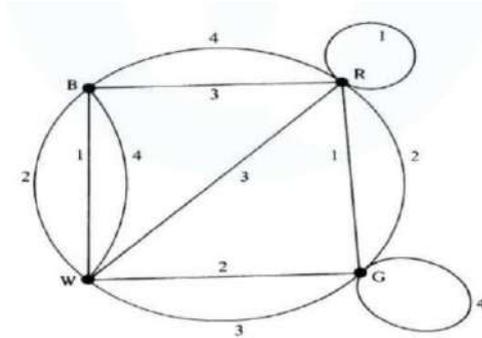
Answer in about 400 words:

1. Prove that a given connected graph G is an Euler graph if and only if all vertices of G are of even degree.
2. Prove: In a connected graph G with exactly $2k$ odd vertices, there exist k edge disjoint subgraphs such that they together contain all edges of G and that each is a unicursal graph.
3. Show that a connected graph G is an Euler graph if and only if it can be decomposed into circuits.
4. Prove: In a complete graph with n vertices there are $(n - 1)/2$ edge-disjoint Hamiltonian circuits, if n is an odd number ≥ 3 .
5. Show that a tree with n vertices has $n - 1$ edges.
6. Prove that every connected graph has at least one spanning tree.
7. Prove that the number of labeled trees with n vertices ($n \geq 2$) is n^{n-2} .
8. Show that a connected graph (spanning tree) of n vertices and e edges has $n - 1$ tree branches and $e - n + 1$ chords.
9. Show that a spanning tree T (of a given weighted connected graph G) is a shortest spanning tree (of G) if and only if there exists no other spanning tree (of G) at a distance of one from T whose weight is smaller than that of T .
10. Show that starting from any spanning tree of a graph G , we can obtain every spanning tree of G by successive cyclic exchanges.
11. In the tree graph obtained in Problem 3-29, observe the following:
 - i) A tree graph has at least one Hamiltonian circuit, and an arbitrary edge of a tree graph can be included in a Hamiltonian circuit.

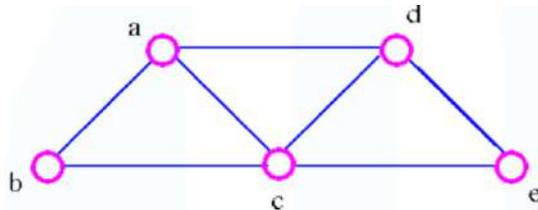
12. Define Walk, Path, Circuit. From the graph shown draw a walk of any length, a path of length 5, a circuit of length 4.



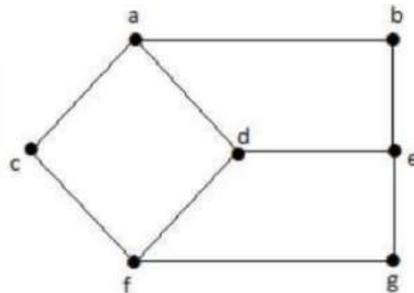
13. Define subgraphs. What are edge disjoint and vertex disjoint subgraphs? Construct two edge disjoint subgraphs of the graph G



14. Define spanning tree. Find any two spanning trees T_1, T_2 of the graph G given below. Also find the branch set, chord set, rank and nullity.



15. Find the eccentricity of all vertices in the graph G given below and also mark the center, radius and diameter of G .



UNIT – V

Section – A (One Mark)

Choose the correct answer:

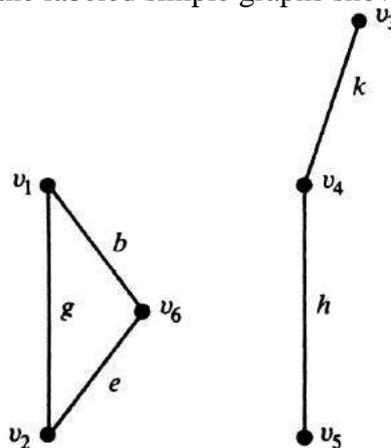
1. In a connected graph G , _____ is a set of edges whose removal from G leave the graph G disconnected.
A. cut-curve **B. cut-sets** C. cut- vertices D. cut-edges
2. Adding just one edge to a spanning tree will create a cycle; such a cycle is called _____.
A. fundamental cycle B. perfect cycle C. simple cycle D. no cycle
3. The _____ of a connected graph G is defined as the minimum number of edges whose removal reduces the rank of graph by one.
A. Vertex connectivity B. Less Connectivity **C. Edge connectivity** D. No connectivity
4. The _____ of a connected graph G is defined as the minimum number of vertices whose removal from G leaves the remaining graph disconnected.
A. Vertex connectivity B. Less connectivity C. Edge connectivity D. No connectivity
5. A connected graph is said to be _____ graph if its vertex connectivity is one.
A. disconnected B. complete **C. separable** D. non-separable
6. A separable graph consists of two or more non separable subgraphs. Each of the largest non-separable is called a _____.
A. sector B. piece C. module **D. block**
7. A graph G is said to be _____ if there exists some geometric representation of G which can be drawn on a plan such that no two of its edges intersect.
A. disconnected **B. planar** C. empty D. non-planar
8. A drawing of a geometric representation of a graph on any surface such that no edges intersect is called _____.
A. disconnected B. linking **C. embedding** D. separable
9. The regions enclosed by the planar graph are called _____ of the graph.
A. infinite **B. interior faces** C. exterior faces D. unbounded
10. A digraph is also referred to as _____ graph.
A. disjoint B. separated **C. oriented** D. bounded
11. The number of edges incident out of a vertex v_i is called _____.
A. zero degree B. null C. in-degree **D. out-degree**
12. The number of edges incident into vertex v_i is called _____.
A. zero degree B. null **C. in-degree** D. out-degree
13. An isolated vertex is a vertex in which the in-degree and the out-degree are both equal to _____.
A. zero B. empty C. one D. two

14. Two directed edges are said to be _____ if they are mapped onto the same ordered pair of vertices
 A. disjoint B. converse C. reverse **D. parallel**
15. Digraphs in which for every edge (a, b) there is also an edge (b, a) is called _____ digraph.
 A. simple **B. symmetric** C. asymmetric D. two

Section – B (Two Marks)

Answer in about 50 words each:

1. Define cut sets and give example.
2. Write the Properties of cut set.
3. Define fundamental circuits.
4. Define fundamental cut sets.
5. What is meant by edge connectivity?
6. What is meant by vertex connectivity?
7. Define separable and non-separable graph.
8. Define articulation point.
9. Define planar graph.
10. Define incident, adjacent and degree.
11. Define directed graph.
12. What is the edge connectivity of the complete graph of n vertices?
13. Write the incidence matrices for the labeled simple graphs shown in the figure.



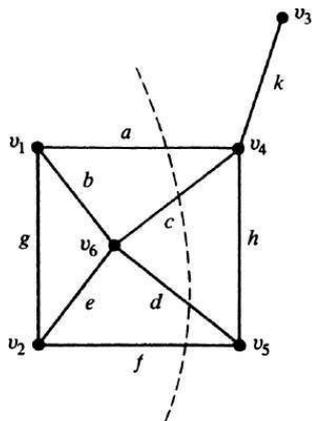
14. Draw a complete symmetric digraph of four vertices.

Section – C

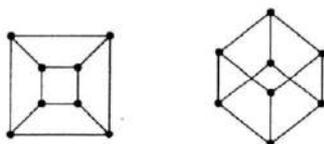
Answer in above 200 words each choosing either (a) or (b):

1. Briefly explain combinational vs geometric graphs.
2. Distinguish between Planar and non-planar graphs.
3. List out some of the properties of cut-set.
4. Show that every cut-set in a connected graph G must contain at least one branch of every spanning tree of G.
5. Prove: In a connected graph G, any minimal set of edges containing at least one branch of every spanning tree of G is a cut-set.
6. Explain with example: i) Edge & Vertex Connectivity ii) Separable Graph

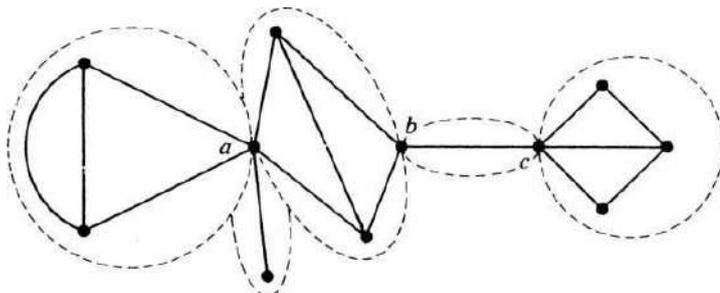
7. Prove that the edge connectivity of a graph G cannot exceed the degree of the vertex with the smallest degree in G .
8. Prove that the vertex connectivity of any graph G can never exceed the edge connectivity of G .
9. Prove that the complete graph of five vertices is non-planar.
10. Show that a connected planar graph with n vertices and e edges has $e - n + 2$ regions.
11. Briefly explain circuit matrix.
12. Explain Digraphs and its types.
13. Show that A digraph G is an Euler digraph if and only if G is connected and is balanced.
14. List all cutsets with respect to the vertex pair v_2, v_3 in the graph.



15. Show that the edge connectivity and vertex connectivity of the graphs in Figure are each equal to three.



16. Label the edges of the graph in figure and write down its circuit matrix B .

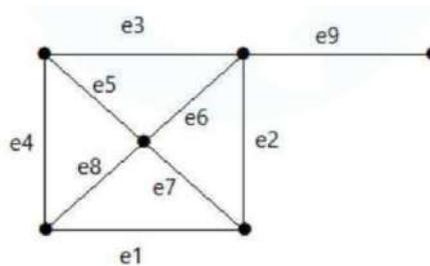


Section – D

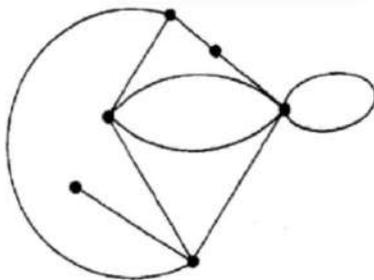
Answer in about 400 words:

1. Show that every circuit has an even number of edges in common with any cut-set.
2. Show that the ring sum of any two cutsets in a graph is either a third cut-set or an edge-disjoint union of cutsets.
3. Prove: In a spanning tree T , a chord c_i that determines a fundamental circuit Γ occurs in every fundamental cut-set associated with the branches in Γ and in no other.

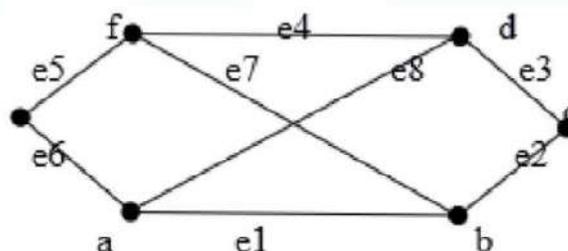
4. Prove: In a given spanning tree T , a branch b_i that determines a fundamental cut-set S is contained in every fundamental circuit associated with the chords in S , and in no others.
5. Show that a vertex v in a connected graph G is a cut-vertex if and only if there exist two vertices x and y in G such that every path between x and y passes through v .
6. Prove that the maximum vertex connectivity one can achieve with a graph G of n vertices and e edges ($e \geq n - 1$) is the integral part of the number $2e/n$; that is, $\lfloor 2e/n \rfloor$.
7. Show that the spherical embedding of every planar 3-connected graph is unique.
8. Show that Two graphs G_1 and G_2 are isomorphic if and only if their incidence matrices $A(G_1)$ and $A(G_2)$ differ only by permutations of rows and columns.
9. Prove that if $A(G)$ is an incidence matrix of a connected graph G with n vertices, the rank of $A(G)$ is $n - 1$.
10. Show that a complete matching of V_1 into V_2 in a bipartite graph exists if and only if every subset of r vertices in V_1 is collectively adjacent to r or more vertices in V_2 for all values of r .
11. Explain four color problem.
12. Explain coverings in detail.
13. Discuss Digraphs and binary relations.
14. Define cutset. Find all cutsets of the graph G given below and also find the edge connectivity of G .



15. Draw the geometric dual of the given graph



16. Consider the following graph G and any one of its spanning trees, T . List all fundamental circuits and fundamental cutsets with respect to T .



ST. MARY'S COLLEGE (Autonomous) –THOOTHUKUDI

I M.Sc. COMPUTER SCIENCE

Semester I

Core IV – COMPILER DESIGN

Question Bank

Sub code: 21PCSC14

UNIT - I

PART-A

1. A compiler which allows only the modified section of the source code to be recompiled is called
 - a) Subjective compiler
 - b) Dynamic compiler
 - c) Re-configurable compiler
 - d) Incremental compiler**
2. A compiler is preferable to an interpreter because
 - a) Debugging can be faster and easier
 - b) If one changes a statement, only that statement needs re-compilation
 - c) It is much helpful in the initial stages of program development
 - d) It can generate standalone programs that often take less time for execution**
3. Compiler can check _____ error.
 - a) Syntax**
 - b) Logical
 - c) Content
 - d) both a&b
4. Lexical Analysis is about breaking a sequence of character into
 - a) Groups
 - b) lines
 - c) Packets
 - d) Tokens**
5. Compiler translates the source code into
 - a) Executable code
 - b) Machine code
 - c) Binary code
 - d) Both a&b**
6. What is the output of Lexical Analyzer?
 - a) Parse tree
 - b) List of tokens**
 - c) Intermediate code
 - d) Machine code
7. Grammar of the programming is checked at the _____ phase of the compiler.
 - a) Semantic analysis
 - b) Syntax analysis**
 - c) Code optimization
 - d) Code Generation
8. What is the action of parsing the source program into proper syntactic classes
 - a) Lexical Analysis**
 - b) Syntax Analysis
 - c) General Syntax Analysis
 - d) Interpretation Analysis
9. A grammar that produce more than one tree for some sentence is called
 - a) Ambiguous**
 - b) Unambiguous
 - c) Regular
 - d) All of the above
10. _____ is the most general phase structured grammar.
 - a) Context sensitive**
 - b) Context Free Grammar
 - c) Regular Grammar
 - d) none
11. Sequence of characters in a token is called
 - a) Pattern
 - b) Language
 - c) Texeme
 - d) Lexeme**
12. The process of determining whether a string of token can be generated by a grammar
 - a) Analyzing
 - b) Parsing**
 - c) Translating
 - d) Recognizing
13. Which grammar defines Lexical Syntax?

a) **Lexical** b) CFG c) Regular d) Syntactic

14. The _____ resolves external memory addresses, where the code in one file may refer to a _____ location in another file.

a) Assembler b) Compiler **c) linker** d) interpreter

15. The purpose of _____ phase is to perform transformations on the intermediate representation, so that the back end can produce a better target program.

a) Parser b) Intermediate code **c) Optimization** d) Syntax

16. _____ phase creates a tree-like intermediate representation that depicts the grammatical structure of the token stream.

a) Lexical b) Intermediate code c) Optimization **d) Syntax**

17. To retract the forward pointer one position, we place a _____ near that accepting state.

a) / **b) *** c) + d) @

18. _____ have for each state, and for each symbol of its input alphabet exactly one edge with that symbol leaving that state.

a) NFA **b) DFA** c) CFG d) RE

19. Pointer _____ scans ahead until a pattern match is found.

a) forward b) lexeme begin c) front d) backward

20. _____ denotes the set of all strings consisting of zero or more instances of a or b, that is, all strings of a's and b's.

a) (a|b)* b) a|a*b c) (a|b)(a|b) d) a*b*

21. We can also represent an NFA by a _____, whose rows correspond to states, and whose columns correspond to the input symbols and ϵ .

a) symbol table b) transition diagram **c) transition table** d) all the above

22. A language is regular if and only if

a) accepted by DFA b) accepted by Turing machine c) accepted by PDA d) none

23. Regular expressions are

a) Type 0 language b) Type 1 language
c) Type 2 language **d) Type 3 language**

24. Regular expressions are closed under

a) Union b) Intersection c) Kleen star **d) All of the above**

25. Regular expression a/b denotes which of the following set?

a) {a} b) { ϵ , a, b} **c) {a, b}** d) {ab}

26. Which of the following regular expression denotes the Language comprising all possible strings of even length over the alphabet (0,1)?

a) (0|1)* b) (0|1)(0|1)* **c) (01 00 1 10)*** d) (0|1)(0|1)(0|1)*

27. The running time of NFA algorithm.

a) O(n) **b) O(k(n+m))** c) O(n+m) d) none

PART-B

1. List the various phases of a compiler.
2. Differentiate tokens, patterns, and lexeme.
3. Differences between compiler and Interpreter.
4. Define Regular Expressions and Regular Grammar.
5. What is Compiler?
6. Define the Analysis and Synthesis Model of Compiler
7. Write down the five properties of compiler.
8. What is translator?
9. Write a regular expression for a language containing strings consisting of zero or more a's which end with "b" over $\Sigma = \{a, b\}$.
10. List the various Compiler construction tool.
11. Differentiate NFA and DFA.
12. State Regular set.
13. Draw the transition diagram for Relational operators.
14. Define the operations on Languages.
15. Write the BASIS rule that define the regular expression.
16. Write the algorithm to simulate a DFA.
17. What is a symbol table?
18. Define Parsing.
19. What is the possible error -recovery action?
20. What are the two pointers in Input Buffering?
21. Differentiate Distinguishable state and Equivalent state.
22. What is a Transition table?
23. Define Token.
24. For any subexpression a in Σ , construct an NFA.
25. Define buffer pair.

PART-C

1. Analyze the structure of a compiler.
2. Discuss in detail about the role of Lexical analyzer with the possible error recovery actions
3. Describe the Input buffering techniques in detail.
4. Explain Specification of Tokens.
5. What is Regular Expression? Write the regular expression for:
 - a. $R=R_1+R_2$ (Union operation)
 - b. $R=R_1.R_2$ (concatenation Operation)
 - c. $R=R_1^*$ (Kleen Clouser)
6. a. Write a regular expression for a language containing strings which end with "abb" over $\Sigma = \{a,b\}$.

- b. Construct a regular expression for the language containing all strings having any number of a's and b's except the null string
7. Define Finite Automata. Differentiate Deterministic Finite Automata and Non-Deterministic Finite Automata with examples.
8. Solve the given regular expression $(a/b)^* abb (a/b)^*$ into NFA using Thompson construction.
9. Analyze the algorithm for simulating NFA and DFA.
10. How will you Minimize the no. of. DFA states for the given transition table

	0	1
q0	q1	q5
q1	q6	q2
q2*	q0	q2
q3	q2	q6
q4	q7	q5
q5	q2	q0
q6	q6	q4
q7	q6	q2

11. Describe in detail the Compiler-construction tool.
12. Draw NFA for the regular expression ab^*/ab .
13. Construct DFA to recognize the language $(a/b)^* ab$

PART-D

1. Describe the various phases of compiler with suitable example.
2. Create a DFA from a NFA using subset construction with an example.
3. Convert the following NFA into DFA.

	0	1
→ p	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

- 4.
5. Analyze the algorithm for minimizing the number of states of a DFA.
6. How will you construct an NFA from a Regular Expression?
7. Explain the following terms
 - a. Specification of Tokens
 - b. Recognition of Tokens

UNIT-II

PART-A

1. A _____ pictorially shows how the start symbol of a grammar derives a string in the Language.
a) Left Derivation **b) Parse tree** c) Right Derivation d) none
2. Type mismatches between operators and operands is an
a) Lexical error b) Syntactic error **c) Semantic error** d) Logical error
3. The goal of _____ parsing is therefore to construct a derivation in reverse.
a) Top-Down **b) Bottom-Up** c) Left Most Right Most
4. LR stands for
a) Left to Right b) Left to Right Reduction
c) Right to left **d) Left to right and right most derivation in reverse**
5. Recursive descent parsing belongs to the class of
a) Top-down parsing b) Bottom-up parsing c) Predictive parsing d) None of these
6. Misplaced semicolon is an example of _____
a) Lexical error **b) Syntactic error** c) Semantic error d) Logical error
7. Boldface string such as **id** or **if** represent a single _____ symbol.
a) Non-terminal **b) Terminal** c) Start d) Production
8. Which of the following derivations does a top-down parser use while parsing an input string?
a) Leftmost derivation in reverse **b) Leftmost derivation**
c) Rightmost derivation d) Rightmost derivation in reverse
9. Automaton accepting the regular expression of any number of a' s is
a) a* b) ab* c) (a/b)* d) a*b*c
10. Grammars that can be translated to DFAs is _____
a) Left grammar **b) Right linear grammar** c) Generic grammar d) Regular
11. Which one of the following is true at any valid state in shift-reduce parsing?
a) At the bottom we find the prefixes b) None of the mentioned
c) Stack contains only viable prefixes d) Stack consists of viable prefixes
12. The grammar $A \rightarrow AA \mid (A) \mid e$ is not suitable for predictive-parsing because the grammar _____ is?
a) Ambiguous **b) Left recursive** c) Right recursive d) An operator grammar
13. Knowing the entire stack and also the next k input symbol cannot decide which of the several reductions to make is _____ conflict.
a) Shift/Reduce **b) Reduce/Reduce** c) Reduce/Shift d) none
14. Augmented grammar production is represented as
a) $S' \rightarrow S.$ b) $S' \rightarrow .S$ c) $S' \rightarrow S \setminus \epsilon$ d) none
15. All items with their dots at the left end ,except for $S' \rightarrow .S$ is _____ item.
a) Kernel **b) Non-Kernel** c) Terminal d) Non-terminal

PART-B

1. What is a parse tree?
2. Define Derivation.
3. What is Shift Reduce-Parsing?
4. Define CFG.
5. List the various error recovery strategies for a lexical analysis.
6. Do left factoring in the following grammar: $A \rightarrow aAB|aA|a$ $B \rightarrow bB|b$
7. Write a short note on: a. Ambiguity (with example)
8. Define Recursive Descent Parser
9. What is Handle pruning?
10. Define LL (1).
11. Differences between SLR, CLR, LALR parsers?
12. List the Problems in Top-Down Parsing?
13. Define Ambiguous grammar?
14. List the various error recovery strategies for a lexical analysis
15. What is the various conflict that occur during shift reduce parsing?
16. What is Left Factoring, how will you eliminate it?
17. Consider the following grammar:
 $S \rightarrow Aa|bAc|Bc|bBa$
 $A \rightarrow d$
 $B \rightarrow d$
Compute closure of Item sets
18. Define Augmented grammar.
19. Differentiate Kernel items and Non-Kernel Items.
20. Write down the different types of Parser.
21. Write the grammar for the given Regular expression: $R=(a+b)^*aa(a+b)^*$, $R=(110+11)^*(10)^*$

PART-C

1. How should the parse resolve the errors when detected?
2. How will you eliminate ambiguity from the 'Dangling else' grammar?
3. Perform Shift Reduce Parsing for the input string **(a,a)** using the grammar
 $S \rightarrow (L)|a$
 $L \rightarrow L,S|S$
4. Construct the recursive decent parser for the following grammar?
 $E \rightarrow E+T/T$
 $T \rightarrow T * F / F$
 $F \rightarrow (E) / id$

5. Explain about Left factoring and Left Recursion with an example?
6. Calculate FIRST and FOLLOW for the following grammar?
 $E \rightarrow E+T/T$
 $T \rightarrow T*F/F$
 $F \rightarrow (E)/id$
7. Derivation and Parse Tree:
 Let G be a Context Free Grammar for which the production Rules are given below:
 $S \rightarrow aB|bA$
 $A \rightarrow a|aS|bAA$
 $B \rightarrow b|bS|aBB$
 Drive the string aaabbabbba using the above grammar (using Left Most Derivation and Right most Derivation).
8. What are the problems associated with Top-Down Parsing?
9. Write Rules to construct FIRST Function and FOLLOW Function.
10. Write a note on LL (1) grammar.

PART-D

1. Explain the algorithm to create Predictive parsing table with the scanning of input string.
2. Give the predictive parser for the following grammar.
 $S \rightarrow (L) | a$
 $L \rightarrow L, S | S$
 - i. Give a rightmost derivation for (a, (a, a)) and show the handle of each right-sentential form.
 - ii. Show the steps of a shift reduce parser
3. Explain in detail about the various types of Top –down parsing.
4. Analyze the LR parsing algorithm with an example
5. What is CFG. Explain in detail about the Context-Free Grammar.
6. (i). What are the different kinds of syntax error phased by a program? Explain in detail.
 (ii). What are the Error recovery techniques used in Predictive parsing? Explain in detail.
7. i) What is an ambiguous and unambiguous grammar?
 Identify the following grammar is ambiguous or not.
 $E \rightarrow E+E | E*E | (E)-E | id$ for the sentence $id+id*id$
 (ii) Prepare the following grammar is LL(1) but not SLR(1).
 $S \rightarrow AaAb | BbBa$
 $A \rightarrow \epsilon \quad B \rightarrow \epsilon$

UNIT-III

PART-A

1. What is true about Syntax Directed Definitions?
 - a) Syntax Directed Definitions + Semantic rules = CFG
 - b) Syntax Directed Definitions + CFG = Semantic rules
 - c) CFG + Semantic rules = Syntax Directed Definitions**
 - d) None of the above
2. Which of the following error is expected to recognize by semantic analyzer?
 - a) Type mismatch
 - b) Undeclared variable
 - c) Reserved identifier misuse.
 - d) All of the above**
3. _____ is a medium to provide semantics to the context-free grammar.
 - a) Domain grammar
 - b) Attribute grammar**
 - c) Object grammar
 - d) Value grammar
4. Which attributes get values from the attribute values of their child nodes?
 - a) Synthesized attributes**
 - b) Inherited attributes
 - c) S-attributed SDTD.
 - d) L-attributed SDT
5. What is true about Attribute Grammar?
 - a) Attribute grammar is a special form of context-free grammar
 - b) Each attribute has well-defined domain of values
 - c) The right part of the CFG contains the semantic rules
 - d) All of the above**
6. _____ is a special form of context-free grammar where some additional information (attributes) are appended to one or more of its non-terminals in order to provide context-sensitive information.
 - a) Attribute grammar**
 - b) Regular grammar
 - c) S-attributed grammar
 - d) L-attributed grammar
7. The parse tree containing the values of attributes at each node for given input string is called.
 - a) Left-Recursive
 - b) Right-Recursive
 - c) Annotated**
 - d) Augmented
8. Useful tool for determining an evaluation order for the attributes instance in a given parse tree.
 - a) Cyclic graph
 - b) Dependency graph**
 - c) Non-Cyclic graph
 - d) None
9. _____ is a tool that depicts the structure of basic blocks, helps to see the flow of values flowing among the basic blocks, and offers optimization too.
 - a) DAG**
 - b) BAG
 - c) SAG
 - d) PAG
10. Which of the following cannot be used as an intermediate code form?
 - a) Quadruples**
 - b) Syntax trees
 - c) Three address codes
 - d) Post fix notation
11. DAG has leaves corresponding to atomic operands and interior nodes are
 - a) Identifiers
 - b) Operators**
 - c) Keywords
 - d) tokens
12. _____ determines the type of a language construct from the way it is used.

- a) Type Checking b) Type synthesis c) **Type inference** d) none
13. The address instruction, which moves an instruction that computes a temporary t, then the instructions that use t require no change.
- a) **Quadruples** b) Triples c) Indirect triple d) Direct triple
14. A _____ is a mapping from type variables to type expressions.
- a) Unification b) Instance c) polymorphism d) **Substitution**
15. Inherited attribute is a natural choice in _____
- a) **Tracking declaration of a variable** b) Correct use of L and R values
c) All of the mentioned d) None of the mentioned

PART-B

1. Write a short note on Attributed grammar.
2. Define an intermediate code form.
3. List various intermediate code forms.
4. Differentiate Synthesized and Inherited attributes.
5. When are two type expressions equivalent?
6. Construct triples notations of an expression: $a * - (b + c)$.
7. Define Quadruples.
8. Define Annotated parse tree.
9. Differentiate between L attribute and S attribute.
10. How do we construct an annotated parse tree?
11. Define Cyclic Definitions.
12. What is three-address code?
13. Mention the rules for type checking.

PART-C

1. Write a note on Dependency Graph.
2. Explain the applications of Syntax Directed Definition.
3. Write short note on:
 - a. Dependency graph
 - b. Directed Acyclic Graph (DAG)
4. Write quadruples, triples and indirect triples for the expression: $-(a*b)+(c+d)-(a+b+c+d)$
5. Write the three-address statement with example for:
 - a. Assignment
 - b. Array statement (2D and 3D)
 - d. Boolean expression
 - e. If-then-else statement
6. Define an intermediate code form. Explain various intermediate code forms?
7. Discuss the common three-address instruction forms.
8. What is type checking and rules for type checking?

9. Write an algorithm for Unification.
10. Differentiate between synthesized translation and inherited translation.
11. Write an algorithm for type inference of polymorphic functions.

PART-D

1. Explain syntax directed definition with simple examples?
2. Describe the evaluation order of SDD.
3. Explain the Value-Numbered method for constructing DAG.
4. Explain Three-Address Code.
5. Write down the translation procedure of Expression.
6. Explain the Type Checking with suitable examples?

UNIT -IV

PART-A

1. Which of the following known as the text part of a program that does not change at runtime. Its memory requirements are known at the compile time?
a) Code b) Procedures c) Variables d) Keywords
2. In activation record, Which of the following Stores the address of activation record of the caller procedure?
a) Access Link b) Actual Parameters c) **Control Link** d) Temporaries
3. Whenever a procedure is executed, its activation record is stored on the stack, also known as?
a) Access Stack **b) Control stack** c) Formal Stack d) Return Stack
4. What is garbage?
a) Unallocated storage **b) Allocated storage whose access paths are destroyed**
c) Allocated storage d) Uninitialized storage
5. _____ are known at the runtime only, unless they are global or constant.
a) values b) Object **c) Variables** d) All of the above
6. Procedure calls are implemented by what are known as _____, which consists of code that allocates an activation record on the stack and enters information into its fields.
a) calling sequences b) return sequence c) recursion d) All of the above
7. Code generation can be considered as the?
a). first phase of compilation b)second phase of compilation
c) third phase of ompilation **d) final phase of compilation**
8. A _____ machine uses two-address instruction.
a) RISC b)SISC c)MISC **d)CISC**
9. _____ are used to keep track of memory locations where the values of identifiers are stored.

- a) Register descriptor **b) Address descriptor** c) Both a and b d) None
10. Code generator uses _____ function to determine the status of available registers and the location of name values.
a) setReg b) cinReg c) pfReg **d) getReg**
11. Which of the following is not a form of Intermediate representation?
a) Abstract Syntax Tree b) 3-address code
c) Directed cyclic Graph d) Reverse Polish Notation
12. The quality of the generated code can be determined by
a) Speed b) size c) both a and b d) none
13. In _____ the position of an activation record is fixed in memory at compile time.
a) Heap b) Stack Allocation c) Buffer **d) Static allocation**
14. An _____ keeps track of the location or locations where the current value of that variable can be found
a) register descriptor **b) address descriptor** c) memory d) all the above
15. The size of the _____ cannot be determined at compile time.
a) Code b) Heap c) Stack **d) both b & c**

PART-B

1. Define Activation Record.
2. Name any four procedural optimization techniques.
3. Define scope and life time of variable.
4. How is run-time memory sub-divided?
5. What are the two strategies for dynamic storage allocation?
6. Define Activation Record.
7. Define code generator.
8. List the primary task of code generator.
9. What are the factors that determine the mapping of code generator to IR?
10. What are the subproblems involved in the use of registers?
11. What are the two types of address descriptors?
12. List the issues in the design of a code generator.

PART-C

1. List the kind of data that might appear in Activation record.
2. What are the principles to be followed when designing calling sequence and layout of activation records?
3. What is the main difference between Static & Dynamic storage allocation?
4. What is a calling sequence? Explain briefly
5. What is the need of a display associated with a procedure?
6. Discuss the different kinds of instruction of a target machine.
7. Discuss the different kinds of addressing modes of a target machine.
8. How will you partition logical address space?
9. Examine the principal uses of registers.

PART-D

1. Discuss about the stack allocation strategy of runtime environment with an example?
2. Discuss how procedure access their data on stack.
3. Explain the issues in the design of a code generator.
4. Explain the simple code generator and generate target code sequence for the following statement $d:=(a-b)+(a-c)+(a-c)$
5. Explain a simple target machine model.

UNIT-V

PART-A

1. _____ is a tool that depicts the structure of basic blocks, helps to see the flow of values flowing among the basic blocks, and offers optimization too.
a) **DAG** b) CAG c) SAG d) PAG
2. _____ is a set of statements which always executes one after other, in a sequence.
a) Loop b) Instructions c) **Basic Block** d) Code
3. The first three-address instruction in the intermediate code is a _____.
a) follower b) **Leader** c) Conditional jump d) unconditional Jump
4. An intermediate-code program is partitioned into basic blocks, we represent the flow of control between them by a _____.
a) Control flow b) block flow c) Data flow d) **flow graph**
5. Instructions that compute a value that is never used is _____.
a) Sub-expression b) Algebraic Law c) **dead code** d) none
6. In _____, the value of the constant expression is evaluated at compile-time, and their values replace constant expression.
a) **constant folding** b) normal-form block c) Dead code d) all of the above
7. Peep-hole optimization is a form of
a) loop optimization b) local optimization c) data flow analysis d) **constant folding**
8. The _____ is a small, sliding window on a program.
a) **peephole** b) machine idioms c) flow control d) data flow
9. A compiler for a high-level language that runs on one machine and produces code for a different machine is called
a) optimizing compiler b) one pass compile c) **cross compiler** d) multipass compiler
10. _____ refers to a body of techniques that derive information about the flow of data along program execution paths.
a) peephole b) machine idioms c) flow control analysis d) **data flow analysis**
11. Relationship between the data-flow values before and after the assignment statement is known as a _____.

- a) reaching definition **b) transfer function** c) control flow d) Recursion
12. _____ is one of the most common and useful data-flow schemas.
 a) **Reaching definitions** b) machine idioms c) flow control analysis d) none
13. An important use for live-variable information is _____ for basic block.
 a) memory allocation b) stack allocation c) heap allocation **d) register allocation**
14. A definition is downwards exposed in a basic block only if it is not _____ by a subsequent definition to the same variable inside the same basic block.
 a) Generated b) **killed** c) Both a & b d) none
15. The _____ contains all the definitions inside the block that are "visible" immediately after the block.
 a) **gen set** b) kill set c) empty set d) null set

PART-B

1. Role of peephole optimization in compilation process.
2. Define Dead-code elimination with example.
3. Write short note on flow graph.
4. What are basic blocks?
5. Define Next-Use information.
6. Define data-flow analysis.
7. What is gen set?
8. Define kill set.
9. Define Execution path.
10. What is reaching definition?
11. What is dead code elimination?
12. List the characteristic of Peephole optimization.
13. What are the use of Machine Idioms?

PART-C

1. Write the algorithm for partitioning into Blocks
2. Write the algorithm for determining the liveness and next-use information.
3. What are the rules to be remembered when reconstructing the basic block from a DAG?
4. Construct the DAG for the following basic block:

$$D := B * C$$

$$E := A + B$$

$$B := B + C$$

$$A := E - D.$$
5. Write a note on flow graphs and its representation.
6. Write an algorithm to compute reaching definitions.
7. Write an algorithm to compute Live-variables.

8. Write an algorithm to compute available expression.

PART-D

1. Explain the peephole optimization Technique?
2. Explain optimization techniques on Basic Blocks with simple examples?
3. Explain about Data-Flow analysis of structured flow graphs.
4. Elucidate Live-Variable Analysis.

11. _____ requires that neither the sender nor the receiver of a message be able to deny the transmission.
 - a) Authentication
 - b) Confidentiality
 - c) Access Control
 - d) **Non-repudiation**
12. The _____ prevents or inhibits the normal use or management of communications facilities.
 - a) Masquerade
 - b) **Denial of Service**
 - c) Modification of messages
 - d) Replay
13. _____ exploit service flaws in computers to inhibit use by legitimate users.
 - a) **Service threats**
 - b) System threats
 - c) Information access threats
 - d) User threats
14. The insertion of bits into gaps in a data stream to frustrate traffic analysis attempts.
 - a) Security label
 - b) **Traffic padding**
 - c) Decipherment
 - d) Integrity
15. A variety of mechanisms that enforce access rights to resources.
 - a) Authentication
 - b) Confidentiality
 - c) **Access Control**
 - d) Non-repudiation

Section – B

1. What is Cryptography?
2. Define security attacks.
3. Define security mechanism.
4. List out the security services.
5. Define cryptanalysis.
6. What is masquerade attack?
7. Define Denial of Service
8. List out the components of encryption algorithm.
9. What is CIA triad?
10. Define Confidentiality Integrity and Availability.
11. What is the difference between threat and attacks?
12. Specify the four categories of security threats.
13. Define authentication.
14. Compare passive attack and active attack.
15. List out the available security mechanisms.

Section – C

1. Discuss security services and mechanisms in OSI architecture.
2. Explain CIA triad in detail.
3. Define passive attacks and classify the different types of passive attacks with a neat sketch.
4. Demonstrate the four categories of active attacks with a neat diagram.

Section – D

1. Explain security mechanisms and compare the relationship between security services and mechanisms.
2. Examine various security services listed in X.800.
3. Analyze the model for network security.
4. Differentiate passive attacks and active attacks.

UNIT – II Section – A

1. In cryptography, the order of the letters in a message is rearranged is _____ ciphers.
a) **Transposition** b) Substitution c) Quadratic d) Dual
2. In cryptography, the order of the letters in a message is replaced by other letters is _____ ciphers.
a) Transposition b) **Substitution** c) Quadratic d) Dual
3. Rail Fence Technique is an example of _____ cipher
a) **Transposition** b) Substitution c) product d) Caesar cipher
4. _____ is a round cipher based on the Rijndael algorithm that uses a 128-bit block of data.
a) AEE b) AED c) **AES** d) ADR
5. The process of writing the text as rows and read it as columns is known as ____ cipher.
a) vernam b) caesar c) **transposition columnar** d) substitution
6. Data Encryption Standard (DES) is a _____ cipher
a) Stream b) **Block** c) Bit d) Byte
7. DES has initial and final permutation block and _____ rounds
a) 14 b) 15 c) **16** d) 17
8. DES uses a key generator to generate sixteen _____ round keys.
a) 32-bit b) **48-bit** c) 54-bit d) 42-bit
9. A _____ cipher is one that encrypts a digital data stream one bit or one byte at a time.
a) Block b) **Stream** c) Random d) Product
10. A _____ cipher is one in which a block of plaintext is treated as a whole and used to produce a cipher text block of equal length.
a) **Block** b) Stream c) Random d) Product
11. In _____ cipher, each new message requires a new key of the same length as the new messages.
a) Playfair b) Hill c) Monoalphabetic d) **One-time pad**

12. _____ cipher is also known as shift cipher
 a) Playfair b) Hill c) **Caesar** d) One-time pad
13. In _____, the statistical structure of the plaintext is dissipated into long-range statistics of the cipher text.
 a) Confusion b) **Diffusion** c) Encryption d) Decryption
14. _____ refers to making the relationship between the ciphertext and the symmetric key as complex and involved as possible.
 a) **Confusion** b) Diffusion c) Encryption d) Decryption

Section – B

1. List out the types of attacks on encrypted messages.
2. Compare Substitution and Transposition techniques.
3. What are hill cipher merits and demerits?
4. List-out the types of attack in caesar cipher.
5. State brute-force attack.
6. State Caesar Cipher.
7. What are the difficulties with one time pad?
8. State Monoalphabetic Cipher.
9. Give an example each for substitution and transposition ciphers.
10. Convert the Given Text “STMARYSCOLLEGE” into cipher text using Rail fence Technique.
11. What is permutation?
12. Define confusion and diffusion.
13. Compare block cipher and stream cipher.
14. What is product cipher?
15. What is the strength of DES?

Section – C

1. Briefly define the Playfair cipher in detail.
2. Write a short note on one time pad cipher with an example.
3. What is the difference between monoalphabetic and polyalphabetic cipher. Give an example.
4. Explain various transposition ciphers in detail.
5. Convert “MEET ME” using Hill cipher with the key matrix. Convert the cipher text back to plaintext.
6. Explain in detail about various types of attacks.
7. Given Cipher text “YMJTYMJWXNIJTKXNQJSHJ”, knowing the message is encrypted by Caesar cipher and $k=5$. Try to decrypt the message.
8. Using Vigenere cipher, encrypt the word “explanation” using the key leg.

Section – D

1. Explain simplified Data Encryption Standard (DES) with an example.
2. Illustrate the Classical Encryption Technique with an example.
3. Explain the structure of Advanced Standard Encryption (AES) algorithm.
4. Differentiate between transposition cipher and substitution cipher. Apply two stage transpositions Cipher on the “treat diagrams as single units” using the keyword “sequence”.
5. Explain the Feistel cipher structure with a neat sketch. And also explain its importance.
6. Describe in detail about vigenere cipher with an example. List out the difficulties involved in this cipher.

UNIT – III Section – A

1. How many keys are used for asymmetric encryption?
a) 1 **b) 2** c) 3 d) 4
2. The difficulty of attacking RSA is based on the difficulty of finding _____ of a composite number.
a) prime factors b) divisors c) factors d) Multiples
3. Message _____ is a mechanism or service used to verify the integrity of a message.
a) Verification **b) Authentication** c) Protection d) Passing
4. Hash functions are commonly used to create a _____.
a) One time password **b) One way password** c) One time code d) One way code
5. The man-in-the-middle attack can endanger the security of the Diffie-Hellman method if two parties are not _____.
a) Unique **b) Authenticated** c) Separated d) Same
6. In RSA, $\Phi(n) = \underline{\hspace{2cm}}$ in terms of p and q
a) $(p)/(q)$ b) $(p)(q)$ **c) $(p-1)(q-1)$** d) $(p+1)(q+1)$
7. In Asymmetric Key Cryptography, the two _____ have a special relationship to each other.
a) sender & receiver b) data **c) keys** d) plain text
8. For RSA to work, the value of P must be less than the value of _____.
a) a **b) n** c) p d) q
9. Session keys are transmitted after being encrypted by _____.
a) make-shift keys b) temporary keys **c) master keys** d) unique key

10. How many bytes of the secret key is generated using Diffie-Hellman encryption or decryption scheme?
- a) **256** b) 871 c) 1024 d) 962
11. MAC stands for _____.
- a) **Message authentication code** b) Message arbitrary connection
c) Message authentication control d) Message authentication cipher
12. In the equation $MAC = C(K,M)$ “K” is referred as _____
- a) **Shared secret key** b) Input message c) MAC function d) Code
13. In general MAC function is _____ function
- a) One-to-one b) **Many-to-one** c) One-to-many d) One-to-two
14. The _____ method provides a one-time session key for two parties
- a) **Diffie-Hellman** b) AES c) DES d) RSA

Section – B

1. Compare public key encryption and conventional encryption.
2. Specify the application of public key cryptography.
3. What is message authentication?
4. What do you mean by MAC?
5. Define the classes of message authentication function.
6. What is a primitive root? Find the primitive roots of 25.
7. Differentiate internal and external error control.
8. What do you mean by hash function?
9. Differentiate MAC and Hash function.
10. What are the roles of public and private key?
11. List out the attacks to RSA.
12. What is one-way function?

Section – C

1. In what way Diffie Hellman key exchange algorithm is prone to man in the middle attack? Explain.
2. Write a detailed note on principles of public-key cryptosystems.
3. Write down the requirements and applications of public-key cryptosystems.
4. Differentiate Symmetric encryption and Asymmetric encryption.
5. What is Message Authentication code? Explain its functions and basic uses.

Section – D

1. Explain the RSA algorithm. Compute cipher text for $M=88$, $p=17$ and $q=11$.
2. Explain in detail about working of Diffie Hellman Key Exchange.
3. Describe secure hash Algorithm in detail.
4. Explain requirements for Message Authentication Code Functions.

UNIT – IV
Section – A

1. _____ is designed by provide security and compression services to data generated from the application layer.
a) **SSL** b) TCP c) ISP d) URL
2. A _____ is a very important aspect of IPSec.
a) **Security Association** b) Standard archive c) Protocol d) danger
3. IPSec has _____ modes.
a) Transport b) Tunnel c) Shift **d) Both A & B**
4. _____ is a protocol designed to create both inbound and outbound Security Associations
a) SP **b) IKE** c) SAD d) SPD
5. SSL stands for _____
a) server socket layer b) socket server layer c) socket server **d) secure sockets layer**
6. SSL divides the data into blocks of 224 bytes.
a) Framing b) Message integrity **c) Fragmentation** d) Compression
7. Host that is using the IPSec protocol needs to keep _____.
a) SP b) SA c) SAD **d) SPD**
8. The _____ protocol is designed to carry messages for the IKE exchange
a) SP b) SAD **c) ISAKMP** d) SPD
9. _____ payload initiates the mechanism of negotiation.
a) SA payload b) certificate **c) Proposal** d) Transform
10. _____ is used to negotiate security parameters
a) SA payload b) certificate payload c) Proposal Payload **d) transform payload**
11. _____ actually carries attributes of the SA negotiation.
a) SP b) SM c) ST **d) Payload**
12. _____ is an open encryption and security specification designed to protect credit card transactions on the Internet
a) **SET** b) SMT c) SPM d) SNM
13. _____ mode provides protection primarily for upper-layer protocols.
a) Transport b) Tunnel c) Wildcard d) Block
14. _____ mode provides protection to the entire IP packet.
a) Transport **b) Tunnel** c) Wildcard d) Block

15. _____ refers to applying more than one security protocol to the same IP packet without invoking tunnelling.
 a) **Transport adjacency** b) Iterated tunneling c) Authentication d) Payload
16. _____ refers to the application of multiple layers of security protocols effected through IP tunneling.
 a) Transport adjacency **b) Iterated tunneling** c) Authentication d) Payload
17. _____ payload contains random data used to guarantee liveness during an exchange and to protect against replay attacks.
 a) **nonce payload** b) certificate payload c) Proposal Payload d) transform payload
18. _____ payload contains either error or status information associated with this SA or this SA negotiation.
 a) nonce payload b) certificate payload **c) notify Payload** d) transform payload
19. _____ is key exchange protocol based on the Diffie-Hellman algorithm but providing added security
 a) HTTP **b) Oakley** c) SMTP d) FTP
20. _____ in transport mode encrypts and optionally authenticates the IP payload but not the IP header
 a) **ESP** b) SMP c) ENP d) SNP

Section – B

1. What are the benefits of IP Security?
2. What are the function areas of IP security?
3. List out some of the applications of IPSec.
4. What are the protocols used to provide IP security?
5. Specify the IP security services.
6. What do you mean by Security Association?
7. Specify the parameters that identifies the Security Association.
8. Define SSL.
9. Mention four SSL protocols.
10. Define Secure Electronic Transaction.
11. What are the features of SET?
12. What is a dual signature?
13. What is the role of internet key exchange?
14. What are the phases of IKE?

Section – C

1. What is the use of SSL protocol? Discuss the architecture of SSL.
2. Discuss the Architecture of IPSec with a neat diagram.

3. Write a detailed note on IPSec Benefits and Applications.
4. What is the need to combine Security Associations? Explain basic combinations of Security Associations.
5. Explain ESP Header of IPSec.
6. Write a note on Authentication Header.
7. Write down the requirements and features of Secure Electronic Transaction.
8. Write down some of the SET transaction types.

Section – D

1. Explain the scope of ESP encryption and authentication in tunnel mode.
2. What is the need for encapsulation of Security Payload? Explain Transport and Tunnel Mode ESP.
3. Briefly describe the key management in IPSec.
4. Explain the phases of Handshake Protocol with a neat diagram.
5. Write a detailed note on Secure Electronic Transaction.
6. Explain SSL record protocol operation with SSL record format.

UNIT – V

Section – A

1. _____ is a software used to disrupt computer operation, gather sensitive information, or gain access to private computer systems.
 a) **Malicious** b) Intrusion c) Firewall d) Access Control
2. _____ is the process of accessing a network or system without proper permission or rights.
 a) Malicious **b) Intrusion** c) Firewall d) Access Control
3. _____ detection involves the collection of data relating to the behavior of legitimate users over a period of time.
 a) **Statistical anomaly** b) Rule-based c) Temporary d) Access Control
4. _____ detection involves an attempt to define a set of rules that can be used to decide that a give behavior is than an intruder.
 a) Statistical anomaly **b) Rule-based** c) Temporary d) Access Control
5. A _____ process model is used to establish transition probabilities among various states.
 a) multivariate **b) Markov** c) time series d) operational
6. A _____ is a program that can replicate itself and send copies from computer to computer across network connections.
 a) Virus b) Intrusion **c) Worm** d) Firewall
7. A _____ is a program that can infect other program by modifying them.
 a) **Virus** b) Intrusion c) Worm d) Firewall

8. A _____ acts as a barrier between a trusted network and an untrusted network.
 a) Virus b) Intrusion c) Worm **d) Firewall**
9. One way to increase the security of a system against intruders and malicious program is to implement _____.
 a) Firewall b) Security service c) Anti-virus **d) trusted system**
10. _____ are decoy systems that are designed to lure a potential attacker away from critical systems.
 a) Firewall **b) Honey pots** c) Trojan Horse d) trusted system
11. A _____ is a secret entry point into a program that allows someone that is aware of it.
 a) Firewall b) Honey pots **c) Trapdoor** d) trusted system
12. _____ is a form of virus explicitly designed to hide itself from detection by antivirus software.
 a) Parasitic b) Boot sector **c) Stealth** d) Polymorphic
13. _____ controls the execution of the target code in antivirus.
 a) CPU emulator b) Virus signature scanner
c) Emulation control module d) system scanner
14. _____ is a firewall applies set of rules to each incoming IP packet and then forwards or discards the packet.
 a) **Packet-Filtering Router** b) Application-level gateways
 c) Circuit-level gateways d) Network-level gateways
15. A _____ is a system identified by the firewall administrator as a critical strong point in the networks security.
 a) Packet-Filtering Router b) Application-level gateways
 c) Circuit-level gateways **d) Bastion Host**

Section – B

1. What do you meant by intruders?
2. What are the three classes of intruders?
3. What are two common techniques used to protect a password file?
4. Define intrusion detection.
5. What is malicious programs?
6. What is meant by firewall configurations?
7. Define viruses.
8. What is trusted systems?
9. Define worms.
10. What is HTTPS?
11. Define firewall.

12. What are the types of firewall?
13. What is bastion host?
14. Define Honeypots.
15. What is a threat? List out its types.

Section – C

1. Give the taxonomy of malicious programs. Define each one.
2. What are the different types of viruses? How do they get into the systems?
3. What is a firewall? What is the need for firewalls?
4. What is the role of firewalls in protecting networks?
5. What is a worm? Name some known worms.
6. Define virus. Specify the types of viruses.
7. What are the different phases a virus go through his lifetime?

Section – D

1. Explain the types of intrusion detection systems in detail.
2. Explain Password management in detail.
3. Describe about malicious software in detail.
4. Explain the technical details of firewall and describe any three types of firewall with neat diagram.

ST.MARY'S COLLEGE (Autonomous) –THOOTHUKUDI

QUESTION BANK

I M.Sc. COMPUTER SCIENCE

Semester - II

Core V -

J2EE

Sub. Code: 21PCSC21

UNIT – I

Section – A (One Mark)

Choose the correct answer:

1. Web tier component runs on _____.
a) Client machine **b) J2EE server** c)API d)Server
2. Web pages and Web Browser are the part of _____.
a)Web Client b) Application Client c) EJB container d) None
3. Web Client is called _____.
a) Thick Client **b)Thin Client** c)Browser d) EJB
4. Applet are executed in _____.
a) J2EE **b)JVM** c)Plug-in d)Java
5. Servlet process request _____.
a) Statistically **b) Dynamically** c) Naturally d) logically
6. _____ bean represent transient conversation with client.
a)Session b)Entity c) Message driven d) persistent
7. Which of the following are container services.
a) Security b) Transaction Management c)Java Naming **d)all of the above**
8. _____ is an API for JAX-RS.
a) RPC style **b)Jersey** c)Documental style d)both a&c
9. _____ controls the communication between tiers.
a) Asynchronous Control Link b)Access Control link
c) Asymmetric Control link d) Adaptive Control link
10. Interface between user and underlying resource manager is called
a) EJB client b)Web client **c)EIS client** d)Application client

11. JACC stands for
- a) Java Advanced Contract for Component
 - b) Java Authorization Contract for Container**
 - c) Java Authorization Contract for Component
 - d) Java Advanced Contract for Container
12. J2EE application with all of its module is delivered in _____ file.
- a) WAR b)JAR c)XML **d)EAR**
13. A person who creates web component, Enterprise beans, applet or application client for use in J2EE is called
- a) Application Deployer
 - b) Application Assembler
 - c) Application Component Provider**
 - d) J2EE Product Provider
14. In _____ persistence EJB container automatically generates the necessary database access calls.
- a)Container Managed b)Bean Managed
 - b)Component Managed** d)Abstract Schema
15. Java API for processing XML document using DOM is
- a) **JAXP** b)SAX c)XSLT d)JAAS
16. _____ is needed to perform database access.
- a) JDBC API** b) EJB c) JSP d)XML
17. _____ provides a standard interface for demarcating transaction.
- a) Java mail b) Java Naming and Directory **c)JTA** d)JMS
18. _____ is an architectural style for developing webservice.
- a) REST** b)SOAP c)UDDI d)XML
19. RPC style message is _____.
- a) Loosely coupled **b)Tightly coupled** c)REST d) SOAP
20. In document style parameters are sent in _____ format.
- a) XML** b) HTML c)JAVA d)EJB

Section – B (Two Marks)

Answer in about 50 words each:

1. Define the J2EE Components.
2. What are the task performed by application deployer/administrator?
3. List the advantages of J2EE technology?
4. Define Roles.
5. What is Web services?
6. List out J2EE Servers.
7. What is a Container?
8. What is Enterprise Bean Developer?
9. Define JAAS.
10. What are the 2 main API defined by java?
11. What is J2EE?
12. List the EJB classes.
13. Define Session Bean.
14. Define Entity Bean.
15. Define Message-Driven Bean.

Section – C

Answer all questions choosing either (a) or (b):

1. Explain Java web services.
2. Explain Packaging.
3. What are the classifications of Client?
4. Explain J2EE Containers.
5. What are J2EE Components?
6. Explain Tool providers.
7. List the Container Services.
8. Difference between REST and SOAP.
9. List the features of Web Services .
10. Explain Web tier Implementation.

Section – D

Answer in about 400 words:

1. Explain in detail the J2EE Multi-tier Architecture.
2. Explain the types of Web Services.
3. Explain J2EE Technology.
4. Explain J2EE Roles in detail.
5. Elucidate Web Services in detail.

UNIT – II

Section – A (One Mark)

Choose the correct answer:

1. Enterprise bean runs in the _____.

- a) **EJB container** b)Web Client c)Browser d)UNIX
2. Instance variables can be made for garbage collection by setting them NULL in _____ method.
- a) ejbCreate b) ejbActivate **c) ejbPassivate** d) ejbRemove
3. Enterprise bean developer solve_____ problems.
- a) Messaging b)Client c)Application **d)Business**
4. Session bean represent _____ client inside J2EE server.
- a) Single** b)Multiple c)Multi d)None
5. _____ session bean maintain conversational state both within and between client transaction.
- a) Stateful** b)Stateless c) both a&b d) None
6. In _____ managed persistence the EJB container automatically generates database access calls.
- a) Bean **b)Container** c) Session d)All the above
7. _____ method is called immediately following the creation of instance and set the context associated with entity.
- a) setSessionContext **b) setEntityContext**
b) c)ejbCreate d)ejbRemove
8. _____ interface defines business method that are specific to the bean.
- a) Home b)Local c)Local home **d)Remote**
9. In _____ method session bean is removed from object pool.
- a) setSessionContext b) setEntityContext c)ejbCreate **d)ejbRemove**
10. An _____ is an XML file that specifies information about the bean such as its persistence type and transaction attributes.
- a) Deployment descriptor** b)Enterprise bean class c)Interface d)HelperClass
11. Which services are provided to EJB components by the EJB container?
- a) Transaction support b) Persistence support
c)Naming support **d) All mentioned above**
12. Abbreviate the term JMS?
- a) Java Message Service** b)Java Monitor Service
c) Java Message Session d)Java Monitor Session

13. Which EJB container must provide an implementation of Java Naming and Directory Interface (JNDI) API to provide naming services for EJB clients and components?
- a) Transaction support b) Persistence support
c) Naming support d) All mentioned above
14. EJB is like COM, Abbreviate the term COM?
- a) Component Object Model** b) Component Oriented Model
c) Common Object Model d) Common Oriented Model
15. Which type of instances retain no data or conversational state for a specific client?
- a) Message-Driven Bean** b) Session Bean
c) Entity Bean d) None of the above

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Session bean.
2. Define Container-Managed Persistence.
3. What is an Enterprise Bean?
4. Define Remote Interface.
5. What are the types of session bean?
6. Define Bean persistence .
7. What is the difference between local interface and local home interface?
8. Define Primary key.
9. Write any two benefits of Entity Bean.
10. Define Entity Bean.
11. What are Bean-Managed Persistent Fields?
12. What are Bean-Managed Relationship Fields?
13. What is a Primary Key of an Entity Bean with Bean-Managed Persistence?
14. What are Container-Managed Persistent Fields?
15. What are Container-Managed Relationship field?

Section – C

Answer all questions choosing either (a) or (b):

1. What are the contents of an Enterprise Bean?
2. Write the state management mode of Session Bean.
3. What are the types of multiplicities?
4. Write the methods of Entity bean.
5. Sketch and explain the life cycle of Stateful session bean.
6. Explain the life cycle of Message driven bean.
7. Explain the life cycle of Entity bean.
8. Differentiate Remote Access interface and Local Access interface.
9. What makes Message Driven Bean different from Session and Entity Bean?

10. What makes entity bean different from Session bean?
11. Write a note on EJB interfaces.

Section – D

Answer in about 400 words:

1. Explain the Life Cycle of an Enterprise Bean.
2. Elucidate the types of Enterprise Bean.
3. Explain Entity Bean in detail.
4. Explain the Session bean in detail.

UNIT - III

Section – A (One Mark)

Choose the correct answer:

1. _____ method returns a string representing the IP address of the computer.
a) getRemoteHost **b) getRemoteAddress** c) getAddress d) getHost
2. _____ is a private method in HTTP Servlet class.
a) doPost b) doGet **c) doHead** d) doTrace
3. The output to the browser is not sent until the servlet processing is finished know as
a) Response Buffer b) Request Dispatching
c) Status Code d) Name Dispatcher
4. _____ method executes an SQL statement that returns a single ResultSet object.
a) execute b) executeUpdate **c) executeQuery** d) queryUpdate
5. _____ drivers are pure Java.
a) Type 1 b) Type 2 c) Type 3 **d) Type 4**
6. Which class provides stream to read binary data such as image etc. from the request object?
a) ServletInputStream b) ServletOutputStream c) PrintWriter d) None
7. Which method is used to send the same request and response objects to another servlet in RequestDispatcher ?
a) forward() b) sendRedirect() c) getHead() d) doGet()
8. Which object is created by the web container at time of deploying the project?
a) ServletConfig **b) ServletContext** c) HTTP ServletContext d) None
9. Which method in session tracking is used in a bit of information that is sent by a web server to a browser and which can later be read back from that browser?
a) HttpSession b) URL rewriting **c) Cookies** d) Hidden form fields

10. When destroy() method of a filter is called?
- The destroy() method is called only once at the end of the life cycle of a filter**
 - The destroy() method is called after the filter has executed doFilter method
 - The destroy() method is called only once at the beginning of the life cycle of a filter
 - The destroyer() method is called after the filter has executed
11. How is the dynamic interception of requests and responses to transform the information done?
- Servlet container
 - Servlet config
 - Servlet context
 - Servlet filter**
12. The life cycle of a servlet is managed by
- Servlet context
 - Servlet container**
 - The supporting protocol (such as http or https)
 - All of the above
13. The FilterChain interface's calls the _____ method to pass control over to the next filter.
- doLoop
 - doFilter**
 - getFilter
 - loopFilter
14. _____ are transferred to and from the client in the HTTP headers.
- control string
 - parameters
 - cookies**
 - session
15. The Servlet API provides an easy way to append session identifier to the URL—using the _____ method.
- encodeURL**
 - encodeString
 - encode
 - encodeURI
16. If the same SQL statement is executed many times, it is more efficient to use a _____ object.
- Callable statement
 - Statement
 - PreparedStatement**
 - create statement.
17. _____ method never returns a null.
- execute Query**
 - excute
 - execute Update
 - executeSql
18. The _____ is the interface between the servlet and servlet Container.
- HttpServlet
 - Servlet Context**
 - Generic servlet
 - ServletConfig
19. web.xml is also called as _____.
- Filter
 - WebINF
 - Deployment descriptor
 - meta.INF
20. _____ returns any extra path information after the servlet name but before the query string, and translates it to a real path.
- getPathInfo ()
 - getPathTranslated ()**
 - getQueryString ()
 - None

Section – B (Two Marks)

Answer in about 50 words each:

- What are the difference between Servlet config and Servlet context.
- What are the life-cycle methods for a Servlet?
- Define Servlet Context.
- What are the methods to set HTTP Status code?
- Define HTTP Servlet Response.
- List few methods of HTTP Servlet Request.
- How will you set up an ODBC Data Source Name?
- Differentiate executeQuery and executeUpdate.
- Define Cookies.

10. What is Session Management?
11. Define Filter.
12. List the servlet tag elements.
13. List the four techniques for session management.
14. Name the four methods of FilterConfig Interface.
15. What is Request Dispatcher?
16. Difference between sendRedirect and forward.

Section – C

Answer all questions choosing either (a) or (b):

1. Sketch the steps in session tracking using HttpSession object.
2. Describe Filters in servlet.
3. Explain life cycle of a Servlet.
4. What are the methods of Connection Interface?
5. How will you Buffer the Response in servlet?
6. Write a note of Request Dispatching.
7. Explain the web application directory structure.
8. Write a note on HttpServlet.
9. How will you handle errors in servlet?
10. Write a note HttpSession Event.

Section – D

Answer in about 400 words:

1. How will you access a database with JDBC? Explain
2. Explain the Session Management in Servlet.
3. Explain Cookies in detail.
4. Explain Application Event.
5. Explain how will you include and forward data from other resource into servlet?

UNIT – IV

Section – A (One Mark)

Choose the correct answer:

1. _____ is everything else that is not recognized by the JSPcontainer.
 - a) **HTMLTemplate Data** b)Scriptlet c)Page directive d)Action tags
2. Which tag is used to execute java source code in JSP?
 - a) Declaration Tag **b) Scriptlet tag** c) Expression tag d)None
3. Which JSP Action tags is used to include the content of another resource, it may be jsp, html or servlet?
 - a) **jsp:include** b)jsp:forward c)jsp:plugin d)jsp:papam

4. In JSP page directive which attribute defines the MIME(Multipurpose Internet Mail Extension) type of the HTTP response?
a) import **b) Content Type** c) Extends d) Info
5. Which attribute specifies a JSP page that should process any exceptions thrown but not caught in the current page?
a) The ErrorPage Attribute b) The IsErrorPage Attribute
c) Both A & B d) None of the above
6. _____ method executes an SQL statement that returns a single ResultSet object
a) executeUpdate **b)execute Query** c)batchUpdate() d)None
7. How many jsp implicit objects are there and these objects are created by the web container that are available to all the jsp pages?
a) 8 **b) 9** c) 10 d) 7
8. Generating the Java servlet source code from a .jsp file takes during _____ phase.
a) Translation time b)Request time c)Execution time d)All the above
9. JSP compiler simply includes the contents of scriptlet verbatim in the body of the _____ method.
a) init() b)destroy() c)execute() **d)service()**
10. _____code is incorporated into the generated source file outside the _jspService() Method.
a)scriptlet b)action tag **c)Declaration** d)JSTL
11. _____ is used to copy static text into the JSP sourcecode before it is transformed into Java servlet source code and compiled.
a) <%@ include %> b) <jsp:include> c)<%include%> d)none
12. The _____object is used to represent the entire JSP page.
a) page **b) pageContext** c)application d)session
13. Commonly used values can be specified at the application level in web.xml file_____tag.
a)<init-param> **b)<context-param>** c)<parameter> d)none
14. Default buffer size used to describe the output buffering modle of JSP is_____.
a)10kb **b)8kb** c)12kb d)12kb
15. Bean property values can be retrieved with the actiontag
a) <jsp:getProperty> b)<% getProperty%> c)getProperty() d)none
16. TLD stands for

- a)TagLibraryDeployer b)TaskLibraryDescriptor
c)Tag Library Descriptor d)Task library Deployer
17. The process of converting objects to a stream of bytes that can be stored in a file or transmitted across a network is_____.
- a)serialization b) Externalizable **c)both a&b** d)none
18. JSTL tag is accessed via
- a){expression} b){@expression} c){!expression} **d) \${expression}**
19. <c:redirect> is a_____ JSTL tag
- a)Core** b)URL c)XML d)Function
20. When the encodeURL() method is used, the session ID is always embedded in the URL when _____ is true.
- a)session.isURL **b) session.isNew()** c)session.isEncoded d)none
21. _____ refers to the maximum length of time between requests that the session will remain valid.
- a) Timeout**b)session expired c)cookie invalid d)none
22. A connected RowSet also populated from a JDBC result set, which behaves according to the JavaBeans model is _____.
- a) CachedRowSet **b) JdbcRowSet** c) WebRowSet d)beanRowset

Section – B (Two Marks)

Answer in about 50 words each:

1. Cite the two operational phases of JSP container.
2. What is a Scriptlets?
3. Write down the syntax for using directive in JSP page.
4. Define JSTL.
5. List the difference between include directive and include action
6. How will you create custom tag?
7. What are the two properties of java bean?
8. List the JSTL sql tags.
9. How to use java beans in jsp page?
10. Define AngularJS.
11. What is BootStrap?
12. What is HttpSessionBindingListener?
13. How will you store and retrieve objects from session?
14. Draw the flowchart of the steps involved in JDBC operation.
15. What are the different types of statements?

16. Struts Framework is based on?

- a) Servlet, JSP and Java b) Servlet, HTML, and Java
c) **Servlet, JSP, XML, and Java** d) Applet, XML, and Java

17. An instance of Action is invoked by

- a)ActionRequest b) ActionListener **c) RequestProcessor** d)ActionServlet

18. The role of controller is played by_____ in struts2.

- a)OGNL b)Interceptor c) Actioncontext **d)Filter Dispatcher**

19. _____method that keeps track of the interceptor chain and invokes the next interceptor or action.

- a)execute() **b) invoke()** c)taskprovider() d)none

20. _____ interceptor also moves parameters onto properties exposed on the ValueStack.

- a) static-param** b)param c)workflow param d)validation param

21. The parameters that this interceptor moves are defined in the action elements of the declarative architecture.

- a) Param **b)static Param** c)autowiring d)logger

22. Most of the interceptors that you'll ever need are found in the _____ package that's declared in the struts-default.xml file.

- a) struts-default** b)intelligent default c)basic struts d)both a&b

Section – B (Two Marks)

Answer in about 50 words each:

1. Define struts2.
2. What are Struts2 core components?
3. What is interceptor in Struts2?
4. What are different ways to create Action classes in Struts2?
5. What are the benefits of Interceptors in Struts2?
6. What is Value Stack and OGNL?
7. Name some useful annotations introduced in Struts2?
8. Provide some important Struts2 constants that you have used?
9. What is the use of namespace in action mapping in Struts2?
10. What is the use of execAndWait interceptor?
11. What is the use of token interceptor in Struts2?
12. What are different Struts2 tags? How can we use them?
13. What is Custom Type Converter in Struts2?
14. What is an interceptor stack?

15. What does an action do?

16. List the different types of validators in struts 2.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Differences between struts1.x and struts2.x.
2. How will you compare struts with other framework?
3. Explain MVC architecture.
4. List down the features of struts 2 framework.
5. What are package and its attributes?
6. What is an interceptor? Explain
7. What are the methods of Value Stack?
8. How can we write our own interceptor and map it for action?
9. Explain struts2 Regex Validation .
10. How will you implement type conversion in struts?
11. What is life cycle of an interceptor?
12. What are the struts 2 components?
13. List down the built-in type convertors in struts2?

Section – D

Answer in about 400 words:

1. Explain the validation framework in struts.
2. Explain Interceptors workflow.
3. Explain the life cycle of struts.
4. Explain the different type of Built-in Interceptors.
5. Explain how you will build your own Interceptors.
6. How OGNL fits into the framework? Explain.

I M.Sc Computer Science

Semester II

Core VI – Data Mining & R Programming Subject Code: 21PCSC22

QUESTION BANK

Unit I

Section A

- _____ is used to map a data item to a real valued prediction variable.
a) **Regression** b) Prediction c) Clustering d) Classification
- KDD process of correcting or removing missing data is called
a) Data Mining b) Selection c) **Pre-Processing** d) Transformation
- Detecting of Spam email is an example for
a) Regression b) Prediction c) Clustering d) **Classification**
- Technique to perform hypothesis testing
a) Activation function b) **Chi-Squared Statistic** c) Both a & b d) None
- The _____ coefficient relates to the overlap to the geometric average of 2 sets.
a) Dice b) Jaccard c) **Cosine** d) Overlap
- Selecting individual based on their fitness is called
a) Associative rules b) **Roulette Wheel** c) Crossover d) Mutation
- Given a data value t , the probability that t is in class C is denoted by
a) $P(t)$ b) **$P(C|t)$** c) $P(t|C)$ d) $P(C) \cdot P(t|C)$
- _____ refers to the process of estimating a population parameter
a) **Point Estimation** b) Bias c) Summarization d) None
- _____ estimator is one whose bias is 0.
a) Bias b) **Unbiased** c) Squared Error d) None
- _____ is one of the popular point estimation techniques
a) Jack-knife b) MLE c) **Both a and b** d) None
- _____ is found by taking the square root of the mean squared error.
a) **RMSE** b) Bias c) MSE d) All
- _____ is an approach that solves the estimation problem with incomplete data.

- a) **Expectation-Maximization** b) Expectation-Minimization c) Likelihood d) None
13. _____ is one of the well-known statistical concepts.
a) Mean b) Variance c) Median d) **All**
14. _____ is one of the visual techniques to display data
a) Histogram b) Scatter Diagram c) Box Plot d) **All**
15. _____ is called Null Hypothesis.
a) **H₀** b) H₁ c) H₂ d) H₃
16. _____ is called Alternative Hypothesis.
a) H₀ b) **H₁** c) H₂ d) H₃
17. Neural Network can be viewed as directed graph with _____
a) Source b) Sink c) Internal Nodes d) **All**
18. _____ is finding hidden information in a database
a) Data Finding b) **Data Mining** c) Data Encapsulation d) Data Filtering
19. _____ is the part of data mining algorithms.
a) Model b) Preference c) Search d) **All**
20. Summarization is also called as _____
a) Characterization b) Generalization c) **Both a and b** d) None
21. Link analysis is referred to as _____
a) Affinity Analysis b) Association c) **Both a and b** d) None

Section B

What is an Unbiased Estimator?

1. What is Point Estimation?
2. Define Confidence Interval
3. Define Likelihood
4. What is posterior probability?
5. Define Hypothesis Testing?
6. Define Decision tree
7. List various activation function?
8. Define activation function?
9. Define neural network
10. What are the five parts of genetic algorithm?
11. List the three parts of data mining algorithms

12. Define Regression
13. What is prediction?
14. What is summarization?
15. What is Sequence Discovery?
16. State five steps of KDD?
17. Sketch KDD process
18. List out visualization techniques

Section C

1. Differentiate data mining with Knowledge discovery in databases.
2. Sketch the KDD process.
3. Categorize various Similarity Measures.
4. Differentiate predictive and descriptive model.
5. Sketch the Decision Tree Model with an example.
6. Explain predictive data mining model with examples.
7. Compare various Activation function.
8. Write a note on Bayes theorem with an example.
9. What do you mean by Jack-knife estimate?
10. Compare Crossover and Mutation.
11. Differentiate Regression and Classification.
12. How will you solve the estimation problem with incomplete data?

Section D

1. Explain a statistical perspective on data mining.
2. Explain Basic data mining tasks.
3. Elucidate about Genetic Algorithms.
4. Explain Neural Network.
5. Compare different Data Mining Techniques.

Unit II

Section A

1. ROC means _____
 - a)Receiver Operating Characteristic
 - b)Relative Operating Characteristic
 - c)**Both a and b**
 - d) None

2. _____ is erroneous data
 - a) **Noise** b) Wrong Values c) Input d) Outliers
3. Regression can be used to perform classification using _____
 - a) Division b) Prediction d) **Both a and b** d) None
4. Instead of fitting the data to a straight line _____ uses a logistic curve.
 - a) Linear regression b) Non-Linear regression c) **Logistic regression** d) None
5. Which of the following are the issues faced by DT?
 - a) Splits b) Tree structure c) Pruning d) **All**
6. CART means _____
 - a) **Classification and Regression Trees** b) Clustering and Regression Technique
 - c) Cyclic and Redundant Transaction d) None
7. In ID3 _____ is used as a measure to choose the best split.
 - a) Similarity b) **Entropy** c) CART d) Gain
8. For each node of a DT a table _____ label group is used
 - a) **AVC** b) SPRINT c) CART d) None
9. _____ learning is known a priori what the desired output should be.
 - a) **Supervised** b) Unsupervised c) Both a and b d) None
10. _____ is a learning technique that adjusts weights in NN.
 - a) Propagation b) **Back propagation** c) Learning rule d) None
11. Basic versions of gradient algorithm are _____
 - a) Batch b) Incremental c) Offline d) **All**
12. If classification fits the training data exactly it is called
 - a) optimum b) underfitting c) **Over Fitting** d) all the above
13. If predictors in linear regression function are modified by some function is called
 - a) **Non-linear** b) Logistic c) Logarithmic d) none
14. The method that removes redundant comparison or remove subtree to achieve better performance.
 - a) Splits b) Ordering c) **Pruning** d) None
15. The concept used to quantify information is called _____.
 - a) ID3 b) **Entropy** c) Likelihood d) Gain
16. A technique that generates a binary decision tree.
 - a) AVC b) SPRINT c) **CART** d) ID3

17. An approach that generate a simple set of rules that are equivalent to a DT with only one level.
- a) ID3 b) RX c) **1R** d) 1IR
18. In RBF _____ activation function is used at the output layer.
- a) Hyperbolic tangent b) Sigmoid c) Gausssian d) **Linear**
19. A mapping between two sets of numbers can be performed using an NN with only one hidden layer.
- a) Perceptron b) MLP c) **Kolmogorov** d) All the above
20. An approach to change the weight on an input arc to a node based on the knowledge that the output value from that node is incorrect.
- a) Hebb Rule b) Delta Rule c) **Both a & b** d) None

Section B

1. Define classification
2. State the 2 phases of classification problem
3. What are the 3 basic methods used to solve classification problem?
4. State the issues in classification
5. What are the approaches to handle missing data?
6. What are the 2 approaches to perform classification by regression?
7. State the types of regression
8. Define Bayes classification
9. What are the 2 basic steps in decision tree-based technique
10. List out the issues faced by DT
11. List the techniques to build a decision tree.
12. Define entropy
13. What are the 2 primary pruning strategies proposed in C4.5?
14. Define Backpropagation
15. What is MSE?
16. Define delta rule
17. What is learning rate?
18. Define perceptron.
19. What is Radial Function?
20. What is dynamic classifier selection?
21. Difference between rules and tree.

Section C

1. Explain KNN distance-based algorithms
2. What are the combining techniques?
3. What are the issues in classification?
4. Explain Regression.

5. What are the issues faced by most DT algorithms?
6. Explain Scalable DT techniques.
7. What do you mean by CART?
8. How does C4.5 improves ID3?
9. Explain the RBF networks.
10. Elucidate the advantages and disadvantages to the use of NNs for classification
11. Sketch the issues to be examined in neural-networks based algorithm.
12. How do you generate rules from a neural net?

Section D

1. Explain decision tree-based algorithms.
2. Explain distance-based algorithms
3. Elucidate Statistical based algorithms.
4. Explain neural network-based algorithms for propagation and NN supervised learning.
5. Generate the rules without a DT and NN in detail.
6. Explain Back Propagation algorithm.

Unit III

Section A

1. In _____ like tuples are grouped together.
a)Clustering b) **database segmentation** c)Classification d)Grouping
2. With _____ clustering the algorithm creates only one set of clusters.
a)Hierarchical b)**Partitional** c) categorical d)Large DB
3. _____ techniques use labelling of the items to assist in classification process.
a)**Extrinsic** b)Intrinsic c)Both a and b d)None
4. _____ satisfy the triangular inequality.
a)Similarity b)Distance c)**Metric attribute** d)None
5. _____ link is the smallest distance between an element in one cluster and an element in other.
a)**Single** b)Complete c)Average d)Centroid
6. _____ represent the distance between the cluster.
a) Centroid b) **Medoid** c)Average Link d)None
7. _____ is the process of identifying outliers in asset of data.
a) Outlier detection b)Outlier Mining c)**Both a and b** d)None
8. A tree data structure called _____ used to illustrate hierarchical clustering
a)Outlier b)**Dendrogram** c)hierarchical d)None
9. Space complexity for hierarchical algorithm is _____

- a) $O(n^2)$ b) $O(kn)$ c) $O(kn^2)$ d) $O(\max d n^2)$
10. Time complexity for hierarchical algorithm is _____
 a) $O(n^2)$ b) $O(kn)$ c) **$O(kn^2)$** d) $O(\max d n^2)$
11. A _____ is a graph in which there exist a path between any two vertices.
 a) Single link b) **Connected component** c) Graph d) None
12. Finding maximal connected component in a graph is called _____.
 a) **Single link** b) Complete Link c) Graph d) None
13. _____ is a maximal graph in which there is an edge between any two vertices.
 a) Complete Link b) **Clique** c) Farthest Neighbour d) None
14. _____ clustering algorithm minimizes the squared error.
 a) **Squared Error** b) Minimized Squared Error c) Both a and b d) None
15. PAM means _____
 a) Partition Against Medoid b) **Partition Around Medoid**
 c) Partition Algorithm Medoid d) None
16. Which of the following is the clustering algorithm based on PAM?
 a) CLARA b) CLARANS c) BEA d) **Both a and b**
17. Which of the following is the basic type of unsupervised learning?
 a) Non Competitive b) Competitive c) **Both a and b** d) None
18. SOM means _____
 a) **Self Organizing Map** b) Self Order Map c) Segmentation Over Medoid d) None
19. Divisive Clustering is a _____ approach.
 a) Bottom-up b) **Top-down** c) Both a&b d) None
20. _____ determines how to group data and how to physically place data on disk.
 a) CLARA b) CLARANS c) **BEA** d) PAM

Section B

1. Define Clustering
2. What is database segmentation?
3. What are the basic features of clustering?
4. Sketch the classification of clustering algorithms
5. What is extrinsic algorithm?
6. What is intrinsic algorithm?
7. Write about medoid
8. List out standard alternatives to calculate the distance between clusters

9. Define outliers
10. What is outlier detection?
11. Write about discordancy tests?
12. What is Dendrogram?
13. State about clique
14. Write about farthest neighbor algorithm?
15. Recall about K-Means
16. Define BEA.
17. What is Agglomerative algorithm?
18. Write a note on GA clustering algorithm.
19. List the various clustering attributes.
20. Draw the classification of clustering algorithms.

Section C

1. Explain Similarity and Distance measures
2. Illustrate the standard alternatives to calculate the distance between clusters.
3. Explain Outliers
4. Illustrate Agglomerative Hierarchical Algorithms.
5. Differentiate Single link and MST single link algorithm.
6. How will you merge two clusters using average link algorithm?
7. How will you cluster large databases?
8. Explain k-medoids algorithm.
9. What are the problems Hierarchical Algorithms that occur when clustering applied to real-world database?
10. Explain the Bond energy algorithm.

Section D

1. Explain any three Partitional Algorithms.
2. Elucidate clustering with Neural networks.
3. Differentiate the various Hierarchical Algorithms.
4. Compare the various Partitional Algorithms.
5. Explain Non-hierarchical clustering.

Unit IV

Section A

1. How many data types are present in R ?
a) 4 b) 5 c) **6** d) 7
2. Which function is used to create the vector with more than one element?
a) Library b) Plot c) **C ()** d) Par()

3. _____ finds the maximum value in the vector x, exclude missing values ?
a) rm (x) b) all(x) **c) max(x, na.rm=true)** d) max(x)
4. You can check to see whether an R object is NULL with the _____ function.
a) **is.null()** b) is.nullobj() c) null() d) as.nullobj()
5. Who developed R?
a) Dennis Ritchie b) John c) Bjarne Stroustrup **d) Ross Ihaka & Robert Gentleman**
6. R language is a dialect of which of the following languages?
a) S b) C c) MATLAB d) SAS
7. What is the length of b? b<-2:7
a) 4 b) 5 **c) 6** d) 7
8. What is the function to set row names for a data frame?
a) **row.names()** b) rownames() c) col.names() d) row name cannot be set for a data frame
9. Numbers in R are generally treated as _____ precision real numbers.
a) single **b) double** c) real d) imaginary
10. _____ provides optional labels with the columns and rows.
a) Disnames **b) Dimnames** c) Denmes d) Demnesd
11. Which of the following can be considered as object attribute?
a) dimensions b) class c) length **d) all of the above**
12. Which is more general than a matrix, in that different columns can have different modes?
a) Data types b) Data frames **c) Data sets** d) Databases
13. The _____ stores the nominal values as a vector of integers in the range of 1 to unique values in the nominal variable.
a) **Factor** b) Matrix c) Lists d) Functions
14. A _____ is an R-object which can contain many different types of elements inside it.
a) Vector **b) Lists** c) Matrix d) Functions
15. Which function replicates elements of vectors?
a) C **b) Rep** c) Crep d) Grep
16. What will be the output of the following R code?

```

➤ x <- list(foo = 1:4, bar = 0.6, baz = "hello")
➤ name <- "foo"
➤ x[[name]]

```


a) **1 2 3 4** b) 0 1 2 3 c) 1 2 3 4 5 d) All of the above
17. _____ operator performs true matrix operation
a) * b) / c) %*% d) %*
18. _____ is used to skip an iteration of a loop.
a) **next** b) skip c) group d) cancel
19. R has _____ basic indexing operators.
a) two **b) three** c) four d) five
20. The _____ function returns a list of all the formal arguments of a function.
a) **formals()** b) funct() c) formal() d) fun()
21. If the programmers want the output to be a data frame or a vector, then _____ function is used.

- a) **Lapply** b) Sapply c) Vapply d) Zapply
22. If a programmer wants the output to be a list then _____ function is used.
a) Lapply **b) Sapply** c) Vapply d) Zapply
23. The only environment without a parent is the _____ environment.
a) full b) half c) null **d) empty**
24. Language that support lexical Scoping is _____
a) Scheme b) Python c) Perl **d) All**
25. _____ prints out the function call stack after an error occurs.
a) trace() **b) traceback()** c) back() d) traback()
26. _____ allows you to modify the error behavior so that you can browse the function call Stack
a) debug() b) trace() **c) recover()** d) traceback()
27. _____ allows you to insert debugging code into a function a specific places
a) debug() **b) trace()** c) browser() d) traceback()
28. _____ suspends the execution of a function wherever it is called and puts the function in debug mode.
a) debug() b) trace() c) recover() **d) browser()**
29. _____ generate random Normal variates with a given mean and standard deviation.
a) dnorm b) rnorm c) pnorm **d) rpois**
30. _____ evaluate the cumulative distribution function for a Normal distribution.
a) dnorm **b) rnorm** c) pnorm d) rpois
31. _____ ensures reproducibility of the sequence of random numbers.
a) sets.seed() **b) set.seed()** c) set.seedvalue() d) set.value()
32. _____ divides the time spend in each function by the total run time
a) "by.sum" **b) "by.total"** c) "by.self" d) "by.del"
33. The final bit of output that summaryRprof() provides is the _____ interval and the total runtime.
a) response **b) sampling** c) processing d) retrieve
34. _____ allows you to test certain function or code block to see if they are taking excessive amount of time
a) **System.time()** b) rprof() c) User Time d) NElapsed time
35. _____ time is time charged to the CPU(s) for the R expression.
a) elapsed b) user c) response d) monitor

Section B

1. List few advantages of R.
2. How do you install a package in R?
3. List the basic data types in R.
4. What is a factor variable?
5. Define Map-reduce.
6. What is an Anonymous function?
7. List the attributes of objects.
8. Define Explicit coercion.

9. How will you denote missing values?
10. What are the 3 operators to extract subset of R object?
11. Define Named argument.
12. Define formal argument.
13. Write down the ways of Argument passing.
14. How will you find column and row sum and mean of row&column?
15. Define lexical scoping.
16. What is an environment?
17. Differentiate Local and Global Variable.
18. List any 4 dplyr commands.
19. What is profiling?
20. What is simulation?
21. Why set.seed is needed?
22. List the loop functions.
23. Define traceback().
24. What are the 2 methods for normalizing the data?
25. How do you perform random sampling?

Section C

1. How will you create a matrices and factor in R?
2. How will you create DataFrame?
3. List the Vector operations in detail.
4. How will you read data into R.
5. How will you write data into R.
6. Describe Subsetting a Vector, Matrix and List.
7. Describe Subsetting Nested and Multiple Elements of a List.
8. Explain the control structures in R.
9. Write a note on the ... argument.
10. Compare and contrast lapply(),sapply(),apply()
11. Explain scoping rules.
12. Explain traceback() function with an example.
13. Explain summaryRprof() function.
14. How will you simulate random samples for linear model?
15. Describe Coding standards of R.
16. How will you visualize data in R .

Section D

1. Explain how will you create the basic
2. Explain how will you get data IN and OUT of R?
3. Explain subsetting R objects.
4. Elucidate Function in R.
5. Describe the loop functions in detail.
6. Explain Debugging in R.

7. Profiling R code Explain.
8. Explain Simulation in R.
9. How will you manage data frames with dplyr package?

Unit V

Section A

1. _____ of an item is the percentage of transaction in which that item occurs
a) **Support** b) Confidence c) Occurrence d) None
2. _____ is the ratio of the number of transaction that contain XUY to the number of transactions that contain X
a) Confidence b) Strength c) **Both a and b** d) None
3. _____ is an item set whose number of occurrence is above a threshold
a) Large item set b) Frequent item set c) **Both a and b** d) None
4. A large item set are also said to be _____
a) Upward Closed b) **Downward Closed** c) Candidate d) None
5. Parallel algorithms strive to parallelize the data known as _____.
a) **data parallelism** b) task parallelism c) Candidate d) None
6. Parallel algorithms strive to parallelize the candidates known as _____.
a) data parallelism b) **task parallelism** c) Candidate d) None
7. CDA means _____
a) **Count Distribution Algorithm** b) Count Data Algorithm
c) Candidate Data Algorithm d) None
8. _____ demonstrates task parallelism
a) CDA b) **DDA** c) Task d) All
9. _____ association rule is one that involves categorical and quantitative data.
a) **Quantitative** b) Multiple-Level c) Generalized d) Minimum Support
10. _____ is defined as set of item sets that are correlated
a) Association Rule b) **Correlation Rule** c) Both a and b d) None
11. Basic content mining is a type of _____
a) **Text mining** b) Data Mining c) both a & b d) none
12. A program that traverses the hyper text structure in the web.
a) Spider b) Crawler c) Robot d) **All the above**
13. The page that the crawler starts with is referred to as
a) URL b) **seed URL** c) Home URL d) none
14. _____ is used to measure the importance of a page.
a) Normalization b) **Page Rank** c) HITS d) None
15. HITS means _____
a) Hyper Induced Text Search b) **Hyperlink-Induced Topic Search**
c) Hyper In link Text Search d) None

Section B

1. Write about association rules
2. Define support
3. What is item sets?
4. Define confidence or strength
5. Define association rule problem
6. Write about Large itemset
7. List out the ways how partitioning can improve performance of finding large itemset.
8. Define data parallelism
9. What is generalized association rule?
10. What are the rules applied for the reduced minimum support?
11. Write a short note on Quantitative Association rule
12. Define Correlation Rule.
13. How will you classify Web data?
14. Draw the Web mining taxonomy.
15. Sketch the text mining pyramid.
16. Define Crawlers and its types
17. What do you mean harvest system?
18. What are HITS?
19. What is page rank?
20. Write about supervised learning
21. What is a Hub page?
22. Define Clever.
23. What are the two components of HITS?
24. Differentiate regular crawling and focused crawling.
25. List the activities of web usage mining.

Section C

1. Explain Association Rules.
2. What do you mean by large item sets?
3. Explain how to improve the performance of finding large item sets.
4. Explain Apriori algorithm.
5. Write about the primary component of focused crawler architecture.
6. Explain Personalization.
7. What is Web-Usage Mining?
8. What are crawlers and explain its types?
9. Explain HITS
10. Describe Page Rank.
11. Write a note on Pattern analysis.
12. Compare the different types of Traversal Pattern Discovery.
13. Differentiate Harvest system and Virtual web View.

Section D

1. Explain basic algorithms of Association rules
2. Explain Web Content Mining.
3. Explain Pattern Discovery.
4. Elucidate web structure mining.
5. What do you mean by Web Usage Mining? Explain rules with examples
6. Elucidate some algorithms used in Web Mining.

ST.MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI

I M.Sc. Computer Science

Semester II

Core VII – Distributed Database Management System Sub. Code: 21PCSC23

QUESTION BANK

UNIT – I

Section – A (One Mark)

Choose the correct answer:

- Two or more processor share from primary memory is called _____.
a) Tightly coupled b) Loosely coupled c) Shared Memory d) **Both a and b**
- Which of the following is the level of data definition occur?
a) Logical structure b) Physical structure c) **Both a and b** d) None
- Which is a network transparency?
a) **Service** b) Location c) Name d) None
- Which of the following are complicating factors?
a) Complexity b) Cost c) Security d) **All**
- _____ refers to distribution of control not of data.
a) **Autonomy** b) Distribution c) Heterogeneity d) None
- In _____ system each machine has full DBMS functionality.
a) Client/Server b) **peer-to-peer** c) Both a and b d) None
- Dimensions are identified as _____.
a) A b) D c) H d) **All**
- Alternatives along with dimensions are identified as _____.
a) 0 b) 1 c) 2 d) **All**
- GCS means _____.
a) **Global Conceptual Schema** b) Global conceptual structure
c) Grouping concept structure d) None
- _____ responsible for interpreting user commands
a) **User Interface Handler** b) Semantic data controller c) Global Query Optimizer d) None
- If heterogeneity exists, then the system has the following alternatives
a) Unilingual b) Multilingual c) **Both a and b** d) None

12. Local DBMS defines _____ schema, which describe data is willing to share with others
- a) Import b) **Export** c) Both a and b d) None

Section – B (Two Marks)

Answer in about 50 words each:

1. Write about Distributed Database System
2. What is distributed processing?
3. Define Distributed database
4. Define Distributed DBMS
5. State 2 levels of data definition
6. State 2 types of data independence
7. What are the two types of distribution transparency?
8. What are the two types of fragmentation alternatives?
9. Define Transaction.
10. List out the complicating factors
11. Sketch the layers of transparency
12. What are the requirements of an autonomous system?
13. What are the dimensions of autonomy?
14. List the elements of user processor
15. List the elements of data processor
16. What are the two implementation alternatives of heterogeneity?

Section – C

Answer all questions choosing either (a) or (b):

1. Explain Multiprocessor system.
2. Write the steps to improve the performance of distributed DBMSs
3. Describe complicating factors
4. Who should provide transparency?
5. Write the short notes on transparent management of distributed and replicated data
6. Explain about the architectural alternatives
7. Explain Peer-to-peer distributed system
8. Explain MDBs architecture with neat sketch.

Section – D

Answer in about 400 words:

1. Explain the various promises of DDBSs
2. Elaborate the Architectural models for distributed DBMSs
3. Describe distributed DBMS architecture in detail.

UNIT – II
Section – A (One Mark)

Choose the correct answer:

1. _____ design activity deals with defining the interfaces for end users
a) **View** b) Conceptual c) Both a and b d) None
2. _____ analysis determine the entities, their attributes and relationship
a) **Functional** b) entity c) view d) Conceptual
3. Divide the relation into sub relation called _____
a) Schema b) Sub relation c) **Fragments** d) None
4. Distribution design activity consist of _____.
a) Fragmentation b) Allocation c) **Both a and b** d) None
5. Following is one of the rule enforced during fragmentation _____.
a) Completeness b) Reconstruction c) Disjointness d) **All**
6. Following is one of the information requirement in horizontal fragmentation
a) Database Information b) Application Information c) **Both a and b** d) None
7. The relation at the tail of a link is _____
a) **owner** b) member c) target d) source
8. The relation at the head is _____
a) owner b) **member** c) target d) source
9. _____ predicate is the conjunction of simple predicates.
a) Simple b) **Min Term** c) Both a and b d) None
10. _____ frequency is which user application access data.
a) **Access** b) Min Term c) Predicate d) None
11. _____ starts by assigning each attribute to one fragment.
a) **Grouping** b) Splitting c) Association d) None
12. _____ starts with a relation and details on beneficial partitioning.
a) Grouping b) **Splitting** c) Fragmentation d) None
13. Which of the following comes under distribution transparency?
a) Fragmentation Transparency b) Location Transparency c) Local mapping d) **All**
14. Distribution Transparency is supported by _____
a) DDD b) DDC c) **Both a and b** d) None
15. _____ refers to the stage of data copies at multiple sites.
a) Data Duplication b) **Data Replication** c) data Redundancy d) None

16. Which of the following are replication scenarios?

- a) Full Replicated DB b) Partially Replicated DB c) Unreplicated DB d) **All**

Section – B (Two Marks)

Answer in about 50 words each:

1. Write two major strategies for designing distributed database
2. List the two parallel activities in top-down design process
3. Write the two related activity groups of the process
4. Define fragments
5. State 2 steps of distribution design activity
6. What are the rules enforced during fragmentation?
7. What are two versions of horizontal partitioning?
8. What are the information requirements of horizontal fragmentation?
9. What is min term predicate?
10. What are the 2 sets of data about user applications?
11. What are the three correctness criteria?
12. List two types of heuristic approaches in vertical fragmentation
13. Write about bond energy algorithm
14. State three steps in generation of clustered affinity matrix
15. What are the three levels of distribution transparency?
16. Describe data replication

Section – C

Answer all questions choosing either (a) or (b):

1. How correctness rules works?
2. Explain data replication
3. Explain the impact of distribution on user queries
4. Explain about the clustering algorithm.
5. Describe partitioning algorithm

Section – D

Answer in about 400 words:

1. Write about alternative design strategies
2. Write about the types of fragmentation
3. Explain Distribution Transparency

UNIT – III

Section – A (One Mark)

Choose the correct answer:

1. Which of the following corresponds to query rewriting?
a) Query Decomposition b) Data Localization c) **Both a and b** d) None

2. _____ program consist of relational algebra operation
 a) **Localization** b) Materialization c) Both a and b d) None
3. Which of the following is communication primitive?
 a) Send b) Receive c) **Both a and b** d) None
4. Each sub query executing at one site called _____ query
 a) **Local** b) Global c) Control d) Variable
5. _____ is a set of execution plans to represent the input query.
 a) Cost model b) **Search Space** c) Search Strategy d) None
6. _____ predicts the cost of given execution plan.
 a) **Cost model** b) Search Space c) Search Strategy d) None
7. _____ tree is a tree , that at least one operand of each operator node is a base relation.
 a) **Linear** b) Busy c) Join d) All
8. _____ tree has operators with no base relations as operands
 a) Linear b) **Busy** c) Join d) All
9. Size of search space is _____
 a) $O(2N)$ b) $O(N)$ c) **$O(2^N)$** d) None
10. _____ time is the sum of all time .
 a) **Total** b) Response c) Elapsed d) All
11. _____ time is the elapsed time.
 a) Total b) **Response** c) Elapsed d) All
12. OVQP means _____.
 a) **One Variable Query Processor** b) Only Variant Query Program
 c) Overview Query Processor d) None
13. Which of the following are the techniques of decomposition?
 a) Detachment b) Substitution c) **Both a and b** d) None
14. The relation whose tuples are read first is called _____
 a) Internal b) **External** c) Join d) None
15. Tuples are found according to the values obtained from external relation is _____
 a) **Internal** b) External c) Join d) None
16. _____ composes the product of two relation.
 a) **Nested Loop** b) Loop c) Merge d) None

17. _____ consist of merging 2 sorted relation on join attribute
a) Nested Loop b) **Merge Join** c) Loop d) None
18. A sequence of semi joins is called _____ program.
a) Localization b) **Semi Join** c) Materialization d) None
19. _____ queries are class of queries that have cycles in their join graph.
a) **Cyclic** b) Tree c) Both a and b d) None
20. Which of the following is the method of R^* ?
a) Ship-Whole b) Fetch-As-Needed c) **Both a and b** d) None

Section-B (Two Marks)

Answer in about 50 words each:

1. List 4 main layers of query processing
2. State the steps of query decomposition
3. What is localization program?
4. What is materialization program?
5. Define local query
6. Define search space
7. Write about cost model
8. What is Search strategy?
9. State 2 kinds of join tree
10. What is join tree?
11. What are the three popular search strategy?
12. List 2 basic techniques of decomposition
13. State 2 major steps of optimization algorithm
14. What are the 2 algorithms in consistency join?
15. State 2 methods in System R Algorithm
16. What are the 2 basic approaches exist to order joins?
17. Write about semi join program
18. What is full reducer?
19. Define cyclic queries
20. Define tree queries
21. Define chained queries
22. Explain fragment and replicate
23. What is apprentice site?
24. State 2 methods of R^* algorithm for inter site data transfers
25. What are the aims of query processing in centralized system?
26. State 3 steps of query optimization

Section-C

Answer in about 50 words each:

1. Explain the Query processing problem
2. Write about centralized query optimization
3. How will you map global query to local
4. Explain Search space
5. Describe distributed cost model
6. Explain the search strategy
7. Illustrate Join ordering
8. Describe semi join based algorithms

Section-D

Answer in about 400 words:

1. Describe the layers of Query processing with neat diagram.
2. Explain Query optimization in detail
3. Elucidate the Join ordering in fragment queries.
4. Explain Distributed query optimization algorithms.
5. Write a detailed note on Query processing in centralized system.

UNIT – IV

Section – A (One Mark)

Choose the correct answer:

1. ____ is a sequence of read and write operation.
 a)Data b) Information c)**Transaction** d)Operation
2. _____ is one of the properties of transaction
 a) Atomicity b)Consistency c)Isolation d)**All**
3. ____ refers to the data values that have been updated by a transaction prior to its commit
 a) **Dirty data** b) Pure data c) Updated data d) None
4. _____ is one of the phenomena in isolation level.
 a)Dirty Read b)Fuzzy Read c)Phantom d)**All**
5. On-Line Transactions are referred to ____ transaction.
 a)**Short-Life** b)Long Life c) Both a and b d)None
6. ____ transaction have single start point and single termination point
 a) **Flat** b) Nested c)Closed d)Workflow
7. Transaction that are embedded in another one are _____.
 a)**Sub Transaction** b)Embedded Transaction c)Both a and b d)None
8. _____ is a sequence of transaction that can be interleaved with other transaction.

- a)Nested b)Workflow c)**Saga** d)Transaction
9. _____ oriented workflow is one of type of workflows.
a)Human b) system c)Transactional d) **All**
10. Schedules that can maintain mutual consistency are called _____
a)**One Copy Serializable** b)Replica c)Both a and b d) None
11. ROWA means _____
a)**Read Once Write All** b)Rewrite Once Write Any
c)Read Or Write All d)None
12. In Locking based system the scheduler is _____ manager.
a)**Lock** b)Transaction c) Scheduler d)DBA
13. _____ phase obtains locks and access data items.
a) **Growing** b)Shrinking c) Lock Point d) None
14. _____ phase releases locks and access data items.
a) Growing b)**Shrinking** c) Lock Point d) None
15. _____ is the moment when the transaction has achieved all its locks.
a) Growing b)Shrinking c) **Lock Point** d) None
16. _____ is one of the properties of timestamp generation.
a)Uniqueness b)Monotonicity c)**Both a and b** d) None
17. _____ is the size of data item allowed to lock.
a) Unit b)**Granularity** c)Both a and b d)None
18. _____ is one of the Intention Mode Lock.
a) Intention-Shared b)Intention-Exclusive c)Shared & Intention Exclusive d)**All**
19. In Multiple Granularity locks are acquired is _____ order.
a)**Top- Down** b)Bottom-Up c)Both a and b d)None

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Transaction
2. State the characterization of transaction
3. What are the properties of transaction?
4. Define dirty data
5. What are the 3 phenomena of isolation level?
6. Describe multiple isolation levels

7. Classify transaction according to criteria
8. Classify transaction according to structure
9. What is sub transaction?
10. Define saga
11. State 2 properties of sagas
12. Define workflow
13. List 3 types of workflow
14. Define schedule
15. State 2 types of conflicts
16. Define one-copy serializable
17. What are the 2 conditions met by one-copy serializable
18. Write about ROWA protocol
19. State 2 types of lock modes
20. Define growing phase
21. Define shrinking phase
22. Describe lock point
23. What are the properties of timestamp generation?
24. List the 2 phases to be followed by execution of a transaction
25. Define concurrency control
26. Define Granularity
27. State 3 additional lock modes with multiple granularity

Section – C

Answer all questions choosing either (a) or (b):

1. Explain Multiple granularity
2. Describe the methods of concurrency control
3. Write objectives of concurrency control
4. Explain the optimistic concurrency control algorithms.
5. What is serializability theory?
6. Describe concurrency control with optimistic methods

Section – D

Answer in about 400 words:

1. Write and explain the properties of transaction.
2. Write the types of transaction
3. Explain Transaction
4. Explain Locking-based concurrency control algorithms
5. Explain Timestamp-based concurrency control algorithms
6. Describe concurrency control anomalies

UNIT – V
Section – A (One Mark)

Choose the correct answer:

1. GWFG means _____
a) **Global Wait For Graph** b) Global Wait First Graph
c) Ground With First Group d) None
2. Algorithm for deadlock avoidance is _____
a) Wait-Die b) Wound-Wait c) **Both a and b** d) None
3. System failures are referred to as _____
a) Transaction b) **Site** c) Media d) None
4. _____ failures refers to the simultaneous failure of all site in distributed system.
a) **Total** b) Partial c) Site d) None
5. _____ failure indicates the failure of only some site
a) Total b) **Partial** c) Site d) None
6. _____ is one of the states in which coordinator can timeout.
a) Wait b) Commit c) Abort d) **All**
7. _____ algorithm kills the younger process.
a) Wound-Wait b) **Wait-Die** c) GWFG d) None
8. _____ checkpoint reduce checkpoint time.
a) Consistent b) **Fuzzy** c) Log d) None
9. _____ is a point of time at which a record is written onto the database from buffers.
a) **Checkpoint** b) Log c) deadlock d) none
10. _____ is one of the advanced recovery techniques.
a) Shadow paging b) Fuzzy Checkpoint c) ARIES d) **All**
11. _____ identifies the dirty page in the buffer.
a) **Analysis** b) Redo c) Undo d) All
12. RAID-1 is _____
a) No Redundancy b) **Mirrored** c) Bit-Interleaved Parity d) None
13. _____ is one of the issues in RAID.
a) Mapping Data b) Reconstruction c) **Both a and b** d) None

Section – B (Two Marks)

Answer in about 50 words each:

1. Define deadlock
2. What are the algorithms for deadlock avoidance?
3. Differentiate between total failure and partial failure
4. List the types of failures
5. Define Checkpoint
6. What is global commit rule?
7. Define coordinator timeout
8. Describe participant timeout
9. List types of checkpoint
10. What are 3 main steps of ARIES?

Section-C

Answer in above 200 words each choosing either (a) or (b):

1. Discuss the various methods to control failures.
2. Write a short note on Wait-Die algorithm.
3. Write a note on Wound-Wait algorithm.
4. Explain ARIES
5. Explain Write-Ahead logging protocol.
6. Describe about deadlock detection.

Section-D

Answer in about 400 words:

1. Explain Deadlock management in detail.
2. Write a detailed note on recovery in DBMS.
3. Explain in detail about Fuzzy checkpoint.
4. Describe shadow paging in detail.
5. Elaborate the concepts of failure in DBMS.
6. Explain Two-Phase Commit protocol.
7. Write a detailed note on Three-Phase Commit protocol

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

I M.Sc. Computer Science

QUESTION BANK

Semester II

Core VIII

SINGLE BOARD COMPUTERS AND IoT

Sub Code: 21PCSC24

UNIT – I

Section – A

- _____ is a complete computer that has been built on single circuit board.
a) **Single board computer** b) Dual computer
c) Multiple computer d) Edge computer
- Raspberry Pi 3B+ has _____ CPU & Clock Speed.
a) ARM 1 GHz b) **ARM 1.4 GHz** c) ARM 1.3 GHz d) ARM 1.5 GHz
- _____ collect data from the environment or object under measurement and turn it into useful data.
a) Gateway b) Cloud c) **Sensors** d) Internet
- The internet _____ receives the aggregated and digitized data and routes it over Wi-Fi, wired LANs, or the Internet.
a) **Gateway** b) Edge c) Toll d) Sector
- In which one of the following is used for multitasking?
a) **Raspberry Pi** b) Arduino Uno c) Sensors d) device
- The input voltage for raspberry pi model B is around _____.
a) **5V** b) 10V c) 20V d) 60V
- How many ports does raspberry pi 3 model B+ contain?
a) one b) two c) three d) **four**
- How many GPIO pins does raspberry pi model B+ have?
a) 7 b) 12 c) 25 d) **40**
- Extension Boards for the BeagleBone are on known as _____.
a) Protection b) **Capes** c) shield d) Cover
- Which board is first to use microcontroller within build USB?
a) LilyPad b) UNO c) RedBoard d) **Leonardo**

Section – B

- What is meant by single board computer?

2. List the applications of single board computer.
3. List out some of the popular sensors.
4. What is the use of GPIO pins in a IoT device?
5. List out various versions of raspberry pi devices till date.
6. What is Raspberry Pi?
7. What is BeagleBoard?
8. List out various versions of Beaglebone devices till date.
9. What is BeagleBone?
10. Summarize the benefits of SBC.
11. Compare sensors and actuators.

Section – C

1. Write a short note on single board computer and its applications.
2. Differentiate Raspberry Pi with BeagleBone Black.
3. Compare different types of single board computers in detail.
4. Difference between single board computer and microcontroller.
5. Explain the various IoT real-time applications.

Section – D

1. Write a detailed note on Raspberry Pi and its versions.
2. Describe BeagleBoard in detail.
3. Explain the stages of IoT architecture with neat sketch.

UNIT – II

Section – A

1. Raspberry Pi is a microcontroller development board like Arduino, or as a _____ replacement.
 a) Smart watch b) Powerbank **c) Laptop** d) UPS
2. The _____ port provides digital video and audio output.
 a) USB **b) HDMI** c) Serial d) PS/2
3. A _____ is a piece of metal, usually with fins to create a lot of surface area to dissipate heat efficiently.
a) heatsink b) heatfill c) heatstore d) heatbank
4. Raspberry Pi + Debian = _____
 a) Raspberriedebian b) Raspian **c) Raspbian** d) Raspberrian
5. _____ filesystem used for system logs and spool files.
 a) /usr **b) /var** c) /bin d) /src
6. _____ linux command is used to list all the files.
 a) all b) list all **c) ls** d) list

7. _____ linux command can be used to create an empty dummy file.
 a) cd b) ls c) mv **d) touch**
8. A program written with the IDE for Arduino is called _____
 a) IDE source **b) Sketch** c) Cryptogrphy d) Source Code
9. Arduino IDE consists of 2 functions. What are they?
 a) Build() and loop() b) Build() and loop()
c) Setup() and loop() d) Build() and setup()
10. How many digital pins are there on the UNO board?
 a) 16 b) 12 **c) 14** d) 20

Section – B

1. Define USB Port in Raspberry Pi.
2. What are the five status LEDs in Raspberry Pi?
3. Show all the power and input/output pins on Raspberry Pi.
4. List out some of the suggestions for troubleshooting Raspberry Pi.
5. What is meant by Raspbian?
6. Give example for the following Linux commands: ls, ls -l, ls -a
7. What are the switches can be used with chmod?

Section – C

1. Write down the steps to boot up Raspberry Pi for the first time.
2. What are the proper peripherals in Raspberry Pi?
3. Discuss about Raspbian.
4. Summarize the most important directories in the Raspbian file system.
5. Examine Sudo and Permissions Linux Commands with examples.

Section – D

1. Elaborate briefly about the Raspberry Pi board with neat sketch.
2. Illustrate briefly how to configure Raspberry Pi.
3. Write down the most important Linux commands with examples.
4. Describe Arduino and the Pi in detail.
5. Construct the design of Lighting up an LED in Ardiuno step by step.

UNIT – III

Section – A

1. _____ allowing a large number of devices to work together to provide certain functionality.
 a) **Self Configuring** b) Self Adapting c) Unique Identity d) Dynamic

2. _____ is data centric middleware standards for device-to-device.
a) HTTP **b) DDS** c) XMPP d) MQTT
3. _____ allows full duplex communication over a single socket connection.
a) HTTP b) CoAP **c) Websocket** d) XMPP
4. _____ open application layer protocol for business messaging.
a) XMPP b) DDS c) Websocket **d) AMQP**
5. _____ light weight messaging protocol based on publish-subscribe model.
a) DDS **b) MQTT** c) AMQP d) HTTP
6. _____ provides users the ability to provision computing and storage resources.
a) IaaS b) PaaS c) SaaS d) VaaS
7. _____ provides users the ability to develop and deploy application in cloud using the development tools, APIs etc.
a) IaaS **b) PaaS** c) SaaS d) VaaS
8. _____ provides the user a complete software application or the user interface to the application itself.
a) IaaS b) PaaS **c) SaaS** d) VaaS
9. _____ is bi-directional, fully duplex communication model that uses a persistent connection between the client and server.
a) Request-Response model b) Publish-Subscribe model
c) Push-Pull Model **d) Exclusive Pair**
10. _____ refers to networking of machines (or devices) for the purpose of remote monitoring and control and data exchange.
a) M2M b) T2T c) C2C d) F2F
11. WiMax standard provide data rates from _____
a) 2 Mb/s to 3Gb/s b) 1.5 Mb/s to 3Gb/s
c) 1.5 Mb/s to 1Gb/s d) 1 Mb/s to 1Gb/s.
12. LR-WPAN Provides data rate from _____
a) 10kb/s to 100kb/s **b) 40kb/s to 250kb/s**
c) 80kb/s to 150kb/s d) 30kb/s to 50kb/s

Section – B

1. Define Internet of Things.
2. List out the characteristics of IoT.
3. Define 6LoWPAN.
4. Compare TCP and UDP.

5. List out the interfaces used in IoT?
6. Define IoT functional blocks.
7. Differentiate between Logical and physical design of IoT.
8. State Request-Response Model.
9. State Publish-Subscribe Model
10. State Push-Pull Model.
11. Define Wireless Sensor Networks.
12. State Communication Protocols.
13. What is meant by embedded systems?
14. Define M2M.
15. Define 3V's in Big Data Analytics.

Section – C

1. Describe the characteristics and physical design of IoT.
2. Formulate the logical design of IoT with explanation.
3. Explain the IoT protocols with block diagram.
4. Describe IoT Communication Models.
5. Discuss Cloud Computing.
6. Write a short note on Big Data Analytics.
7. Describe IoT Protocols in Link Layer.
8. Explain IoT Protocols in Network Layer.
9. Illustrate the various IoT Protocols in Transport Layer.
10. Describe IoT Protocols in Application Layer.
11. Write a short note on Machine-to-Machine.

Section – D

1. Explain the physical and logical design of IoT in detail.
2. Briefly describe the various IoT enabled technologies.
3. Design the protocol layer of IoT and explain various protocols used in each layer.
4. Generalize the IoT communication APIs
 - a. REST –based communication APIs
 - b. WebSocket-based Communication APIs
5. Elucidate the various applications of IoT.
6. Distinguish between IoT and M2M.

UNIT – IV

Section – A

1. In SOA, _____ layer is the infrastructure to support over wireless or wired connections among things.
 - a) Sensing **b) Network** c) Service d) Interface

2. In SOA, _____ layer is to create and manage services required by users or applications.
a) Sensing b) Network **c) Service** d) Interface
3. In SOA, _____ layer consists of the interaction methods with users or applications.
a) Sensing b) Network c) Service **d) Interface**
4. In SOA, _____ layer is integrated with available hardware objects to sense the status of things.
a) Sensing b) Network c) Service d) Interface
5. In _____, an application is a combination of scheduler and components wired together by specialized mapping constructs
a) nesC b) Keil C c) Dynamic C d) B#
6. The _____ statement in Dynamic C immediately passes control to another costate segment.
a) skip b) pass **c) yield** d) move
7. _____ is a multithreaded programming language designed for constrained systems.
a) nesC b) Keil C c) Dynamic C **d) B#**
8. _____ supports object-oriented programming.
a) nesC **b) B#** c) Dynamic C d) Keil C
9. _____ is an abstraction for procedural calls across languages, platforms, and protection mechanisms.
a) RPC b) CPC c) KPC d) VPC
10. _____ are able to provide portable and platform-independent environments for hosting the applications and all their dependencies.
a) Cache **b) Containers** c) Bucket d) Block
11. _____ is a sequence of data elements ordered by time.
a) Stream b) Block c) Container d) Box
12. _____ processing is a one-pass data-processing paradigm that always keeps the data in motion to achieve low processing-latency.
a) Stream b) Block c) Container d) Bit

Section – B

1. List out the embedded device programming languages.
2. What are the two types of pointers used in Keil C?
3. What are the two main directives in Dynamic C?
4. What is meant by resource partitioning?
5. Define code offloading?

6. Differentiate Cloud versus Fog.
7. Define containers.
8. What is the structure of a stream?
9. Define Stream.
10. What is Stream processing?
11. List the characteristics of stream data in IoT.

Section – C

1. Write a short note on Keil C.
2. Discuss about Dynamic C and B#.
3. Write a short note on nesC.
4. Discuss CoAP.
5. Discuss IoT and the Cloud in Detail.
6. Explain Real-time analytics in IoT and Fog computing.
7. Compare Stream Model and Batch Model.
8. Explain the general architecture of a stream-processing system in IoT.
9. Write down the challenges in stream processing.

Section – D

1. Describe briefly about message passing in devices.
2. Elaborate the concepts of Resource Management in IoT.
3. Summarize the various embedded device programming languages.
4. Classify the various architecture involved in IoT environment?
5. Explain the various protocols in IoT communication layers.
6. Demonstrate some IoT Applications in detail.
7. Write a detailed note on the characteristics of stream data in IoT.
8. Explain continuous logic processing system in detail.

UNIT – V

Section – A

1. _____ threats are related to capturing the system or information.
 a) **Capture** b) Disrupt c) Manipulate d) Confuse
2. _____ threats are related to denying, destroying, and disrupting the system.
 a) Capture b) **Disrupt** c) Manipulate d) Confuse
3. _____ threats are related to manipulating the data, identity, time-series data, etc.
 a) Capture b) Disrupt c) **Manipulate** d) Confuse
4. An entity pretends to be a different entity is called _____
 a) DOS b) Replay attack c) **Masquerading** d) Man-in-the-Middle
5. A transmitted data can be read only by the communication endpoints is _____
 a) **Confidentiality** b) Availability c) Integrity d) Authenticity

6. The communication endpoints can always be reached and cannot be made inaccessible is _____
a) Confidentiality **b) Availability** c) Integrity d) Authenticity
7. A received data are not tampered with during transmission, and assured of the accuracy and completeness over its entire lifecycle is _____
a) Confidentiality b) Availability **c) Integrity** d) Authenticity
8. Data sender can always be verified and data receivers cannot be spoofed and authorization is _____
a) Confidentiality b) Availability c) Integrity **d) Authenticity**
9. _____ attack is primarily targeted to disrupt routing paths.
a) Selective-forwarding b) Sinkhole c) Hello-flood d) Wormhole
10. A _____ is an out-of-band connection between two nodes using wired or wireless links.
a) Selective-forwarding b) Sinkhole c) Hello-flood **d) Wormhole**
11. In _____ attack, an attacker copies the identities of a valid node onto another physical node.
a) Clone-ID b) Sinkhole c) Hello-flood d) Wormhole

Section – B

1. Write down the categories of threats.
2. List out some of the known active threats.
3. What is replay attacks?
4. What is Denial of Service (DoS) attacks?
5. List out some of the security requirements of IoT.
6. What is Bootstrapping?
7. What is Authentication?
8. What is RFID?
9. List out some of the security protocols in IoT.
10. List out some of the known routing attacks in IoT.
11. Define lightweight cryptography.
12. What is data anonymization?
13. What is code obfuscation?
14. What is diversification?

Section – C

1. Write a short note on IoT Security Requirements.
2. Write a note on IoT Gateway and Security.
3. Briefly discuss about IoT routing attacks.

4. What are the challenges in network and transport layer?
5. Briefly discuss about authorization mechanisms in IoT Security.
6. Compare Symmetric and Asymmetric key LWC algorithms.
7. Write a brief note on IoT network stack and access protocols.
8. Explain obfuscation and diversification techniques.
9. Discuss the operating systems for embedded systems.

Section – D

1. Explain the concepts of IoT security in detail.
2. Describe in detail about security frameworks for IoT.
3. Explain privacy in IoT networks in detail.
4. Distinguish the characteristics of IoT in detail.

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

QUESTION BANK

I M.Sc. Computer Science
Semester II

Elective II B

SOFT COMPUTING

Sub Code: 21PCSE22

UNIT – I

Section – A (One Mark)

Choose the correct answer:

1. What are the issues on which biological networks proves to be superior than AI networks?

- a) robustness & fault tolerance b) flexibility
c) collective computation **d) all of the mentioned**

2. The fundamental unit of network is

- a) brain b) nucleus **c) neuron** d) axon

3. What are dendrites?

- a) fibers of nerves** b) nuclear projections
c) other name for nucleus d) none of the mentioned

4. Signal transmission at synapse is a

- a) physical process **b) chemical process** c) physical & chemical both d) biological

5. What is ART in neural networks?

- a) automatic resonance theory b) artificial resonance theory
c) adaptive resonance theory d) adaptive reasoning theory

6. What are the advantage of neural networks over conventional computers?

- a) They have the ability to learn by example
b) They are more fault tolerant
c) They are more suited for real time operation due to high 'computational' rates
d) all of the above

7. What is an activation value?

- a) weighted sum of inputs** b) threshold value
c) main input to neuron d) none

18. Widrow & hoff learning law is special case of?
- a) hebb learning law b) perceptron learning law
c) delta learning law d) none of the mentioned
19. What's the other name of widrow & hoff learning law?
- a) Hebb **b) LMS** c) MMS d) None of the mentioned
20. What is competitive learning?
- a) learning laws which modulate difference between synaptic weight & output signal
b) learning laws which modulate difference between synaptic weight & activation value
c) learning laws which modulate difference between actual output & desired output
d) none of the mentioned
21. What is error correction learning?
- a) learning laws which modulate difference between synaptic weight & output signal
b) learning laws which modulate difference between synaptic weight & activation value
c) learning laws which modulate difference between actual output & desired output
d) none of the mentioned
22. What is reinforcement learning?
- a) learning is based on evaluative signal**
b) learning is based o desired output for an input
c) learning is based on both desired output & evaluative signal
d) none of the mentioned
23. _____ has the effect of lowering the net input of the activation function.
- a) Bias **b) Threshold** c) Weight d) Error
24. The net input of the activation function may be increased by a _____.
- a) Bias** b) Threshold c) Weight d) Error
25. If neuron output is 1 and should have been 0 the input vector p is _____ from the weight vector w.
- a) added **b) subtracted** c) multiplied d) divided
26. Delta Learning rule is also known as _____.
- a) Gradient Based b) Error Correction c) Widrow & Hoff **d) all the above**
27. _____ is defined as the training examples that lies in the immediate neighbourhood of the test vector test.
- a) Nearest Neighbour** b) K-NN c) Delta d) memory based

28. Processing in _____ network depends on the state of the network at the last time step.

- a) Multi layer b) Competitive c) Feed forward **d) Recurrent**

29. When the cell is said to be fired?

- a) if potential of body reaches a steady threshold values**
b) if there is impulse reaction
c) during upbeat of heart
d) none of the mentioned

30. Where does the chemical reactions take place in neuron?

- a) dendrites b) axon **c) synapses** d) nucleus

31. What was the name of the first model which can perform weighted sum of inputs?

- a) McCulloch-pitts neuron model** b) Marvin Minsky neuron model
c) Hopfield model of neuron d) none of the mentioned

32. Who proposed the first perceptron model in 1958?

- a) McCulloch-pitts b) Marvin Minsky c) Hopfield **d) Rosenblatt**

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Artificial Neural Network.
2. How is net input calculated using matrix multiplication methods?
3. Define Training .
4. Differentiate between excitatory and inhibitory connections.
5. What are dendrites?
6. What are the different types of training?
7. What are the basic building block of ANN?
8. Draw the structure of biological neuron.
9. Differentiate between excitatory and inhibitory connection.
10. Define Bias and Threshold.
11. What is activation function?
12. List the classification of activation function?
13. What are the types of sigmoidal function?
14. Define Weight.
15. Define Learning.
16. Define Delta Learning Rule.
17. Define Perceptron and its models.

Section – C

Answer all questions choosing either (a) or (b):

1. Compare Biological and Artificial Neuron Network.

2. Explain the Artificial Neuron Model.
3. What are the various characteristics of ANN?
4. Write down the building blocks of biological neural network.
5. Generate OR function using McCulloch –Pitts neuron model.
6. Explain the organization of the brain.
7. What are the advantages of neural network?
8. Different types of activation function in detail.
9. Explain Hebb Learning rule.
10. Classify the strategies of learning?
11. Explain perceptron learning rule.

Section – D

Answer in about 400 words:

1. Explain the McCulloch-Pitts neuron architecture.
2. Elucidate the historical development of neural network.
3. List few applications of ANN in detail.
4. Explain the features of Neural Network.
5. Explain various ANN architecture.
6. Write down the terminologies of ANN
 - a) Weight
 - b) Bias
 - c) Threshold
 - d) Activation Function
7. Explain any three Supervised Learning rule.
8. What is the importance of delta learning rule? Delta Learning is called error correction rule Justify.

UNIT – II

Section – A (One Mark)

Choose the correct answer:

1. If the change in weight vector is represented by Δw_{ij} , what does it mean?
 - a) **describes the change in weight vector for i th processing unit, taking input vector j th into account**
 - b) describes the change in weight vector for j th processing unit, taking input vector i th into account
 - c) describes the change in weight vector for j th & i th processing unit.
 - d) none of the mentioned
2. Who invented perceptron neural networks?
 - a) McCulloch-pitts b) Widrow c) Minsky & papert **d) Rosenblatt**

3. On what parameters can change in weight vector depend?
- a) learning parameters b) input vector
c) learning signal **d) all of the mentioned**
4. What is asynchronous update in neural networks?
- a) output units are updated sequentially**
b) output units are updated in parallel fashion
c) can be either sequentially or in parallel fashion
d) none of the mentioned
5. What leads to minimization of error between the desired & actual outputs?
- a) stability **b) convergence**
c) either stability or convergence d) none of the mentioned
6. What is the sequence of the following tasks in a perceptron?
- 1) Initialize weights of perceptron randomly.
 - 2) Goto next batch of dataset
 - 3) If the prediction does not match the output ,change the weight
 - 4) for a sample input ,compute an output.
- a) 1,2,3,4 b) 4,3,2,1 c) 3,2,1,4 **d)1,4,3,2**
7. Perceptron delta function is
- a) $\Delta W_{ij} = \eta w_{ij} x_j$ **b) $\Delta W_{ij} = \eta t x_j$** c) $\Delta W_{ij} = w_{ij}(k) + w_{ij}(k+1)$ d) $\Delta W_{ij} = 0$
8. A Multilayer feed-forward consisting of processing elements with continuous differentiable activation function
- a) Feed forward neural network **b) Back Propagation Network**
c) Back-Tracking Algorithm d) Feed Forward backward algorithm
9. Network that has one layer of interconnection between the input and output neuron is_____
- a) Single Layer Perceptron** b) Multi layer Perceptron
c) both a & b d) none
10. Convergence of BPN is affected by
- a) Learning rate** b) initial weights c) Momentum d) no. of. Training data
11. The network learns well but doesn't generalize well this is called.
- a) Local minima b) global minima **c) overfitting** d) none

12. RBFN is also called.
- a) globalized receptive field network **b) Localized receptive field network**
 c) globalized field network d) localized field network
13. The network that performs forward and backward associative searches for stored stimulus response.
- a) RBFN **b) BAM** c) LVQ d) Hopfield
14. Determination of weight in BAM is done using _____ rule training algorithm.
- a) Perceptron b) Delta **c) Hebb** d) Outstar
15. _____ activation function for Discrete BAM.
- a) Sigmoidal b) Logistic sigmoid
c) Step function with nonzero threshold d) Logarithmic
16. Discrete Hopfield network is used in
- a) pattern matching **b) Content Addressable memory**
 c) Continues Addressable memory d) All the above
17. An autoassociative fully interconnected single-layer feedback network.
- a) RBFN b) BAM c) LVQ **d) Hopfield**
18. _____ law states that the total current entering a junction is equal to that leaving the same function.
- a) Kohonen learning **b) Kirchoff's** c) Self-Organizing d) LQV
19. The objective of the training algorithm is to find the output unit that is closest to the input vector for _____ supervised learning network.
- a) RBF b) LVQ c) KSOFM **d) Both b and c**
20. _____ is a classifier paradigm that adjust the boundaries between categories to minimize existing classification.
- a) LVQ** b) LVQ2 c) LVQ 2.1 d) LVQ 3
21. CAM stands for
- a) Content Associative Memory **b) Content Addressable Memory**
 c) Content Adaptive Memory d) Content Auto-associative Memory

Section – B (Two Marks)

Answer in about 50 words each:

1. Define single layer perceptron.
2. State perceptron convergence theorem .
3. Define Linear Separability.

4. What is Back Propagation Network?
5. What is the limitation of the perceptron model?
6. Define MLP.
7. What is the characteristic of multilayer perceptron?
8. Define rate of learning.
9. Define Hopfield networks and its types.
10. Differentiate Discrete BAM and Continuous BAM.
11. Differentiate KSOFM and LVQ.
12. What is Feature Map?
13. List the several variants of LVQ.
14. Write a note on the Architecture of RBF.
15. What is Generalization?
16. Define overfitting.
17. Differentiate Single-mode and Batch -mode training in BPN.
18. Define BAM.
19. Write a note on KSOMM.
20. Draw the flow chart for perceptron network with single output.
21. What is Associative Hopfield network?
22. Define energy(Lyapunov)function.
23. Define hetero-associative memory.
24. Write down the energy function of Continuous Hopfield.
25. What is an auto-associative net?

Section – C

Answer all questions choosing either (a) or (b):

1. Explain the perceptron training algorithm for Multiple Output Classes.
2. Write the training algorithm for single layer perceptron.
3. Write the perceptron network testing algorithm.
4. Explain the training process of Back propagation algorithm.
5. Classify the learning factors of BPN.
6. Draw the flowchart of training process and explain the training algorithm of RBF.
7. Write short notes Hopfield networks and its types.
8. Describe Associate Memory network.
9. What are the activation functions for BAM?
10. Analyze the energy function of Continuous Hopfield Network.
11. Discuss the variants of LVQ.
12. What is KSOFM? Explain the architecture of KSOFM.

Section – D

Answer in about 400 words:

1. Derive a multilayer feed forward neural network using back propagation algorithm
2. Explain RBF.
3. Compare Discrete and Continuous BAM.
4. Explain the architecture of Discrete Hopfield network.
5. Explain the architecture of Continuous Hopfield network.

6. Elucidate Kohonen Self-Organizing Feature Map.
7. Discuss Learning Vector Quantization in detail.

UNIT – III
Section – A (One Mark)

Choose the correct answer:

1. In fuzzy systems, values are indicated by a number called a _____
a) **truth value** b) primary c) whole number d) constant
2. The collection of elements in the universe is called _____
a) infinite set **b) whole set** c) empty set d) subset
3. The collection of elements within the universe are called _____
a) whole number b) array c) strings **d) sets**
4. The collection of elements within a set are called _____
a) equal sets b) infinite sets **c) subsets** d) empty set
5. A fuzzy set is a set having degrees of membership between ____ and ____
a) 3,4 b) 1,2 **c) 0, 1** d) -1,0
6. The collection of all fuzzy sets and fuzzy subsets on universe is called fuzzy _____
a) weak set b) infinity set **c) power set** d) simple set
7. When five sets are involved in the subset of full Cartesian product then the relations is called _____
a) primary b) ternary c) quaternary **d) quinary**
8. The operation executed on two compatible binary relations to get a single binary relation is called _____
a) Composition b) Union c) Intersect d) Difference
9. The binary relation on a single set X is called _____
a) undirected graph **b) directed graph** c) Simple graph d) Trivial Graph
10. The cardinality of fuzzy sets on any universe is _____
a) finite b) definite **c) infinity** d) boundary

Section – B (Two Marks)

Answer in about 50 words each:

1. Define classical sets
2. Define fuzzy sets.
3. State the importance of fuzzy sets.
4. What are the methods of representation of a classical set?
5. Define membership function.
6. State Cartesian product of relation.
7. Give the Cardinality of classical relation.

8. Define classical relations.
9. Define fuzzy relations.
10. What is one-one mapping of a relation?
11. List out the properties of crisp relations?
12. What are the properties of fuzzy relations?
13. What are the various types of composition techniques?
14. Define fuzzy matrix and fuzzy graph.

Section – C

Answer all questions choosing either (a) or (b):

1. Explain classical sets operations in detail.
2. What are the properties of classical sets?
3. Explain the functional mapping of classical sets.
4. Explain fuzzy sets operations in detail.
5. What are the properties of fuzzy sets?
6. Mention the operations performed on classical relations.
7. Explain the composition of classical relations.
8. Explain operations on fuzzy relations in detail.
9. Discuss fuzzy composition techniques.
10. Given the two fuzzy sets $A = \left\{ \frac{1}{2} + \frac{0.75}{4} + \frac{0.3}{6} + \frac{0.15}{8} + \frac{0}{10} \right\}$

$$B = \left\{ \frac{1}{2} + \frac{0.6}{4} + \frac{0.2}{6} + \frac{0.1}{8} + \frac{0}{10} \right\}$$

Find the following: i) $A \cup B$ ii) $A \cap B$ iii) \bar{A} iv) \bar{B} v) $A|B$

11. Consider the two given fuzzy sets $A = \left\{ \frac{1}{2} + \frac{0.3}{4} + \frac{0.5}{6} + \frac{0.2}{8} \right\}$ $B = \left\{ \frac{0.5}{2} + \frac{0.4}{4} + \frac{0.1}{6} + \frac{1}{8} \right\}$
Perform union, intersection, difference and complement over fuzzy set A and B.
12. Consider the following two fuzzy sets $A = \left\{ \frac{0.3}{x_1} + \frac{0.7}{x_2} + \frac{1}{x_3} \right\}$ $B = \left\{ \frac{0.4}{y_1} + \frac{0.9}{y_2} \right\}$. Perform the Cartesian product over these given fuzzy sets.

Section – D

Answer in about 400 words:

1. Write a detailed note on crisp sets.
2. Write a detailed note on fuzzy sets.
3. Explain fuzzy relations in detail.
4. Explain Classical relations in detail.
5. Describe in detail Classical Equivalence and Tolerance relation.
6. Write a detailed note on Fuzzy Equivalence and Tolerance relation.
7. Given two fuzzy sets $A = \left\{ \frac{1}{2} + \frac{0.65}{4} + \frac{0.5}{6} + \frac{0.35}{8} + \frac{0}{10} \right\}$ $B = \left\{ \frac{0}{2} + \frac{0.35}{4} + \frac{0.5}{6} + \frac{0.65}{8} + \frac{1}{10} \right\}$

Find the following: i) $A \cup B$ ii) $A \cap B$ iii) \bar{A} iv) \bar{B} v) $\overline{A \cup B}$ vi) $\overline{A \cap B}$

vii) $\bar{A} \cup \bar{B}$ viii) $\bar{A} \cap \bar{B}$ ix) $A \cup \bar{A}$ x) $B \cap \bar{B}$

$$8. \text{ Given two fuzzy relations are } R = \begin{matrix} & y_1 & y_2 \\ x_1 & [0.6 & 0.3] \\ x_2 & [0.2 & 0.9] \end{matrix} \quad S = \begin{matrix} & z_1 & z_2 & z_3 \\ y_1 & [1 & 0.5 & 0.3] \\ y_2 & [0.8 & 0.4 & 0.7] \end{matrix}$$

Obtain fuzzy relation T as a composition between the fuzzy relations.

UNIT – IV
Section – A (One Mark)

Choose the correct answer:

1. A fuzzy set wherein no membership function has its value equal to 1 is called _____ fuzzy set.
a) normal **b) subnormal** c) convex d) nonconvex
2. The maximum value of the membership function in a fuzzy set A is called as _____ of the fuzzy set.
a) width b) center **c) height** d) depth
3. _____ membership method is based upon the polling concept.
a) Intuition b) Inference **c) Rank Ordering** d) Neural Networks
4. _____ process may also be termed as “rounding it off”.
a) Fuzzification **b) Defuzzification** c) Rank Ordering d) Lambda-cut
5. _____ method is also known as height method and is limited to peak output functions.
a) Max-membership b) Mean-max membership
c) Centroid d) Weighted Average
6. _____ method is also known as the middle of the maxima.
a) Max-membership **b) Mean-max membership**
c) Centroid d) First of Maxima
7. A _____ variable is a variable of a higher order than a fuzzy variable and its values are taken to be fuzzy variables.
a) substitute **b) linguistic** c) mathematical d) exponential
8. _____ statements use the “IF-THEN” rule based form.
a) Conditional b) Unconditional c) Assignment d) Constant
9. In _____ reasoning, antecedents with fuzzy quantifiers are related to inference rules.
a) Qualitative **b) Syllogistic** c) Categorical d) Dispositional
10. In _____ reasoning, the antecedents contain no fuzzy quantifiers and fuzzy probabilities.
a) Qualitative b) Syllogistic **c) Categorical** d) Dispositional

Section – B (Two Marks)

Answer in about 50 words each:

1. Define fuzzification.

2. State three laws of induction.
3. List the various methods employed for the membership value assignment.
4. State weak lambda-cut.
5. State strong lambda-cut.
6. Define defuzzification.
7. List the properties of lambda-cut for fuzzy sets.
8. Mention the properties of lambda-cut for fuzzy relations.
9. What is fuzzy inference system (FIS)?
10. What is meant by linguistic hedges?
11. What are the characteristics of a linguistic variable?
12. List the basic logic operations performed over the propositions.

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. What are the features of membership functions?
2. Explain in detail the inference method adopted for assigning membership values.
3. Differentiate the following:
 - a. Convex and nonconvex fuzzy set.
 - b. Normal and subnormal fuzzy set.
4. Write a short note on Lambda-cuts for fuzzy sets
5. Compare first of maxima and last of maxima method.
6. What is the difference between centroid method and center of largest area method?
7. Write a short note on fuzzy propositions.
8. Discuss the methods of aggregation of fuzzy rules.
9. What are the four modes of approximate reasoning?
10. With suitable block diagram, explain the working principle of an FIS.
11. Differentiate between Mamdani FIS and Sugeno FIS.

Section – D

Answer in about 400 words:

1. Explain the various methods employed for the membership value assignment.
2. Using the inference approach, find the membership values for the triangular shapes I, R, E, IR and T for a triangle with angles $45^\circ, 55^\circ, 80^\circ$.
3. Explain in detail the methods employed for converting fuzzy form into crisp form.
4. Two fuzzy sets defined on X, A and B are as follows:

$\mu(X_i)$	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇
A	0	0.1	0.2	0.3	0.4	0.5	0.6
B	1	0.9	0.8	0.7	0.6	0.5	0.4

Express the following λ -cut sets using Zadeh's notation i) $(\bar{A})_{0.2}$ ii) $(\bar{B})_{0.6}$

iii) $(A \cup B)_{0.5}$ iv) $(A \cap B)_{0.5}$ v) $(A \cup \bar{A})_{0.7}$ vi) $(B \cap \bar{B})_{0.8}$

5. Explain the four modes of approximate reasoning.
6. Describe in detail the methods of FIS with suitable diagram.

UNIT – V
Section – A (One Mark)

Choose the correct answer:

1. The chromosomes are divided into several parts called _____.
(a) **genes** (b) cell (c) pairs (d) None
2. Mutation of a bit involves _____ a bit, changing 0 to 1 and vice-versa.
(a) **Flipping** (b) Mutation (c) Reversing (d) cropping
3. The possibilities of combination of the genes for one property are called _____.
(a) Chromosome (b) **alleles** (c) Genes (d) All
4. In _____ the same genetic information is copied to new offspring.
(a) Meiosis (b) Reproduction (c) **mitosis** (d) None
5. _____ is the set of individuals currently involved in the search process.
(a) **population** (b) Individual (c) Cells (d) Genes
7. _____ encoding is mainly used for evolving program expressions for genetic programming
(a) Binary (b) Octal (c) Value (d) **Tree**
8. _____ based selection picks out individuals based upon their fitness values relative to the fitness of the other individuals in the population
(a) **Proportionate** (b) Ordinal (c) Both a and b (d) None
9. The word "genetics" is derived from the _____ word "genesis"
(a) Latin (b) **Greek** (c) French (d) None
10. Expand DNA _____
(a) Deoxy Nucleic Acid (b) **deoxyribonucleic acid**
(c) Dynamic Nucleic Atom (d) None
11. The set of all possible alleles present in a particular population forms a _____.
(a) **Gene pool** (b) Pool (c) Gene (d) Chromosome
12. The set of all the genes of a specific species is called _____.
(a) Chromosome (b) **genome** (c) Gene pool (d) Both a and b
13. Each and every gene has a unique position on the genome called _____.
(a) genome (b) **Locus** (c) Pool (d) Point
14. For a particular individual, the entire combination of genes is called _____.
(a) **Genotype** (b) Phenotype (c) genome (d) Genes
15. The _____ describes the physical aspect of decoding a genotype
(a) Genotype (b) **phenotype** (c) genome (d) Genes

Section – B (Two Marks)

Answer in about 50 words each:

1. Define Chromosomes
2. Sketch the cell nucleolus
3. What are Genetic Algorithms?
4. Why Genetic Algorithms?
5. What is a Cell?
6. What are called individuals
7. Define population
8. List the reasonable variants of hybrid genetic algorithm
9. State the main types of PGAs
10. What are the reasons for multideme PGAs to become popular?

Section – C

Answer in above 200 words each choosing either (a) or (b):

1. Describe the ways by which, Reproduction of species via genetic information is carried out.
2. Discuss Simple GA.
3. Write a note on General Genetic Algorithm.
4. What is meant by Mutation? Explain its types.
5. Explain Messy Genetic Algorithm.
6. What are the components of ISGAs?
7. Discuss the applications of Genetic Algorithm.

Section – D

Answer in about 400 words:

1. Explain Adaptive Genetic Algorithm in detail.
2. Describe the Parallel Genetic Algorithm in detail.
3. Elucidate the working of Real-Coded Genetic Algorithms.
4. Classify the types of Crossover in detail.
5. Explain in detail about Encoding and its types.
6. Demonstrate Selection process with neat sketch.
7. Illustrate the working of Schema Theorem.

ST.MARY'S COLLEGE (Autonomous) -THOOTHUKUDI

II M.Sc COMPUTER SCIENCE

Core IX – Software Testing

Semester-III

Subject code: 21PCSC31

Question Bank

UNIT I

Part-A

1. Expand TQC
(a)Time Quality Control (b)Transaction Queue Change
(c)**Total Quality Control** (d)All
2. The adjudged cause of an error is ____
(a)Failure (b)Error (c)**Fault** (d)Bug
3. White box testing is also called as ____ testing.
(a)Structural (b)Functional (c)Glass box (d) **Both a & c**
4. Test case is designed as a combination of modular test components called ____
(a)Test Tools (b)**Test Steps** (c)Test Design(d)Test Plan
5. In ____testing, one does not have access to the internal details of a program
(a) **functional** (b) structural (c)Non-functional (d)None
6. Hardware DVT plan is prepared and executed by the ____ group.
(a)**Hardware** (b)Software (c)Test Team (d)Integration
7. Signal quality is one of the ____ hardware test.
(a)Diagnostic test (b)Thermal Test (c)**Electrical Test** (d)Acoustic Test
8. Another name for Ishikawa's diagram is ____
(a)Shewart (b)**Cause and Effect** (c)SQC (d)4Ms
9. ____ is the managing director of union of JUSE.
(a)**Kenichi Koyanagi** (b)William EdwardsDeming (c)Ishikawa (d)Joseph M Juran
10. Which of the following is/are the common causes of 4Ms?
(a)Materials (b) Machines (c)Methods (d)**All**

Part-B

1. List the benefits of test automation
2. Draw the Shewhart cycle
3. Summarise about failure
4. State some factors must be focus on be an effective quality process
5. What are the key elements of TQC management?
6. Sketch the Ishikawa diagram
7. What are called as verification activities?
8. Define fault
9. Define error
10. State the benefits of test automation
11. Mention the list of prerequisites must be considered for an assessment of whether the organization is ready for test automation

Part-C

1. Discuss the objectives of testing
2. Present the testing activities
3. Distinguish between Verification and Validation
4. Compare and contrast the features of white box testing and black box testing
5. Discuss about test planning and design

Part-D

1. Analyze the sources of information for test case selection
2. Simplify the concepts of structural and functional testing
3. Explain test team organization and management

UNIT II

Part-A

1. _____ means containing all the necessary code to support a set of functions,
(a) **Self-contained** (b) Stable (c) Support (d) Testing
2. _____ means that the subsystem can stay up for 24 hours without any anomalies.
3. (a) Self-contained (b) **Stable** (c) Support (d) Testing
4. A _____ is a compiled software binary.
(a) Build (b) **software image** (c) System (d) Product
5. A build is an interim software image for internal testing within the organization.
(a) **Build** (b) software image (c) System (d) Product
6. ESD testing based on _____ models.
(a) 2 (b) **3** (c) 5 (d) 4
7. The HALTs rely on the principle of _____
(a) Log (b) Time (c) **logarithmic time compression** (d) Error
8. BIT model that can operate in _____ mode/modes
(a) normal (b) maintenance (c) **normal and maintenance** (d) None
9. In _____ the boundary conditions for each EC are analyzed in order to generate test cases.
(a) Equivalence Classes (b) **BVA technique** (c) Decision Table (d) None
10. Decision table consist of _____
(a) set of conditions (b) set of effects (c) set of rules and values (d) **All**
11. _____ testing is under taken within the development organization of the supplier
(a) **Business Acceptance** (b) User Acceptance (c) Satisfaction (d) All
12. As the cumulative failure count increases, the failure intensity _____
(a) Increases (b) Constant (c) Zero (d) **Decreases.**
13. Failure intensity never reaches zero in _____ model.
(a) Basic (b) Intensity (c) **Logarithmic** (d) Failure
14. _____ is the Effort required to couple one system with another
(a) Interface (b) Integrity (c) **Interoperability** (d) None
15. Expand IETF _____
(a) Internet Expert Task Force (b) **Internet Engineering Task Force**
(c) International Expert Task Force (d) International Engineering Task Force

Part-B

1. List out three reasons for the importance of integration testing
2. What is the objective of system integration?
3. State some common approaches to performing system integration
4. What are the activities involve in constructing a software image?
5. How will you plan a test strategy?
6. Say about the advantages of the top-down approach
7. What are the limitations of the top-down approach?
8. Say about the advantages of the bottom-up approach
9. What are the disadvantages of the bottom-up approach?
10. Say the reasons for not recommending the big bang approach for large systems
11. How a hardware engineering process is viewed?
12. What is failure rate?
13. Discuss about Software Reliability
14. Define Acceptance Testing
15. Write about Fault?

Part-C

1. Compare the top-down and bottom-up approaches
2. Which of the parameters determines the number of system integration test cycles and the total integration time?
3. How will you test a function in a context?
4. Explain Boundary Value Analysis Testing
5. Summarize Reliability Models

Part-D

1. Argue the approaches of system integration
2. Manage software and hardware integration
3. Explain the test plan for system integration
4. Compose Decision Table

UNIT III

Part-A

1. _____ tests provide the evidence that the system can be installed, configured and brought to an operational state
(a) **Basic** (b) Functionality (c) Robustness (d) Stress
2. _____ tests measure the ability of the system to keep operating for a long time without developing failures.
(a) Basic (b) **Reliability** (c) Robustness (d) Stress
3. _____ is the requirement that data and the processes be protected from unauthorized disclosure.
(a) integrity (b) availability (c) **confidentiality** (d) stress

4. _____ is often used to predict the limit of scalability.
(a) Scalability **(b) Extrapolation** (c) Interpolation (d) None
5. The reliability of a system is typically expressed in terms of _____.
(a) MTTF (b) MTTR (c) MTBF (d) MRRR
6. In _____ new tests are not designed. Instead, test cases are selected from the existing pool
(a) Reliability tests **(b) Regression testing** (c) stability tests (d) Basic
7. Software safety is defined in terms of _____.
(a) Reliability **(b) Hazards** (c) Accident (d) Crash
8. A _____ is a state of a system or a physical situation which when combined with certain environmental conditions could lead to an accident or mishap.
(a) Reliability (b) Crash **(c) Hazards** (d) integrity
9. An _____ is an unintended event or series of events that results in death, injury, illness, damage or loss of property, or harm to the environment
(a) accident (b) mishap (c) hazards **(d) accident or mishap**
10. Software systems can be broadly classified into _____.
(a) stateless (b) state-oriented systems **(c) Both a and b** (d) Hardware
11. A state-oriented system can be viewed as having a _____ portion.
(a) control and data (b) control (c) data (d) Full

Part-B

1. Identify the advantages in identifying test categories?
2. List out the taxonomy of system tests
3. What is command line interface tests?
4. Say about feature tests
5. Which are the usability characteristics can be tested?
6. Recall about robustness tests
7. Enumerate the boundary value tests
8. Define power cycling tests
9. State few limitations of scaling test
10. Locate the problems occur, when a large number of users are introduced with incompatible systems and applications
11. Name the objectives of load and stability tests
12. Quote the main idea in regression testing
13. Why a subset of the test cases is carefully selected from the existing test suite?
14. Formulate mean time between failures
15. What are basic tasks performed by an SA engineering team

Part-C

1. Explain about Graphical user interface tests
2. Express the testing with state verification
3. Indicate the test generation from an FSM
4. Identify the security tests and its objective
5. Point out the features of interoperability tests

6. Explain stress tests with examples
7. Integrate Load and stability tests
8. Infer about regression tests
9. Write about regulatory tests

Part-D

1. Interpret test architectures
2. Illustrate the transition tour method
3. Describe about finite state machine
4. Evaluate the robustness tests
5. Construct the state oriented model

UNIT IV

Part-A

1. The _____ is the ability to describe and follow the life of a requirement, in both forward and backward direction
(a) **requirements traceability** (b) traceability matrix (c) requirement (d) state
2. A new requirement is put in the _____ state to make it available to others.
(a) open (b) **submit** (c) review (d) assign
3. In open state, the _____ is in charge of the requirement.
(a) submitter (b) customer (c) **marketing manager** (d) director
4. The _____ of software engineering is the owner of the requirement in the review state
(a) **director** (b) submitter (c) customer (d) marketing manager
5. The _____ is the owner of the requirement in the assign state
(a) submitter (b) customer (c) **marketing manager** (d) director
6. The _____ is the owner of the requirement in the commit state.
(a) **program manager** (b) submitter (c) customer (d) marketing manager
7. The director of software engineering is the owner of the requirement in the implement state.
(a) marketing manager (b) submitter (c) test manager (d) **director**
8. The _____ is the owner of the requirement in the verification state.
(a) submitter (b) customer (c) marketing manager (d) **test manager**
9. The requirement is moved to the closed state from the verification state by the _____ after it is verified.
(a) director (b) submitter (c) **test manager** (d) marketing manager
10. Who initiates the design of the test case?
(a) owner (b) creator (c) **owner or creator** (d) tester
11. The owner of this state is the test group, that is, the system test team.
(a) create (b) **draft** (c) Review and Deleted (d) Released and Update
12. This metric is useful in allocating time to the test preparation activity in a subsequent test project.
(a) PST (b) **ATS** (c) NAT (d) NPT

13. A metric commonly used in the industry to measure test case design effectiveness is the

- _____
- (a) **TCDY** (b) TCE (c) NPT (d) NAT

Part-B

1. What are factors considered during test design?
2. Say about the main challenges in defining requirements
3. What are the severe consequences of different teams interpreting a requirement in different ways ?
4. Sketch the state transition diagram of requirement
5. State the applications of traceability matrix in requirement identification
6. Why a test case may become obsolete over time?
7. What are the metrics to represent the level of preparedness of test design?
8. Discuss the objectives of the test case design effectiveness metric
9. How to calculate spoilage metric?

Part-C

1. Evaluate the test design factors
2. Model the test design process
3. Appraise about the test design preparedness metrics
4. Criticize the test case design effectiveness
5. Paraphrase about beta testing

Part-D

1. Organize the requirement identification
2. Compile the metrics for tracking system test
3. Summarize the defect casual analysis
4. Measure the test effectiveness

UNIT V

Part-A

1. In _____ view quality is recognized through experience.
(a)**Transcendental** (b)User (c)Manufacturing (d)Product
2. The _____ view represents the merger of two independent concepts: excellence and worth
(a)Transcendental (b)**Value-Based** (c)Manufacturing (d)Product
3. An organization to improve its testing process _____model has been developed
(a) **Test Process Improvement** (b)Capability Maturity Model (c)ISO (d)None
4. Mention the correct level order of CMM:
(a) **Initial,Repeatable,Defined,Managed,Optimizing**
(b) Initial,Defined, Repeatable,Managed,Optimizing
(c) Initial,Repeatable,Managed,Defined,Optimizing
(d) Initial,Repeatable,Managed,Optimizing,Defined

5. Manufacturers are interested in obtaining _____ and _____
(a) Defect Count, Rework Cost (b) Defect Cost, Rework Count
 (d) Quality, Rework (c) None
6. _____ is expressed as the number of defects found per thousand lines of code.
 (a) Defect Count **(b) Defect Density** (c) Lines of Code (d) Count
7. The rework can be split into _____
 (a) Development (b) Operation (c) Cost **(d) Development and Operation**
8. Quality Factors have been grouped into _____
 (a) Product operation (b) Product Revision (c) Product Transition **(d) All**
9. A _____ is defined in terms of quality policy and quality objectives.
(a) Quality management system (b) Process (c) People (d) Improvement
10. Maturity subgoals are achieved by means of _____
 (a) Activities (b) Task (c) Responsibilities **(d) All**

Part-B

1. Who are called stakeholders?
2. What are the five views of software quality?
3. Say the reasons for developing a quantitative view of a software system
4. How can you analyse the defects?
5. What is Quality Factors ?
6. List out McCall's Quality Factors
7. What is Quality Criteria?
8. How can you derive quality metrics?
9. What are the components of ISO 9000:2000 standard?
10. Sketch the CMM structure
11. List some of the key areas in test process improvement
12. What is called check points?

Part-C

1. Simplify Five Views of Software Quality
2. Explain the relationship between quality factors and quality criteria
3. Summarize the documentation part
4. Discuss the important activities for upper management to perform regarding requirements
5. What are the important activities concerning resource management?
6. Say about the key elements of the realization part
7. Address the wide range of performance measurement needs
8. Explain about Capability Maturity Model Integration

Part-D

1. Criticize McCall's Quality Factors and criteria
2. Argue the capability maturity model

3. Investigate ISO 9000:2000 Fundamentals
4. Discuss about ISO 9001:2000 Requirements
5. Generalize the concept of test process improvement
6. Write about testing maturity model

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

QUESTION BANK

II M.Sc. Computer Science

Semester III

Core X

CLOUD COMPUTING & BIG DATA

Sub Code: 21PCSC32

UNIT I

Section - A

- _____ prescribes actions or the best option to follow from the available options.
a) **Prescriptive Analysis** b) Predictive Analysis
c) Descriptive Analysis d) Diagnostic Analysis
- The _____ of the data is also related to the veracity or accuracy of the data.
a) **Value** b) Volume c) Veracity d) Variety
- Data that can be stored, accessed and processed in the form of fixed format is _____.
a) **Structured** b) Semi Structured c) UnStructured d) Table
- _____ is a widely used RTAP.
a) OSA b) SAP HANA c) Apache Spark Streaming d) **All the above**
- _____ is the process of making a group of abstract objects into classes of similar objects.
a) Quantization b) Controlling c) Radiance d) **Clustering**
- Any data with unknown form or the structure is classified as _____.
a) **Unstructured data** b) Structured data c) Segment d) Partitioning
- _____ aims to answer - What has happened?
a) Prescriptive Analysis b) Predictive Analysis
c) **Descriptive Analysis** d) Diagnostic Analysis
- _____ comprises analysis of past data to diagnose the reasons as to why certain events happened.
a) Prescriptive Analysis b) Predictive Analysis
c) Descriptive Analysis d) **Diagnostic Analysis**

9. _____ of data refers to how fast the data is generated.
- a) **Velocity** b) Volume c) Veracity d) Variety
10. An 'Employee' table in a database is an example of _____ data.
- a) **Structured** b) Semi Structured c) UnStructured d) Table
11. The output returned by 'Google Search' is a _____ data.
- a) Structured b) Semi Structured c) **UnStructured** d) Table
12. Personal data stored in an XML file is _____.
- a) Structured b) **Semi Structured** c) UnStructured d) Table
13. _____ is a type of computing wherein the process is being done by many CPUs working in parallel to execute a single program.
- a) **MPP** b) OLAP c) LAMP d) AMP
14. A _____ job usually splits the input data-set into independent chunks which are processed by the map tasks in a completely parallel manner.
- a) **MapReduce** b) HDFS c) Clusters d) BigTable
15. _____ is an instance of density-based clustering models, in which we group points with similar density.
- a) K –Means clustering b) Hierarchical clustering
c) DBSCAN d) None

Section - B

1. List the structure of Big Data.
2. Define Big Data.
3. Define the goals of the analytics task.
4. List few clustering Techniques.
5. What is grid computing?
6. Define MPP.
7. List few applications of RTAP.
8. What is RTAP?
9. How DBSCAN works?
10. What are the various distance measures that can be used for clustering algorithms?

11. What is Unstructured Big Data?
12. List few Domain specific examples of BigData.
13. What is velocity?
14. What is Apache Hadoop?
15. What is Analytics?

Section - C

1. What are the types of Analytics?
2. Describe the structure of big data.
3. Explain about the characteristics of Big Data.
4. List few Cluster Analysis techniques.
5. What is Hadoop?
6. Write a note on Big Data.
7. List Domain Specific Examples of Big Data.

Section - D

1. Explain in detail the Real time Sentiment analytics platform application with an example.
2. Analyze the role of cluster analysis.
3. Elucidate Real time Stock analytics.
4. When are specialized tools and frameworks are required for big data analysis?
5. Describe the evolution of analytical stability.

UNIT - II

Section - A

1. _____databases stores unstructured data without a fixed schema.
 a) **key-value** b) document c) column-family d) graph
2. A database as a sparse, distributed, persistent, multi-dimensional sorted map is_____.
 a)DynamoDB **b)HBase** c)MongoDB d)Neo4j
3. Pig provides an interactive shell called _____for developing pig scripts.
 a) hive b)hbase **c)grunt** d)bourne
4. HDFS stands for _____.
 a) **Hadoop Distributed File System** b) Hierarchical Data File System
 c) Hierarchical Distributed File System d) Hadoop Data Force System
5. Hive can use _____as the execution engines.
 a) **either MapReduce or Apache Tez** b)Only Map reduce
 c)only Apache Tez d) Both MapReduce and Apache Tez

6. _____ is an abstraction over MapReduce.
- a) Data Pig b) Range Pig **c) Apache Pig** d) Code Pig
7. _____ which an open source Web interface for analyzing data with Hadoop.
- a) Apache Hue** b)HBase c)MongoDB d)Neo4j
8. A _____ is an unordered collection of tuples.
- a) collection **b) bag** c)Map d)List
9. HBase uses _____ for the exclusion of store files that need to be looked up while serving read requests for a particular row key.
- a)Filters b)pointer **c) Bloom Filters** d)none
10. The storage structure used by HBase is a _____ Tree.
- a) Log Structured Merge (LSM)** b) Hierarchical Structured Merge (HSM)
- c) both a & b d) none
11. _____ database is an example of Key-Value .
- a)Mongo DB b)Dynamo DB c) Hbase d)Neo4j
12. _____ is an example of Document database.
- a)Mongo DB b)Dynamo DB c) Hbase d)Neo4j
13. _____ is an example of Column family database.
- a)Mongo DB b)Dynamo DB c) Hbase d)Neo4j
14. _____ is an example of Graph database.
- a)Mongo DB b)Dynamo DB c) Hbase d)Neo4j
15. Cassandra is an example of _____ database.
- a)Key-Value** b)Document c)Column family d)Graph
16. Couch is an example of _____ database.
- a)Key-Value **b)Document** c)Column family d)Graph

17. Google Big Table is an example of _____ database.
- a)Key-Value b)Document **c)Column family** d)Graph
18. Allegro Graph is an example of _____ database.
- a)Key-Value b)Document c)Column family **d)Graph**
19. The _____ operator is used to filter out tuples from a relation based on the condition specified.
- a) FILTER** b) UNION c)GROUP d) JOIN
20. HBase uses _____ for distributed state coordination.
- a) Meta b)HFile c)HLog **d) Zookeeper**

Section - C

1. List the aggregate data models.
2. What is Hive?
3. Write down the features of NoSql.
4. Define aggregate data model.
5. List the features of NoSQL.
6. What is ACID?
7. What is Mongo DB?
8. What are the operations Hbase support?
9. What is tombstone?
10. What is LMS?
11. Define Compaction.
12. What is Pig?
13. What is key-value database?
14. List the data types in Pig.
15. What is Bloom filter?

Section - C

1. Explain Amazon DynamoDB.
2. Explain Hive.
3. Elucidate the concepts of Grunt.
4. Write down the features of HBase
5. What is Document Database?

6. What is Graph database with an example?
7. Write the functions of Pig.
8. Draw the architecture of HBase .
9. Write a note on compaction and Bloom Filter.
10. Explain key-value database.

Section - D

1. Examine the significance of HBase.
2. Explain the aggregate data models
3. Enumerate Apache Pig Grunt Shell Commands .
4. Compare the NoSQL database.
5. Explain Pig .

UNIT - III

Section - A

1. The default GFS block size is _____MB.
 a)32 **b)64** c)28 d)16
2. Microsoft Azure is a vendor for _____ service
 a)Iaas b)Saas **c)Paas** d)Xaas
3. _____ which is in charge of allocating the execution of virtual machine instances.
a) Scheduler b)IaaS c)PaaS d)SaaS
4. _____ is a third party Iaas service provider.
 a)Enomaly b)Elastra c) Eucalyptus **d)All the above**
5. _____ platforms are typically built-in house and they belong to personal and business.
 a) Query cloud b) Session cloud c) Public cloud **d) Private cloud**
6. An expansion for PaaS is _____.
 a) Port as a Service **b) Platform as a Service**
 c) Protocol as a Service d) Portal as a Service
7. _____manage the pool of resources and expose the distributed infrastructure as a collection of virtual machines
a) Hypervisor b) Virtual Manager c)IAAS d)PAAS

8. _____ is the key function of core middleware.
 a)IaaS b)PaaS **c) Infrastructure Management** d)SaaS
9. _____ is a software delivery model that provides access to applications through the Internet as a Web-based service.
 a)IaaS b)PaaS c)XaaS **d)SaaS**
10. PAAS is a _____ platform.
 a) physical infrastructure **b) development platform** c) service
 d)none
11. Example of SAAS are
 a) Web-based applications b) gaming portals
 c) social networking websites **d)All the above**
12. _____ cloud is designed to address the needs of a specific industry.
 a)private b)public **c)Community** d) hybrid
13. _____ hypervisor run on top of a (main/host) operating system and monitor the guest operating system.
 a) Type I b) Type II c)Hosted **d) both b&c**
14. AmazonS3 is a _____ service.
 a) Compute **b)Storage** c) Communicational d) infrastructure
15. EBS stands for
a) Elastic Block Service b)Elastic Bucket service
 c) Elastic Bag Service d) Elastic Bundle service
16. _____ is a PaaS implementation that provides services for developing and hosting scalable Web applications.
 a) Azure b)Amazon AWS **c)Google AppEngine** d)Sales Force

Section - B

1. What are the Characteristics that identify a PaaS solution?
2. List out the cloud computing service classification along with their vendors.
3. What is Multitenancy?
4. List the benefits of SAAS.
5. What is a public cloud?
6. What is a scheduler and List its task?

7. Define IaaS.
8. Define AWS.
9. What is Virtualization?
10. What is EC2?
11. What is a Bucket?
12. What is Microsoft Azure?
13. What are the 3 components of virtualized environment?
14. What is a Host OS?
15. What is a Guest OS?
16. Define Hypervisor.

Section - C

1. List the classification of Paas.
2. Analyse the vision of cloud computing.
3. How would you classify clouds?
4. Write the characteristics of virtualized environment.
5. Examine the software requirements of cloud.
6. Draw and Explain the virtual reference model.
7. Explain any three virtualization techniques.
8. Write a note on EC2.
9. Explain Amazon storage service.
10. Write the Characteristics of virtualized environments.
11. Explain SaaS.

Section - D

1. Draw an overview on cloud computing architecture.
2. Explain the PaaS architecture.
3. Elucidate Virtualization techniques.
4. Explain the Amazon Compute Services.
5. Explain the Amazon Storage Services.
6. Describe the cloud platform in Industry.

UNIT - IV

Section - A

1. Partitioning that splits a given job or a program into smaller tasks is
 - a) **Computation**
 - b) Data
 - c) Job
 - d) Program

2. The most recently proposed parallel and distributed programming models.
 - a) Dryad
 - b) Hadoop
 - c) MapReduce
 - d) **all the above**

3. Twister is also called _____.
- a) Dryad b) Hadoop c) MapReduce **d) Map Reduce++**
4. Python is often used with frameworks such as
- a) Django b) CherryPy **c) both a&b** d) none
5. Each Chubby cell has _____ servers inside.
- a) 5** b) 4 c) 6 d) 3
6. Hadoop implementation of MapReduce uses _____.
- a) GFS **b) HDFS** c) DFS d) non
7. Boto is an Amazon _____.
- a) Compute service b) Storage service c) Message Service **d) API**
8. _____ is Google's distributed lock service.
- a) Open nebula b) Nova **c) Chubby** d) Django
9. _____ multiple processor performs multiple tasks assigned to them simultaneously.
- a) Parallel computing** b) Integral computing
- c) Normal computing d) Intersection data computing
10. _____ is a framework for modeling and simulation of cloud computing infrastructures and services.
- a) Portal network b) Flow control c) Datagram **d) CloudSim**
11. _____ periodic messages sent to the NameNode by each DataNode in a cluster.
- a) heartbeats b) Blockreport **c) both a&b** d) none
12. Monitoring jobs and assigning tasks to TaskTrackers is managed by.
- a) **JobTracker** b) Job monitor c) Job Manager d) Job Scheduler
13. _____ can support a hybrid cloud model.
- a) Eucalyptus **b) Open Nebula** c) Aneka d) Nova

14. Instances are often called _____.

- a) **Amazon Machine Images**
- b) Amazon Mirror Image
- c) Amazon Image
- d) All the above

15. Eucalyptus stores images in _____.

- a) Ram disk
- b) Rom disk
- c) Amazon S3
- d) Walrus**

Section - B

1. Write the formal definition of Map Reduce.
2. What are the two layers of hadoop?
3. List the features of parallel and distributed programming.
4. Define Distributed computing.
5. Define Parallel computing.
6. What does the reduce function perform?
7. Define JobTracker.
8. Define Task Tracker.
9. What is block replication?
10. What is Heartbeat and Blockreport messages?
11. Write the advantage of HDFS.
12. What is GFS?
13. What is chubby?
14. Define AMI and its types.
15. What is blobs?
16. Define Aneka.

Section - C

1. List few emerging cloud software environments.
2. List out the cloud computing service classification along with their vendors
3. Examine the software requirements of cloud.
4. Write down the formal notation of MapReduce data flow.
5. What are the functions of parallel computing?
6. How will you run a job in Hadoop?
7. Write a note on Hadoop.
8. List the features of HDFS.
9. Explain the architecture of Map reduce in Hadoop.
10. Explain the architecture of HDFS.
11. What are the HDFS operations?

12. What is open nebula?
13. Explain the architecture of Aneka.
14. What is open stack ?
15. Write a note on Microsoft Azure.

Section - D

1. Write a detailed note on Programming Amazon AWS.
2. Explain Hadoop library from Apache.
3. Elucidate the process of actual data flow and control flow of MapReduce.
4. Describe any two emerging cloud software environment.
5. Explain HDFS.

UNIT - V

Section - A

1. _____ is an industry standard in SaaS environment.
 a)SOX b)GLBA c)HIPAA **d)PCI DSS**
2. _____ assurance that the data is consistent and correct.
 a)Data isolation b)Data Consistency **c)Data Integrity** d)None
- 3.Web applications are secured by _____ guidelines.
 a) LAMP b)IAM c)PCI DSS **d)OWASP**
4. IAM stands for
a)Identity Access Management b)Identity Application management
 c)Information Access Management d)Inforamtion Application management
5. _____ pertains to the accessibility privileges offered to user accounts.
 a) AIM **b) IAM** c) MMA d) AMI
6. An expansion for DDoS is _____.
 a) Data Denial of Service b) Data Distributed of Service
c) Distributed Denial of Service d) Distributed Data of Session
7. _____ is an open-source web development platform, also called a web stack.
a) LAMP b)IAM c)PCI DSS d)OWASP

8. The act sets compliance with government regulation on requirements.
a)SOX b)GLBA c)HIPAA **d)All the above**
9. The speed at which applications will change in the cloud will affect both
a) SDLC&Security b)Security&Integrity
c)SDLC & Design c) SDLC & Documentation
10. LAMP stands for
a) Linux Apache MySQL PHP
b) Linux Apache MySQL Perl
c) Linux Apache MySQL Python
d) All the above

Section - B

1. What does risk management entails?
2. What is a web stack?
3. Define DataIntegrity.
4. List few baseline security practices for the SaaS environment.
5. What is IAM?
6. List few government act for security regulation.
7. Define data security.
8. What is application security?
9. Define virtual machine security?
10. Define SaaS security.

Section - C

1. Evaluate the role of virtual machine security.
2. Elaborate the importance of data security.
3. What are the challenges and risk involved in cloud security?
4. What are the security issues which one should discuss with a cloud-computing vendor?
5. Write a note on IAM.
6. Explain Application security.

Section - D

1. Evaluate the challenges and risks of cloud security.
2. Explain few security practices for the SaaS environment.
3. Describe Security Architecture design.

ST .MARY'S COLLEGE (Autonomous) -THOOTHUKUDI

II M.Sc. COMPUTER SCIENCE

Semester III

Core XI

DATA SCIENCE USING PYTHON

Question Bank

Sub.Code: 21PCSC33

UNIT I

PART-A

1. _____ analytics employs predictive modeling using statistical and machine learning techniques.
a. Decision b. Descriptive **c. Predictive** d. Prescriptive
2. An _____ curriculum helps students acquire diverse perspectives on data and information.
a. **iSchool** b. Business analytics c. IIT d. All the above
3. _____ thinking is using abstraction and decomposition when attacking a large complex task or designing a large complex system.
a. **Computational** b. Logical c. Analytical d. Prescriptive
4. In _____ data is information devoid of any underlying structure.
a. Structured b. **Unstructured** c. Open d. Noisy
5. Multidimensional sets of data that can be stored in a spreadsheet are know as _____.
a. Ordinal data b. Nominal data c. **Data Cubes** d. Noisy data
6. A method for selecting a subset of features or columns from the given dataset as a way to do data reduction.
a. Slicing b. indexing c. Selection d. **Feature Space Selection**
7. A variable that is thought to be controlled or not affected by other variables is
a. Independent b. Predictor c. Response d. **both a and b**
8. _____ is the area of business analytics dedicated to finding the best course of action for a given situation.
a. **Prescriptive** b. Descriptive c. Exploratory d. Mechanistic
9. _____ is a measure of functional relationship between two or more correlated variables.
a. **Regression** b. Normal distribution c. Median d. Correlation
10. The science of understanding the cognitive processes an analyst uses to understand problems and explore data in meaningful ways is _____.
a. Data Analysis b. **Data Analytics** c. Information Science d. None

PART-B

1. What is data science?
2. Define Information Science.
3. Define Business Analytics.
4. List at least two differences between structured and unstructured data.
5. Give three examples of structured data formats.
6. Give three examples of unstructured data formats.
7. How will you convert a CSV file to a TSV file? List at least two different strategies.
8. How do data analysis and data analytics differ?
9. Define Data Munging.
10. List the common techniques used for data reduction.
11. What are the attributes involved in data discretization ?
12. Name three measures of centrality and describe how they differ.
13. List two differences between correlation analysis and regression analysis.
14. What is a predictor variable?
15. Define Mechanics Analysis.

PART-C

1. Sketch the relationship between Data Science and Information Science.
2. List of Principles associated with open data in policy document.
3. What are the formats to store data as simple text?
4. List the process Involved in Data Cleaning.
5. List the process involved in Data Transformation.
6. Describe how exploratory analysis differs from predictive analysis.
7. Write a note on Descriptive Analysis.
8. Define Predictive Analytics and list the process of Predictive analytics.
9. Write down the steps for integrating multiple databases or files.
10. Write a note on Variables and its types.

PART-D

1. What is Data Science? How does it relate to and differ from Statistics?
2. Identify three areas or domains in which data science is being used and describe how.
3. Explain the different forms of Data.
4. Elucidate Data Preprocessing.
5. What are the various forms of data analysis and analytics techniques.

UNIT-II

PART-A

1. An application or interface that allows one to either run UNIX commands or connect with a UNIX server.
a. FTP b. **SSH** c. POP d. All the above
2. Unix command to Lists the processes for everyone on the machine
a. ps b. **ps aux** c. ps aux|grep daffy d. ls
3. **vi** stands for
a. Visual interface. b. Visual Inatance c. computer vision d. **Visual display**
4. _____ is an UNIX editor.
a. vi b. Emacs c. **Both a & b** d. None
5. Search command used in Unix
a. Cat b. **grep** c. sort d. sed
6. A _____ is a variable that is being used to measure some other variable or outcome.
a. **predictor variable** b. ordinal variable c. outcome variable d. none
7. _____ is a branch of machine learning that includes problems where a model could be built using the data and true labels or values.
a. Machine Learning b. **Supervised Learning** c. Unsupervised Learning d. none
8. The systematic arrangement of data points in groups or categories according to some shared qualities or characteristics.
a. Clustering b. Distribution c. **Classification** d. Sampling
9. An algorithm that locates the maxima of a density function given a set of data points that fit that function.
a. MaxiM b. **MeanShift** c. MaximShift d. None
10. _____ lies under Unsupervised Learning.
a. Classification & Regression b. **Clustering & Density Estimation**
b. Classification & Clusteing d. Correlation & Regression

PART-B

1. Define Directory.
2. What is FTP?
3. Define SSH.
4. Write any two unix editor.
5. What is a shell in the context of UNIX?
6. Name at least two operating systems that are based on UNIX.
7. Define Machine learning.
8. Differentiate Supervised and Unsupervised Learning.

9. What is linear regression?
10. List few IDE to run python.
11. Define Unsupervised Learning.
12. Define outcome variable.
13. What is density estimation?
14. Why do you create a Data frame ?
15. List few packages in Python.
16. List three different data types
17. How do you get user input in Python?

PART-C

1. How will you connect to a UNIX Server?
2. List few UNIX shortcut command.
3. What is the difference between a pipe and a redirection?
4. List Process related commands.
5. Write about the control structures in Python.

PART-D

1. Explain File and directory manipulation commands.
2. UNIX a tool for Data Science Explain.
3. Explain the Statistical essential measured and manifested in python.

UNIT-III

PART-A

1. By default, the dtype of the created array is
 - a. float 16
 - b. float 32
 - c. float 64**
 - d. Complex
2. Output of:


```
b = np.arange(12).reshape(3,4)
```

```
b.sum(axis=0)
```

 - a. array([6,22,38])
 - b. array([0,16,22,38])
 - c. array([11,14,17,20])
 - d. array([12, 15, 18, 21])**
3. Find the output:


```
a = np.arange(10)**3
```

```
a[2:5]
```

 - a. array([8, 27, 64])**
 - b. array([1,8, 27])
 - c. array ([1,6, 9])
 - d. array([8, 27,65])
4. In _____ arrays can be indexed by arrays of integers and arrays of booleans.
 - a. Slicing
 - b. Boolean Mask
 - c. Fancy indexing**
 - d. splitting

5. Find the output:

```
a = np.arange(12).reshape(3,4)
```

```
i = np.array( [ [0,1], [1,2] ] )
```

```
a[i,2]
```

a. array([[2, 5], [7, 11]]) b. array([[[2, 1], [3, 3]])

c. array([[2, 6], [6, 10]]) d. array([[2, 1], [6, 5]])

6. _____ will create arrays with a specified number of elements, and spaced equally between the specified beginning and end values.

a. **Linespace** b. indices c. step d. newaxis

7. Find the output:

```
x = np.arange(10)
```

```
x[:-7]
```

a. array([10, 9, 8]) b. array([1,3,5])

c. array([0, 1, 2]) d. array([1, 2,3])

8. _____ are ndarrays whose datatype is a composition of simpler datatypes organized as a sequence of named fields. F

a. Boolean array **b. Structured Array** c. Record array d. Combined Array

9. _____ attribute returns the size in bytes of each element of the array.

a. Size b. arraysize **c. itemsize** d. shape

10. Function that returns the indices of the sorted elements.

a. Sort **b. argsort** c. arraysort d. none

PART-B

1. Define NumPy.
2. Differences between NumPy arrays and the standard Python.
3. What are the ways of creating 1D,2D arrays in numpy?
4. How can u reverse an NumPy array?
5. Define Broadcasting.
6. What is fancy indexing?
7. List few aggregate functions available in NumPy.
8. What is partial Sort?
9. List the basic array manipulation.
10. Define splitting of an array.
11. How will you reshape an array?
12. List the rules of broadcasting.
13. What is UFuncs?
14. What is the difference between Array Indexing and Array Slicing?
15. Define Boolean array.

PART-C

1. Explain the attributes of a ndarray objects.
2. Differentiate copies and views of array manipulation.
3. Give an outline on Boolean Mask in Numpy.
4. Elucidate Aggregate functions with an example .
5. How will you access a subarray in NumPy?
6. Explore Fancy indexing with examples?
7. How will you split and sort array?
8. What is Record array?
9. What are the different ways of creating arrays?
10. How will you access single element using array indexing?
11. Array Concatenation and Splitting explain?

PART-D

1. Explain the computations on NumPy arrays using Universal Functions.
2. Explain NumPy Structured array.

UNIT-IV

PART-A

1. Amongst which of the following is a correct syntax for panda's dataframe?
 - a. pandas.DataFrame(data, index, dtype, copy)
 - b. **pandas.DataFrame(data, index, columns, dtype, copy)**
 - c. pandas.DataFrame(data, index, dtype, copy)
 - d. pandas.DataFrame(data, index, rows, dtype, copy)
2. To extract the first three rows and three columns of a data frame
 - a. exp.iloc [0:2,0:2]
 - b. exp.iloc [1:3,1:3]
 - c. **exp.iloc [0:3,0:3]**
 - d. exp.iloc [1:4,1:4]
3. Command used to count the total no of rows of dataframe 'df'
 - a. **len(df)**
 - b. df.len
 - c. df.len()
 - d. all the above
4. To count non NAN value of dataframe we can use
 - a. size
 - b. len
 - c. **count**
 - d. values
5. A dataframe has two axes ,where axes =0 represent
 - a. **row**
 - b. column
 - c. index
 - d. value

6. Which of the following is used to represent a dataframe as numpyarray
- a. shape **b. values** c. dtypes d. size
7. When data frame is created using dictionary of any sequence such as list or series the resulting index or lables are _____ of all indexes and labels
- a. UNION** b. INTERSECTION c. PRODDUCT d. SUM
8. print (df. loc [:])
- a. Display “Err” **b. Display all row**
- c. Display all columns d. Display all rows and columns
9. In Boolean indexing we can filter data in _____ ways
- a. 1 **b.2** c.3 d.many
10. Slicing with an _____ index the final index is included in slice.
- a. Implicit **b. Explicit** c. sorted d. All the above
11. By default the join is a _____ of the input columns.
- a. union** b. outer c. inner d. equi join
12. _____ method will quickly convert a multiply-indexed series into a conventionally indexed Data Frame .
- a. Stack **b. unsack** c. push d. pop
13. A Better way to perform multi-index slicing
- a. Index split **b. IndexSlice** c. Indexing d. none
14. None is a python object used only in arrays with _____ datatype.
- a. Int b.float c. arbitrary **d. object**
15. The _____ parameter lets you specify a minimum number of no-null values for the row/columns to be kept.
- a. how b. left-index c. rightindex **d. thresh**

PART-B

1. List the indexer attributes.
2. What is index Object?
3. Difference between join and merge.
4. List the operations on Null values.

5. How will you convert series to dictionary?
6. Differentiate stack () and unstack().
7. Difference between np. concatenate and pd.concat.
8. Define how keyword.
9. What is the use of left-index and right-index keyword?
10. How will you concat with joins?
11. What is reset_index?

PART-C

1. Explain data selection in Data Frame.
2. Give an outline on panda index Object.
3. Differentiate index alignment in series and dataframe.
4. Classify the methods of MultiIndex creation.
5. Write a note on indexers attributes.
6. What is index alignment?
7. Sketch the difference between concat and append.
8. List the categories of join.
9. Explain the left_on and right_on keywords with an example.
10. How will you Rearrange multi-indices?

PART-D

1. Summarize any two fundamental Pandas data structure.
2. How will you handle Missing data.
3. Explain Data selection in series and data frame.
4. Explain Hierarchical Indexing .
5. How will you combine dataset using Merge and join?

UNIT- V

PART-A

1. _____ method computes several common aggregate for each column and returns the result.
 - a. mad
 - b. Describe**
 - c. prod
 - d. none
2. The _____ involves computing some function within an individual group
 - a. **Apply**
 - b. split
 - c. combine
 - d. groupby
3. The aggfunc keyword controls what type of aggregation is applied which is _____ by default.

- a. Median b. mode **c. mean** d. avg
4. The regular expression used to find all names that start with a constant
a. \$ b. @ c. # **d. ^**
5. _____ method split long strings into lines with length less than a given width
a. Pad b. trunc **c. wrap** d. break
6. We can parse dates from a variety of string format using
a. Datetime b. datetime64 **c. dateutil** d. dateutil64
7. The default time mode in datetime64 is
a. ms b. us c. ps **d. ns**
8. _____ package imports financial data from a number of available sources.
a. **Data-reader** b. Data-import c. Data-collector d. none
9. The _____ method shifts the index.
a. shift **b. tshift** c. ishift d. none
10. The _____ function evaluates a string describing operation on DataFrame columns.
a. Query() b. asfreq() **c. eval()** d. none
11. _____ character is supported by Dataframe.eval() method not by pandas.eval()
a. ! b. \$ **c. @** d. #
12. Find the output:

```
str = "His shirt is red"
pos = str.find("is")
print(pos)
```

a. 11 b. 9 c. 2 **d. 1**
13. Find the output:

```
Mali=5
print("Mali" + " is " + str(Mali))
```

a. Mali is Mali **b. Mali is 5** c. 5 is Mali d. 5 is 5

PART- B

1. List few pandas aggregation methods.
2. Differences between Split, Apply and Combine.
3. What is column indexing?
4. List the operation by groupby object.
5. What is filtering?
6. What is a pivot table?
7. List few methods that accepts regular expression over string element.
8. Define Time-delta.
9. Write the ways for working with Date and time in native python.

10. List the pandas date/time object.
11. Define Eval().
12. Difference between resample() and asfreq().
13. What is time-shift ?
14. What is the use of query()?
15. What is timestamp object?

PART-C

1. Compare aggregate, filter, transform and apply.
2. How does panda motivate pivot table?
3. Write down the miscellaneous string methods in pandas.
4. Explain Numpy datetime64 .
5. What is frequency and offset?
6. Distinguish Resampling, Shifting and Windowing.
7. How will you perform column-wise operation usins df.eval()?

PART-D

1. Elucidate Aggregation and grouping in Pandas.
2. Explain the GroupBy object.
3. Explain eval() and query().
4. How will you handle and manipulate Pandas String operations?
5. Elucidate the working of Time series.

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

QUESTION BANK

II M.Sc. Computer Science

Semester III

Core XII

RESEARCH METHODOLOGY

Sub Code: 21PCSC34

UNIT - I

Section - A

1. _____ refer to the behaviour and instruments we use in performing research operations such as making observations, recording data etc.
a) Research operations b) Research methods c) Researching d) **Research techniques**
2. _____ is employed for measuring the quantity or amount of a particular phenomenon by the use of statistical analysis.
a) Quantitative Research b) Qualitative Research c) Applied Research d) Fact
3. _____ research is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones
a) Quantitative b) Qualitative c) Applied d) **Conceptual**
4. _____ research aims at finding a solution for an immediate problem facing a society or an industrial /business organisation.
a) Fundamental b) Conceptual c) **Applied** d) Historical
5. The purpose of _____ approach to research is to form a data base from which to infer characteristics or relationships of population.
a) Fundamental b) Qualitative c) Applied d) **Inferential**
6. In social science and business research we quite often use the term _____ research for descriptive research studies.
a) **Ex post facto** b) Qualitative c) Applied d) Inferential
7. _____ research is mainly concerned with generalisations and with the formulation of a theory.
a) **Fundamental** b) Qualitative c) Applied d) Inferential
8. _____ approach to research is concerned with subjective assessment of attitudes, opinions and behaviour.
a) Quantitative b) **Qualitative** c) Experimental d) Simulation
9. _____ approach involves the construction of an artificial environment within which relevant information and data can be generated.
a) Quantitative b) Qualitative c) Experimental d) **Simulation**

10. _____ approach is characterised by much greater control over the research environment.
 a) Quantitative b) Qualitative c) **Experimental** d) Simulation
11. _____ Research is also called Clinical research.
 a) **Diagnostic** b) Qualitative c) Applied d) Fundamental
12. Research carried on over several time periods is known as _____ research.
 a) Clinical b) **Longitudinal** c) Experimental d) Applied
13. In _____ research, recording of notes, Content analysis, Tape and Film listening and analysis will be taken place.
 a) Clinical b) Field c) **Library** d) Laboratory
14. _____ sampling is also known as purposive or non-probability sampling.
 a) Random b) **Deliberate** c) Stratified d) Systematic
15. In _____ sampling, the population is stratified into a number of non-overlapping subpopulations or strata and sample items are selected from each stratum.
 a) Random b) Deliberate c) **Stratified** d) Quota

Section - B

1. List out the objectives of research.
2. What is meant by descriptive research?
3. Discuss the significance of research.
4. Define research.
5. What is meant by one-time research?
6. What is meant by clinical or diagnostic research?
7. Define Historical research.
8. What is meant by decision-oriented research?
9. What is meant by analytical research?
10. Define Qualitative research.
11. Define Quantitative research.
12. What is meant by research methodology?
13. What is meant by Quota sampling?
14. Define cluster sampling.
15. What is meant by Stratified sampling?

Section - C

1. Write a short note on Descriptive and Analytical research.
2. Differentiate between Applied vs. Fundamental research.
3. Differentiate between Quantitative researches vs. Qualitative researches.
4. Differentiate between Conceptual researches vs. Empirical researches.
5. Write a note on conclusion-oriented and decision-oriented research.
6. List out and explain the criteria of a good research.
7. Distinguish between Research methods and Research methodology.

8. Write a note on research approaches in detail.
9. Explain data collection in research process.
10. Explain about execution of the project in research process.

Section - D

1. Briefly describe the different steps involved in a research process.
2. Explain the different types of research in detail.
3. Explain the types of sampling in determining a sample design in research process.
4. Explain the following in detail.
 - (i) Data Analysis in research process
 - (ii) Hypothesis testing in research process

UNIT - II

Section - A

1. _____ deals with the method of selecting items to be observed for the given study.
 - a) Statistical design b) **Sampling design** c) Operational design d) Observational design
2. _____ design deals with the techniques by which the procedures specified in the sampling.
 - a) Statistical b) Sampling c) **Operational** d) Observational
3. _____ design relates to the conditions under which the observations are to be made.
 - a) Statistical b) Sampling c) Operational d) **Observational**
4. A good design is often characterised by adjectives like _____.
 - a) Flexible b) Appropriate c) Efficient d) **All the above**
5. In social research, the researcher is advisable to do some field observation is often called _____.
 - a) **Pilot Survey** b) Experience Survey c) Study d) Review
6. When a researcher discuss his problem with his colleagues and others who have enough experience in the same area is often known as _____.
 - a) Pilot Survey b) **Experience Survey** c) Study d) Review
7. Through _____, the researcher puts the research problem in as specific terms as possible so that it may become operationally viable.
 - a) Copying b) Developing c) **Rephrasing** d) Reviewing
8. A _____ is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.
 - a) Analysis b) Review c) Research Problem d) **Research design**

9. The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project is known as _____.
- a) Analysis b) Review c) Research Problem d) **Research design**
10. In research process, the first and foremost step happens to be that of selecting and properly defining a _____
- a) Analysis b) Review c) **Research Problem** d) Research design

Section - B

1. What is a research problem?
2. How to state the research problem?
3. How to understand the statement of the research problem?
4. What is meant by experience survey?
5. What is meant by rephrasing the research problem?
6. Define sampling design.
7. Define observational design.
8. Define statistical design.
9. Define operational design.
10. What is meant by pilot survey?

Section – C

1. Write a brief note on selecting the research problem.
2. Write a short note on rephrasing the research problem.
3. What is the necessity of defining a research problem? Explain.
4. What are the various parts in research design?
5. Write down the features of a good design.
6. What are the components of a research problem?
7. How to develop ideas through discussion while defining a research problem?

Section - D

1. Explain the techniques involved in defining a research problem.
2. What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem.

UNIT - III

Section - A

1. The measurement of _____ is usually called the precision of the sampling plan.
a) Systematic bias **b) Sampling error** c) Experiment error d) Human bias
2. In _____ observation, mechanical instruments are used for accuracy and standardisation.
a) Controlled b) Uncontrolled c) Flexible d) Constant

Section - B

1. Define Sampling design.
2. List out the steps in sampling design.
3. What is area sampling?
4. Define cluster sampling.
5. What is systematic sampling?
6. What is multistage sampling?
7. Define sequential sampling.
8. What are the two cases of incorrect inferences in sampling procedure?
9. What is primary data?
10. What is secondary data?
11. What is structured observation?
12. Compare controlled and uncontrolled observation.
13. What is LaTeX?
14. What are the uses of R tool?
15. What is SPSS?
16. What is NS2 tool?
17. What is MATLAB?

Section - C

1. What are the criteria of selecting a sampling procedure?
2. Distinguish between Restricted and unrestricted sampling.
3. Differentiate Convenience and purposive sampling.
4. Distinguish between Systematic and stratified sampling.
5. Briefly Distinguish Cluster and area sampling.
6. How do we select a random sample?
7. Differentiate between collection of data through questionnaires and schedules.
8. Discuss interview as a technique of data collection.
9. Examine the merits and limitations of the observation method in data collection.
10. Discuss data collection through questionnaires.
11. Discuss data collection through schedules.
12. Write a short note on R Tool.
13. Write a short note on MATLAB.
14. Write a short note on NS2 Tool.
15. Write a short note on LaTeX.
16. Write a short note on SPSS.

Section – D

1. Explain some of the complex random sampling designs.
2. Explain the different types of sampling designs.
3. Write down the steps to keep in mind while developing sample design.
4. Enumerate the different methods of collecting data. Explain its merits and demerits.
5. Explain some of the tools used for research.

UNIT - IV

Section - A

1. The _____ report is one which gives emphasis on simplicity and attractiveness.
a) Standard b) Technical c) **Popular** d) Simple
2. _____ appear at the bottom of a page and are separated from the last line of text by additional space and/or a line, and/or a smaller font.
a) **Footnotes** b) Bookmark c) Index d) Endnotes
3. A detailed summary of the findings and the policy implications drawn from the results be explained in _____.
a) **Conclusion** b) Introduction c) Discussion d) Review
4. _____ will contain any additional information that the researcher have collected while carrying out the study.
a) Table of content b) **Appendices** c) Preface d) Acknowledgement
5. _____ are citations that are inserted in the main text of the paper.
a) **In-text citation** b) Out-text citation c) With-text citation d) For-text citation
6. A _____ generally covers the story of how the book came into being, or how the idea for the book was developed.
a) Table of content b) Appendices c) **Preface** d) Acknowledgement
7. _____ are used to show the reader where the information in the paper was originally published
a) **Citation** b) Impact factor c) Index d) Title
8. In research report, the _____ part of outline consists of a description of your problem within its context.
a) **Head** b) Body c) Tail d) Reference
9. In research report, the _____ part of outline consists of the discussion of your data, conclusions, and recommendations.
a) Head b) Body c) **Tail** d) Reference
10. The _____ should contain the title, the names of the authors with their designations, the institution that is publishing the report with its logo.
a) Preface b) **Cover page** c) Foreword d) Acknowledge
11. A _____ is usually a short piece of writing found at the beginning of a book or other piece of literature, before the introduction.
a) Preface b) Cover page c) **Foreword** d) Acknowledge

12. A _____ report is used whenever a full written report of the study is required whether for record keeping or for public dissemination.
- a) Standard b) **Technical** c) Popular d) Simple
13. _____ must be prepared and be given invariably in the report at the end.
- a) Preface b) Cover page c) **Index** d) Acknowledge
14. _____ referencing is done by placing the citation in brackets in the text at the precise place where the borrowed information occurs.
- a) Standard b) Average c) Text d) **Source**
15. _____ is the intentional act of making up data or results and recording or reporting them.
- a) **Fabrication** b) Falsification c) Recreation d) Cloning
16. _____ form of textual plagiarism generally occurs when you combine multiple research contributions of some others.
- a) Idea plagiarism b) **Mosaic paraphrasing** c) Simple paraphrasing d) Metaphor plagiarism
17. A _____ consists of any valuable business information.
- a) Trademark b) Patent c) Copy Right d) **Trade Secrets**
18. The _____ owner can be an individual, business organization, or any legal entity
- a) **Trademark** b) Royalty c) Copy Right d) Trade Secrets
19. _____ is a form of protection provided to the authors of original works of authorship fixed in any tangible medium of expression.
- a) Trade Secret b) Patents c) **Copyrights** d) Trademark
20. _____ is copying material you have previously produced and passing it off as a new production.
- a) Fabrication b) **Self-plagiarism** c) Copyright d) Rephrasing
21. _____ plagiarism is commonly seen in education and research.
- a) **Textual** b) Coding c) Structural d) Image
22. _____ may be granted to anyone who invents a new, original, and ornamental design for an article of manufacture.
- a) **Design Patents** b) Utility Patents c) Plant Patents d) Color Patents
23. _____ can be defined as an appropriation of the ideas, words, process or results of another person without proper acknowledgment, credit or citation.
- a) Copying b) Falsification c) **Plagiarism** d) Fabrication

24. Codes written by others are copied or re-used or modified or converted a part of codes and claimed as one's own is known as _____
a) music plagiarism b) image plagiarism c) textual plagiarism d) **source code plagiarism**
25. The owner of a _____ has the right to reproduce the work, prepare derivative works based on the original work.
a) **Copying** b) Falsification c) Plagiarism d) Fabrication
26. A trademark registration is valid for _____ years and may be renewed for additional ten year periods.
a) **10** b) 5 c) 3 d) 6
27. _____ type of Plagiarism Combines perfectly cited sources with copied passages without citation.
a) Recycle b) **Hybrid** c) Mashup d) Remix
28. _____ may be granted to anyone who invents or discovers any new and useful process, machine, article of manufacture.
a) Design Patents b) **Utility Patents** c) Plant Patents d) Color Patents

Section - B

1. What are the preliminary pages in research report?
2. Define technical report.
3. What is meant by citation?
4. What is meant by footnotes?
5. What are the significance of report writing?
6. Define popular report.
7. List out some of the citation styles.
8. What is meant by foreword in the research report?
9. Define preface in the research report.
10. Define references.
11. What is meant by review of literature?
12. Define title page in the research report.
13. What is meant by Intellectual Property Rights (IPR)?
14. Define Patent.
15. Define trade secrets.
16. What is meant by Plagiarism?
17. Define Self-plagiarism.
18. What is copyright & trademark?
19. Define Falsification & Fabrication.
20. What is utility, design and plant patents?

Section - C

1. Explain the different steps in writing a research report.
2. Write a short note on 'Methodology' in the context of a research report.
3. Write a short note on "Research findings" in the context of a research report.
4. Write a short note on "Review of Literature" in the context of a research report.
5. Difference between technical report and popular report.
6. Write a short note on referencing methods.
7. What is meant by Plagiarism? Explain its types.
8. Explain some of the useful plagiarism detection tools.
9. What are the ethical issues involved in research process?
10. Write a short note on patents and its types.
11. Write a brief note on trade secrets & trademarks.
12. Write a brief note on copyrights.

Section - D

1. Elucidate the layout of research report.
2. Explain the mechanisms of writing a research report?
3. Explain the main components or chaptering of research report.
4. Explain the types of reports in detail.
5. Explain Intellectual Property Rights in detail.
6. Describe Plagiarism types and tools in detail.

UNIT – V

Section - A

1. _____ learning experiences can take place in a single lesson or over the course of several lessons or even several weeks..
a) Lecture Method b) Discussion Method c) **Inquiry-based** d) Project Method
2. _____ is an educational presentation delivered by an instructor to a group of students with the help of instructional aids and training devices.
a) **Lecture Method** b) Discussion Method c) Inquiry-based d) Project Method
3. A seminar organized to discuss a topic in class is known _____ seminar.
a) **Mini** b) Major c) National d) International
4. The teacher opens the discussion by asking one of the prepared _____ question.
a) Initial b) Follow-up c) Open-up d) **Lead-off**
5. _____ is referred to problem-based learning, experiential learning and 21st century learning.
a) Lecture Method b) Problem solving Method c) Project Method d) **Discovery Method**

6. A _____ method comprises of principles and methods used by teachers to enable student learning.
a) instructing b) coaching c) **teaching** d) playing
7. _____ phase involves the instructions to be done by a teacher before the classes like lesson plan write-up.
a) **Planning** b) Execution c) Evaluation d) Discussion
8. _____ phase means the plan execution stage, where all the activities of a teacher are clubbed up with the learning experiences.
a) Planning b) **Interactive** c) Evaluation d) Discussion
9. _____ phase of teaching without which the teaching process is incomplete is the evaluation process.
a) Pre-active b) Interactive c) **Post-active** d) Execution
10. _____ method of learning through experiences and it gives importance to purposeful activities carried out in a life-like situation.
a) Lecture Method b) Seminar Method c) **Project Method** d) Discovery Method
11. In _____ type, projects in which students are asked to do something like building, planning to execute a model.
a) **Procedure** b) Consumer c) Problem d) Drill
12. In _____ type, no new activity is undertaken but an activity once performed, is repeated to acquire greater skill.
a) Procedure b) Consumer c) Problem d) **Drill**
13. _____ seminars are organized at departmental or institutional level.
a) Mini b) **Major** c) National d) International
14. _____ type of seminar is organized by an association or organization.
a) Mini b) Major c) **National** d) International
15. _____ reinforcement are the conditions which increase the possibility of recurrence of desired behaviour or response.
a) **Positive** b) Negative c) Minimum d) Maximum

Section - B

1. What are the objectives of the teaching methodology?
2. List out and explain the objectives of seminar method.
3. Discuss the pre-active phase of teaching.
4. What is meant by Interactive phase of teaching?
5. Discuss the post-active phase of teaching.

6. What are the characteristics of a good lecture?
7. What are the components involved in a lecture method of teaching?
8. What are the types of knowledge involved in problem solving method of teaching?
9. What are the types of project method of teaching?
10. Discuss the roles in seminar method of teaching.
11. List out and explain the types of seminar method of teaching.
12. Discuss the structure of teaching.
13. Discuss the structure of discussion method of teaching.
14. What are the principles of project method?
15. Define problem solving method of teaching.

Section - C

1. Explain problem solving method of teaching.
2. Write a detailed note on project method of teaching in detail.
3. Briefly describe the inquiry-based method of teaching.
4. Write a short note on lecture method of teaching.
5. Describe discussion method of teaching.
6. Explain discovery method of teaching.
7. Explain seminar as a teaching methodology.
8. Discuss the phases of teaching in detail.

Section - D

1. Explain some of the teaching methods in detail.

ST.MARY'S COLLEGE (Autonomous) -THOOTHUKUDI

Question Bank

II M.Sc. COMPUTER SCIENCE

Semester III

Elective III B

Object Oriented Software Engineering

Sub.Code: 21PCSE32

UNIT I

Part-A

1. _____ is an Agile Process model.
a) FDD b)Scrum c)Crystal **d)All the above**
2. An _____ is a set of tasks that is performed toward a specific purpose
a)Role b)Task **c)Activity** d)Participant
3. Weakness of _____ models is that they assume that after an activity is finished and reviewed, the associated work product can be baselined
a) V b)Water fall c)Spiral d)entity centered
4. _____ is a cost estimation modeling technique.
a) COCOMO b)POJO c) COCO d)COMO
5. Which one of the following is not a step of requirement engineering?
a)Elicitation b) Design **c) Analysis** d) Documentation
6. Actual programming of software code is done during the _____ step in the SDLC.
a) Maintenance and Evaluation b) Design
c) Analysis **d) Development and Documentation**
7. Which of the following is/are main parameters that you should use when computing the costs of a software development project?
a)Travel and training costs b)Hardware and software costs
c)Effort costs **d)All of these**
8. _____ phase identifies the use cases.

- a) Transition **b)Inception** c)Elaboration d)Construction
9. Entity Centered model is also called.
- a) environment based b)assessment based **c)issue based** d)deployment based
10. During _____ state tracking the team status and problem identification.
- a) Project steady state** b) Project Conception c)project start d)none
11. SPMP stands for
- a) Software Project Maintenance Plan b) System Project Management Plan
- c) System Project Management Plan d) **Software Project Management Plan**
12. The _____ Process focuses on the tracking and control of changes of work products.
- a) Configuration Management** b)Verification&Validation
- c) Documentation Development d)Testing
13. The IEEE standard lists a total of _____ processes.
- a)15 b)20 c)18 **d)17**

Part-B

1. What are the process of project management?
2. What are the two types of unified process?
3. List few Agile Process model.
4. Define OOSE.
5. List the Project Management processes.
6. List the process group of SDLC.
7. What are the Project management basic activities?
8. Define functional and non-functional requirements.
10. What is communication?
11. What is scrum?
12. Differentiate Iterative and Incremental Unified Process.
13. Define Workflow and its types.
14. Define Problem Definition.
15. What is Postmortem?

Part-C

1. Write a note on project planning.

2. Explain about the incremental model.
3. Write a note on Project estimation.
4. What is project management?
5. What are the steps to be followed for planning a project?
6. What are the components of project?
7. Write a note on Project Management.
8. List the principles of Agility.
9. Explain Unified Process and its types.

Part-D

1. Explain the Software Lifecycle Model.
2. Elucidate the Life Cycle Models.
3. Explain Project planning and estimation.
4. Why project scheduling is necessary for a project?
5. What are the Phases of a Software Project?

UNIT II

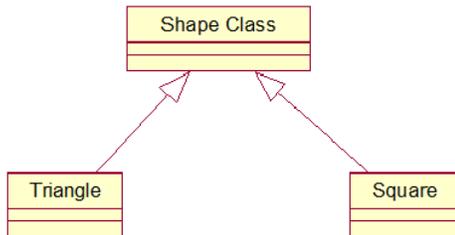
Part-A

1. The UML was designed for describing _____.
 - a) Object-oriented systems b) Architectural design
 - c) SRS **d) Both object-oriented systems and Architectural design**
2. Identify among the following UML diagrams which has a static view?
 - a) Collaboration **b) Use case** c) State chart d) Activity
3. The user system requirements are the parts of which document?
 - a) SDD **b) SRS** c) DDD d) SRD
4. The _____ and _____ are the two issues of Requirement Analysis.
 - a) Performance, Design **b) Stakeholder, Developer**
 - c) Functional, Non-Functional d) None of these
5. Dynamic behavior of the system and to visualize the communication among objects through_____.

- a) use case diagram **b)interaction diagram** c) class diagram d)activity diagram.
6. _____ is a technique for reducing multiplicity by using keys also called a qualifier.
 a)aggregation b)specialization **c)qualification** d)generalization
7. The requirements specification is _____ if the system can be implemented within constraints.
a) Realistic b)Verifiable c)Traceable d)None
8. The requirements of the new system are extracted from an existing system in _____.
 a) Greenfield Engineering **b)ReEngineering**
 c)Interface Engineering d) ReuseEngineering
9. Which one of the following is NOT desired in a good Software Requirement Specifications (SRS) document?
 a)Fuctional requirement b)Non-Functional
 c)Goals of Implementation **d)Algorithms for software implementation**
10. A Software Requirements Specification (SRS) document should avoid discussing which one of the following?
 a)User interface issues b)Non functional Requirements
c)DesignSpecification d)Functional Requirements
11. _____are Weak entities are represented in UML diagrams by using aggregations.
 a) quantified b) non-quantified c) non-qualified **d) qualified**
12. _____ represented by In UML diagrams, relationship between component parts and object.
 a) ordination b) aggregation c) segregation **d) increment**
13. Which type they considered Activity diagram, use case diagram, collaboration diagram, and sequence diagram?
 a) non-behavioral b) non-structural c) structural **d) behavioral**
14. Which diagram is used to show interactions between messages are classified as?
 a) activity b) state chart **c) collaboration** d) object lifeline
15. _____diagram is time-oriented?

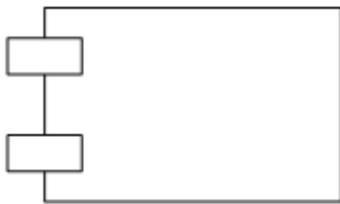
- a)Collabration b)Sequence c)Activity d)none

16. What type of relationship is represented by Shape class and Square ?



- a) Realization **b) Generalization** c) Aggregation d) Dependency

17. Which core element of UML is being shown in the figure?



- a) Node b) Interface c) Class **d) Component**

Part-B

1. Define state machine diagram.
2. What are the primary goals in the design of UML?
3. What is UML?
4. Define Activity diagram.
5. What is interaction diagram and mention its types?
6. Define Transition and its states.
7. What is component diagram?
8. What are the requirement of elicitation?
9. Define RAD.
10. List few non functional requirements.
11. What is Aggregation?

12. What is Generalization?
13. What is composition?
14. How to apply activity diagram?
15. Define Traceable.

Part-C

1. Interpret activity diagram. Explain about its applications.
2. Illustrate Collaboration Diagram with proper example.
3. Summarize Sequence Diagram with proper diagram
4. Paraphrase about Interaction Diagram Notation
5. Explain UseCase Diagram.
6. What are the components of Requirement Elicitation?
7. List the activities of Requirement Elicitation.
8. How will you document Requirement Elicitation?
9. What is Noun phrase Approach?
10. What is CRC?

Part-D

1. Explain UML in detail.
2. Elucidate SRS Documentation.
3. Explain the approaches for identifying Classes.
4. Explain Behavioral UML diagram.
5. Compare and contrast Behavioral and structural UML diagram.

UNIT III

Part-A

1. In the analysis phase, the development of the _____ occurs, which is a clear statement of the goals and objectives of the project.
 - a) Documentation b) Flowchart **c) Program specification** d) Design
2. _____ is a visual dictionary of the main concepts visible to the user.
 - a) Analysis object model** b) Analysis Dynamic Model
 - c) Dynamic Object model d) Static Object Mode.
3. _____ object represent the interactions between the actors and the system.

- a)Entity **b)Boundary** c) Control d)Actor
4. _____ is the number of dependencies between two subsystems.
 a)Cohesion **b)Coupling** c)OCL d)interface specification
5. A constraint is expressed as a boolean expression returning the value True or False is
 a)Cohesion b)Coupling **c)OCL** d)interface specification
6. In design phase, which is the primary area of concern?
 a) Architecture b) Data c) Interface **d) All of these**
7. Cohesion is a qualitative indication of the degree to which a module
 a)can be written more compactly
b)focuses on just one thing
 c)is able to complete its function in a timely manner
 d)is connected to other modules and the outside world
8. Coupling is a qualitative indication of the degree to which a module
 a)can be written more compactly
 b)focuses on just one thing
 c)is able to complete its function in a timely manner
d)is connected to other modules and the outside world
9. _____ defines the properties of a data object and take on one of the three different characteristics.
 a)data objects **b)attributes** c) relationship d)both a&b
10. A _____ is a graphical representation that depicts information flow and the transforms that are applied as data moves from input to output.
 a) dataflow diagram **b) state transition diagram** c) workflowdiagram d)none
11. _____returns a collection containing elements from both the original collection and the collection specified as parameter.
 a) **union(collection)** b)set(collection) c)intersection(collction) d)none
12. The _____ requires that objects in a program should be replaceable with instances of their subclasses without altering the correctness of that program.
a)LSP b)OCP c)DIP d) ISP
13. The best known example of a pipe and filter architectural style is the _____.
 a) Gruntshell **b) Unix shell** c) Bourne shell d)none

Part-B

1. Differentiate Dynamic object modeling and static object modeling
2. What are the objectives of analysis pattern?
3. Define object model.
4. Define Generalization.
5. Define Specialization.
6. What are the different models of system development?
7. Define OCL.
8. What is class implementor?
9. What is class extender?
10. How to achieve high Coherence?
11. How to achieve Low Coupling?
12. Define MVC architecture style.
13. List the activities of Interface specification.
14. Define OCL Bags.
15. What are the three types of collection in OCL?

Part-C

1. Explain the Analysis Object Model.
2. Write a note on Object Constraint Language.
3. What are the different types of analysis object model?
4. Write a note on Analysis Model vs Object Design model
5. What are the OCL collections and operations for accessing the collection.
6. Give a note on Interface specification.
7. What is Coupling and Cohesion?
8. Differentiate Layers and partitions.
9. What is subsystem interface, classes and service?
10. Write a note on Design Patterns.
11. Differentiate Static object model and dynamic object model.
12. What are the different views developers have on class diagram?

Part-D

1. Explain the Architectural Styles in Design Phase.
2. Elucidate the Analysis Phase.

3. Describe the different types of Design Principles.
4. Explain Object Constraint Language.
5. Enumerate in detail the design concepts.

UNIT IV

Part-A

1. Debugging is _____.
 - a) creating program code
 - b) finding and correcting errors in the program code**
 - c) identifying the task to be computerized
 - d) creating the algorithm
2. A _____ improves the readability or the modifiability of the source code
 - a) Model transformation
 - b) Refactoring**
 - c) Mapping
 - d) Forward Engineering
3. A _____ association is implemented as buried foreign key
 - a) one-to-many**
 - b) one-to-one
 - c) many-to-one
 - d) many-to-many
4. All components are first tested individually and then tested together as a single system
 - a) big bang testing**
 - b) bottom-up testing
 - c) top-down testing
 - d) sandwich testing
5. _____ prototype implements a single layer in the system.
 - a) vertical
 - b) horizontal**
 - c) user-interface
 - d) wizard of-Otzu
6. _____ is a meta-model for data.
 - a) schema**
 - b) table
 - c) view
 - d) data dictionary
7. A _____ links a data record in one table with one or more data records in another table.
 - a) Primary key
 - b) Candidate key
 - c) foreign key
 - d) Constraint key
8. _____ testing methods can be used to drive validations tests
 - a) Yellow-box
 - b) Black-box**
 - c) White-box
 - d) All of the mentioned
9. Which of the following is a part of testing OO code?
 - a) Validation tests
 - b) Integration tests
 - c) Class tests**
 - d) System tests
10. _____ testing tries to find faults in participating objects and/or subsystems with respect to the use cases from the use case model.
 - a) integration
 - b) Unit**
 - c) Usability
 - d) system
11. An _____ state is caused by one or more faults and can lead to a failure.
 - a) erroneous**
 - b) test case
 - c) failure
 - d) test stub
12. Equivalence testing is also called _____ testing.

- a) Yellow-box **b)Black-box** c) White-box d) All of the mentioned

13. SCMP stands for

- a) **Software Configuration Management Plans**
b) System Configuration Management Plans
c) Security Configuration Management Plans
d) Software Control Management Plans

Part-B

1. Define Big Bang Testing.
2. List down the transformation principles .
3. What is buried association?
4. What is program evolution dynamics?
5. Define Buried Association.
6. What two main options for mapping an inheritance relationship to a database schema?
7. Differentiate test stub and test driver.
8. List few testing categories.
9. What is transformation?
10. What are the components involved in fagan's inspection method?
11. What is usability testing and its types?
- 12 . What is prototype test and its types?
- 13.What is white box testing?
14. List horizontal integration testing strategy:
15. What is system testing and its types?
16. Define Configuration Management.
17. Differentiate Promotion and release.
18. What is version and Configuration?

Part-C

1. What are the four types of Transformation?
2. What are the activities of Configuration Management?
3. Infer in detail about Black box testing.
4. Describe the types of software testing.
5. Write down the testing activities.

6. How will you map an object model to a relational database?
7. What are the repositories defined in configuration?
8. How will you document configuration management?

Part-D

1. Explain Testing and Implementation.
2. How Integration testing is essential concept in real time scenario?
3. Explain Usability testing and Unit Testing.
4. Elucidate Mapping models to code.
5. Explain Configuration Management.

UNIT V

Part-A

1. Roles concerned with coordination among teams is.
a) Management b)Development **c)Cross-funtional** d)Consultant
2. The _____ is responsible for the interface definition of the assigned subsystem.
a) API engineer b)Tester c) Document Editor d)Configuration Manager
3. A client who can answer developer questions and make decisions without having to ask anybody else
a) Pseudo Client **b)Local King Client** c)NoClient d)Proxy Client
4. _____ is a methodology targeted at small teams of developers who need to develop software quickly in a changing environment.
a) Royce **b) Extreme Programming** c) Rugby d)None
5. _____ methodology is based on the Unified Process life cycle.
a) Royce b) Extreme Programming c) Rugby d)None
6. Defined by the client and current state of the development organization is _____.
a) Project Environment b)Methods c)Tools d)none
7. A project can start without a client is _____.
a) Pseudo Client b)Local King Client **c)NoClient** d)Proxy Client
8. Selecting an existing architecture is always more advantageous than recreating one from scratch is known as _____.

- a) **Architecture reuse** b) Design pattern reuse
 c) Framework reuse d) component reuse
9. Compact representation for storing the design and rationale of an existing system is _____.
- a) Communication b) Analysis c) Design **d) Archival**
10. _____ is also called customer, is responsible for the formulation of scenarios and the requirements.
- a) End User b) application domain specialist
c) Client c) The solution domain
11. Generate and evaluate large number of solutions for a problem.
- a) Status Review **b) Brainstorming** c) Walkthrough d) Inspection
12. The cross-functional role is also called _____.
- a) API engineer b) Tester **c) Liaison** d) Configuration Manager

Part-B

1. What is project communication?
2. List the types of client.
3. Define Software engineering methodology .
4. List the types of clients.
5. What are the advantages of modeling?
6. Where do we need models?
7. How do we control software development?
8. Define proxy client.
9. List Key principles of the methodology.
10. List few Spectrum of methodologies.
11. What are the three major types of interaction in a project?
12. Define Roles and its types.
13. What are four types of liaisons?
14. What are the classification of communication?
15. What are task and workproduct?

Part-C

1. List the different types of Roles in Project Organization.

2. How can software development better be described?
3. Give a note on How Much Reuse?
4. Explain Rugby methodologies.
5. Explain cross-functional Roles.
6. What are the types of Consultant Role?
7. Explain Roles and its types.

Part-D

1. Explain Project Organization and Communication
2. Explain the spectrum of Methodologies.
3. Elucidate the Key questions for which methodologies provide guidance.
4. Explain Planned and Unplanned Communication Event.
5. Explain the developers perspective of project component.

ST. MARY'S COLLEGE (AUTONOMOUS)

Re-accredited with A+ Grade by NAAC Thoothukudi – 628001, Tamil Nadu

(Affiliated to Manonmaniam Sundaranar University)



QUESTION BANK

M. Sc Physics

2021-2023

(for those who joined in July 2021 and after)

Section A**UNIT I: FUNDAMENTAL PRINCIPLES AND LAGRANGIAN FORMULATION**

1. If a force \mathbf{F} is derivable from a potential function $V(r)$, Where r is the distance from the origin of the coordinate by system, it follows that
a) $\nabla \times \mathbf{F} = 0$ b) $\nabla \cdot \mathbf{F} = 0$ c) $\nabla V = 0$ d) $\nabla^2 V = 0$
2. The kinetic energy can be expressed as the sum of kinetic energy of
a) Centre of mass + body b) All particles of body + centre of mass c) None
d) Motion of the centre of mass + motion about the centre of mass
3. Work – Energy theorem states that the work done is equal to the change in -----.
a) Linear momentum b) Angular momentum **c) Kinetic energy** d) All the above
4. Rate of change of angular momentum is called -----.
a) Potential energy b) Kinetic energy c) Impulse **d) Torque**
5. Angular momentum of a particle is defined as the moment of -----.
a) Linear momentum b) Energy c) Both a, b d) None
6. A particle is constrained to move along the inner surface of a fixed hemisphere bowl. The number of degrees of freedom of the particle is
a) One **b) Two** c) Three d) Four
7. Constraint in a rigid body is -----.
a) Holonomic b) Nonholonomic c) Scleronomic **d) Both a, c**
8. Generalized coordinates -----.
a) are necessarily spherical coordinates **b) may be Cartesian coordinates**

- a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) 2 d) $\frac{1}{2}$
4. A particle is moving in central force field, the potential energy function being $V(r) = -kr^{n+1}$. Where k is a constant, r is the distance of the particle from the origin. The orbit is stable if
 a) $n = 1$ b) $n > 2$ c) $n < 3$ **d) $n > -3$**
5. The motion of a particle under central force takes place in a -----.
 a) Cone **b) Plane** c) Elliptical orbit d) circular orbit
6. Eccentricity $\epsilon < 1$ represents ----- orbit.
 a) Hyperbolic b) Parabolic **c) Elliptical** d) None
7. According to virial theorem
 a) $\bar{T} = -\bar{V}/2$ b) $2\bar{T} + \bar{V} = 0$ c) $\bar{T} = \bar{V}/2$ **d) Both a and b**
8. Rutherford differential scattering cross - section
 a) **Has the dimension of area** b) Has the dimension of solid angle
 c) Is proportional to the square of the kinetic energy of the incident particle
 d) None of the above
9. Which of the following one is true for the above system?
 a) **The acceleration of the comet is maximum when it is closest to the sun.**
 b) The linear momentum of the comet is a constant.
 c) The comet will return to the solar system after a specific period.
 d) The kinetic energy of the comet is a constant.
10. The particle is moving in a central force. Which of the following physical quantity remains constant?
 a) Linear momentum **b) Angular momentum** c) Kinetic energy d) None

UNIT III: HAMILTON'S FORMULATION

1. If a function does not depend on time explicitly and is a constant of motion, its poisson bracket with the ----- vanishes.

- a) Lagrangian **b) Hamiltonian** c) Both d) None
2. $[p_k, p_l] = \text{-----}$.
 a) **0** b) p_{kl} c) $-p_{kl}$ d) $1/p_{kl}$
3. $[F, G] = \text{-----}$.
 a) $[G, F]$ **b) $-[G, F]$** c) GF d) FG
4. $[q_k, p_l] = \text{-----}$.
 a) δ **b) δ_{kl}** c) qp_{kl} d) None
5. According to the principle of least action:
 a) $\int \sum_k p_k \dot{q}_k = 0$ **b) $\Delta \int \sum_k p_k \dot{q}_k dt = 0$** c) $\Delta \int (\sum_k p_k \dot{q}_k - H) dt = 0$ d) $H = 0$
6. Hamilton's principle function is -----.
 a) $S = \int_{t_1}^{t_2} H dt$ **b) $S = \int_{t_1}^{t_2} L dt$** c) Both a, b d) None
7. The Δ – operation is $\Delta = \delta + \text{-----}$.
 a) d/ds b) d/dq c) $\Delta t d/ds$ **d) $\Delta t d/dt$**
8. In the case of canonical transformations
 a) Hamilton's principle is satisfied in old as well as in new coordinates.
 b) The form of Hamilton's equation is preserved.
 c) The form of Hamilton's equation is not preserved.
d) Both a, b
9. $[CF, G] = \text{-----}$.
a) $C[F, G]$ b) $-C[F, G]$ c) $-[F, G]$ d) None
10. If the poisson bracket of a function with the Hamiltonian vanishes -----.
 a) The function depends upon time **b) The function is a constant of motion**
 c) The function depends on velocity d) The function is not the constant of motion

UNIT IV: RIGID BODY PROBLEMS

1. The general motion of a rigid body has ----- degrees of freedom.

- a) 3 b) 2 c) 1 **d) 6**
2. In case of inertial tensor $I_{xy} = \text{-----}$.
- a) $-I_{xy}$ **b) I_{yx}** c) $-I_{yx}$ d) $1/I_{yx}$
3. For a rigid body, angular momentum vector and angular velocity are -----.
- a) Not always in same direction** b) Same in magnitude
c) Always in same direction d) None
4. When a rigid body rotates about a given axis, then the degrees of freedom -----.
- a) 1** b) 2 c) 3 d) 4
5. If a rigid body is rotating with an angular velocity ω about an instantaneous axis through a fixed point in the body, the angular momentum vector J about the same point
- a) will be always in the direction of ω **b) may be in the direction of ω**
c)) may be in opposite direction of ω d) will be always perpendicular to ω
6. In the case of rigid body, having N particles, the number of degrees of freedom is -----.
- a) N **b) $3N$** c) 3 d) 0
7. A heavy symmetrical top is rotating about its own axis of symmetry (the Z - axis). If I_1 , I_2 and I_3 are the principal moments of inertia about X , Y and Z axes respectively, then
- a) $I_2 = I_3; I_1 \neq I_2$ b) $I_1 = I_3; I_1 \neq I_2$ c) $I_1 = I_2; I_1 \neq I_3$ d) $I_1 \neq I_2 \neq I_3$
8. A heavy symmetrical top is rotating under the action of a gravitational angular momentum along the figure axis.
- a) The torque is perpendicular to J_3 .
b) The angular momentum J_3 will change in magnitude.
c) The angular momentum J_3 will remain constant in magnitude.
d) Both a,c.

UNIT V: RELATIVISTIC MECHANICS

1. Frame S' is moving with speed v along X - axis relative to S . A rod is stationary in frame S with length l along X – axis. The length as observed in frame S' is
- a) $l / \sqrt{1 - v^2/c^2}$ **b) $l \sqrt{1 - v^2/c^2}$** c) l d) l / v

2. A relativistic particle moves with a constant velocity v with respect to the laboratory frame. In time t , measured in the rest frame of the particle, the distance that it travels in the laboratory frame is -----.
- a) vt b) $ct / \sqrt{1 - v^2/c^2}$ c) $vt \sqrt{1 - v^2/c^2}$ d) $vt / \sqrt{1 - v^2/c^2}$
3. Particle of ----- rest mass travels with the speed of light.
- a) Infinite b) **Zero** c) None d) Both a, b
4. Relativistic mass of photon is -----.
- a) Ec^2 b) Ec c) mc^2 d) **$h\nu / c^2$**
5. Mass energy relation is -----.
- a) **$E = mc^2$** b) $E = mc$ c) $m = Ec$ d) $m = Ec^2$
6. Lorentz transformations are ----- with the constancy of speed of light in all inertial frames.
- a) **Consistent** b) Inconsistent c) Homogenous d) Uniform
7. The expression for the relativistic energy of a particle is
- a) mc^2 b) $\sqrt{(p^2 c^2 + m_0^2 c^2)}$ c) $p^2 c^2 + m_0^2 c^2$ d) **Both a, b**
8. Examples of mass energy conversion
- a) Nuclear energy b) Electron – proton annihilation
c) Pair production d) **All the above**
9. An electron and a positron practically at rest come together and annihilate each other. Calculate the energy released.
- a) 2 Mev b) **2.5 Mev** c) 3 Mev d) 3.2 Mev
10. Find the energy in MeV released when a neutron decays into a proton and an electron
- a) **0.73 MeV** b) 73 MeV c) 7.3 MeV d) 3.7 MeV

Section B

UNIT I: FUNDAMENTAL PRINCIPLES AND LAGRANGIAN FORMULATION

1. Define conservation of linear momentum of a particle.
2. Discuss conservation of angular momentum of a particle.

3. List out the types of constraints.
4. Define generalized coordinates.
5. Define principle of virtual work.
6. State Hamilton's variational principle.

UNIT II: TWO BODY CENTRAL FORCE PROBLEMS

1. List out the examples of two body problem.
2. Find the reduced mass of the hydrogen atom, Positronium and Hydrogen molecule.
3. List out the conditions for closure of an orbit.
4. Tabulate the values of energy (E) as well as eccentricity (ϵ) for different shapes of orbit.
5. State Kepler's laws of planetary motion.
6. State Virial theorem.
7. What is angle of scattering?
8. What is differential scattering cross – section?

UNIT III: HAMILTON'S FORMULATION

1. Write about Canonical transformations.
2. Write about Legendre transformations.
3. Discuss about Lagrange brackets.
4. Find out the relation between Lagrange and Poisson brackets.
5. Find the value of $[J_x, J_y]$.
6. How will you find frequency of Harmonic oscillator using action angle variables?

UNIT IV: RIGID BODY PROBLEMS

1. What is rigid body?
2. What are coordinates needed to describe the motion of the rigid body?
3. Define body and space coordinate systems.
4. Compare precession angle, nutation angle and body angle.
5. What is line of nodes?

UNIT V: RELATIVISTIC MECHANICS

1. What are the postulates of special theory of Relativity?
2. What is proper length of the rod?
3. Discuss Lorentz – Fitzgerald contraction.
4. What is time dilation?
5. Discuss twin paradox.
6. List out relativistic law of addition of velocities.
7. Discuss the relation between momentum and energy of a relativistic particle.

Section C

UNIT I: FUNDAMENTAL PRINCIPLES AND LAGRANGIAN FORMULATION

1. Explain about mechanics of a particle.
2. Explain in detail about mechanics of a system of particles.
3. Derive an expression for work – energy theorem.
4. Explain in detail about D'Alembert's principle.
5. Obtain the equation of motion of a system of two masses, connected by an extensible string passing over a small smooth pulley.

UNIT II: TWO BODY CENTRAL FORCE PROBLEMS

1. Derive an expression for $r(t)$ and $\Theta(t)$ in central force motion.
2. Obtain the equation of the orbit in the central force motion.
3. Derive the conditions for the stability of the orbits under the central force motion.
4. Obtain an expression for Kepler's third law.
5. Explain centre of mass and laboratory co – ordinates.

UNIT III: HAMILTON'S FORMULATION

1. Deduce Hamilton's equations from variational principle.
2. Explain principle of least action.
3. Explain Hamilton – Jacobi equation.
4. Write about action angle variables.

UNIT IV: RIGID BODY PROBLEMS

1. Explain in detail about body and space reference systems.
2. Derive an expression for angular momentum and inertia tensor of a rigid body.
3. Write a short note on principal moments of inertia.
4. Describe moments of inertia for different body systems.

UNIT V: RELATIVISTIC MECHANICS

1. Explain length contraction.
2. Explain in detail about simultaneity.
3. Obtain an expression for time dilation.
4. Derive an expression for Hamiltonian formulation of relativistic mechanics.

Section D

UNIT I: FUNDAMENTAL PRINCIPLES AND LAGRANGIAN FORMULATION

1. Explain mechanics of a particle.
2. Write in detail about mechanics of a system of particles.
3. Formulate Lagrange's equations from D'Alembert's principle.
4. Create an equation of motion of simple as well as compound pendulum by using Lagrange's equation and deduce their period of oscillation.
5. Formulate Lagrange's equations from Hamilton's principle.

UNIT II: TWO BODY CENTRAL FORCE PROBLEMS

1. Discuss in detail about reduction of two body central force problem to the equivalent one body problem.
2. Summarize the general features of the orbits in equivalent one dimensional problem.
3. Discuss in detail about Kepler's I law.
4. Write in detail about motion under inverse square force.
5. Explain in detail about Rutherford scattering.

UNIT III: HAMILTON'S FORMULATION

1. Discuss in detail about Poisson brackets.
2. Justify the invariance of Poisson bracket with respect to canonical transformations.
3. Find the solution of Harmonic Oscillator problem by Hamilton – Jacobi method.
4. Discuss in detail about Hamilton’s characteristics function.

UNIT IV: RIGID BODY PROBLEMS

1. Explain Euler’s angles and how will you transform the space set of axes to body set of axes with these angles.
2. Discuss Euler’s equations of motion for a rigid body.
3. Explain torque free motion of a rigid body.
4. Discuss force free motion of a symmetrical rigid body.

UNIT V: RELATIVISTIC MECHANICS

1. Discuss in detail about Lorentz transformations.
2. Discuss in detail about Mass Energy relation with examples.
3. Explain Lagrangian formulation of relativistic mechanics.
4. Summarize covariant Lagrangian and Hamiltonian formulation.

CORE II - MATHEMATICAL PHYSICS I - SUB.CODE:21PPHC12

Section A

UNIT I: VECTOR CALCULUS

1. $\mathbf{a} \times (\mathbf{b} \times \mathbf{c}) =$
 a) $(\mathbf{a} \cdot \mathbf{c})\mathbf{b} - (\mathbf{a} \cdot \mathbf{b})\mathbf{c}$ b) $(\mathbf{a} \cdot \mathbf{b})\mathbf{c} - (\mathbf{a} \cdot \mathbf{c})\mathbf{b}$ c) $\mathbf{a}(\mathbf{c} \cdot \mathbf{b}) - \mathbf{a}(\mathbf{b} \cdot \mathbf{c})$ d) $\mathbf{a}(\mathbf{b} \cdot \mathbf{c}) - \mathbf{a}(\mathbf{c} \cdot \mathbf{b})$
2. $\text{curl}(\mathbf{A} + \mathbf{B}) =$
 a) $\text{curl } \mathbf{A} + \text{curl } \mathbf{B}$ b) $\text{curl } \mathbf{A} - \text{curl } \mathbf{B}$ c) $\text{curl } \mathbf{B} - \text{curl } \mathbf{A}$ d) $\text{grad div } \mathbf{A} - \nabla^2 \mathbf{A}$
3. If $\mathbf{A} = x\mathbf{i}$ and $\mathbf{B} = y\mathbf{j}$, then $\nabla(\mathbf{A} \cdot \mathbf{B})$ is equal to
 a) $y\mathbf{i} + x\mathbf{j}$ b) $\mathbf{0}$ c) $\frac{1}{2}yx^2\mathbf{i} + \frac{1}{2}xy^2\mathbf{j}$ d) 2
4. The volume of the parallelepiped whose edges are represented by $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$, $\mathbf{b} = \mathbf{i} + 2\mathbf{j} -$

k, c = 3i - j + 2k.

- a) 6 b) 15 c) 28 **d) 7**

5. A unit vector normal to the surface $z = x^2 + y^2$ at the point (1, 2, 5)

- a) $\pm \frac{i+2j-k}{\sqrt{6}}$ b) $\pm \frac{2i+2j-2k}{\sqrt{12}}$ **c) $\pm \frac{2i+4j-k}{\sqrt{21}}$** d) $\pm \frac{2i+4j-2k}{\sqrt{24}}$

6. The value of a, b and c such that $\mathbf{F} = (3x - 4y + az)\mathbf{i} + (cx + 5y - 2z)\mathbf{j} + (x - by + 7z)\mathbf{k}$ is irrotational, are respectively

- a) 1, 2, -4** b) -4, 2, 1 c) 2, 1, -4 d) -4, 1, 2

7. The condition that the vector A should be the gradient of a scalar function is

- a) $\nabla \cdot \mathbf{A} = 0$ b) $\nabla \mathbf{A} = 0$ c) $\nabla \times \mathbf{A} = 0$ d) $\nabla \times \mathbf{A} - \nabla^2 \cdot \mathbf{A} = 0$

8. Vector A is solenoidal if its

- a) divergence is zero** b) gradient is zero
c) divergence is non-zero d) gradient is non-zero

9. The line integral per unit area along the boundary of small area around a point in vector field \mathbf{A} is called

- a) grad \mathbf{A} b) div \mathbf{A} **c) curl \mathbf{A}** d) Line integral \mathbf{A}

10. The direction of grad Φ is

- a) tangential to level surface **b) normal to level surface**
c) inclined at 45° to level surface d) arbitrary

11. The Gauss divergence theorem is

- a) $\iint \mathbf{A} \cdot d\mathbf{s} = \iiint (\text{div} \mathbf{A}) dv$** b) $\iint A \cdot ds = \iiint (\text{grad} A) dv$
c) $\iint A \cdot ds = \oint A \cdot dr$ d) $\iint A \cdot dr = \iiint (\text{curl} A) ds$

12. According to the Stoke's theorem, $\oint (\nabla \times \mathbf{v}) \cdot d\mathbf{a} =$

- (a) $\oint \mathbf{V} \cdot d\mathbf{l}$** (b) $\oint \nabla V \cdot d\mathbf{l}$ (c) $\oint (\nabla \cdot V) d\tau$ (d) $\oint \nabla V \cdot d\tau$

13. If $r^2 = x^2 + y^2 + z^2$, then grad r^n

- a) r^{n-2} **b) $n\mathbf{r}^{n-2} \mathbf{r}$** c) $n(n-2) r^{n-3} \mathbf{r}$ d) 0

14. If $r = (x^2 + y^2 + z^2)^{1/2}$, then grad r

- a) r **b) \mathbf{r}/r** c) 0 d) r^2

15. Find $\nabla \phi$ if $\phi = \log r$

- a) $\frac{r}{r}$ **b) $\frac{r}{r^2}$** c) $\frac{r}{r^3}$ d) 0

11. The matrix $\begin{bmatrix} 0 & -4 & 1 \\ 4 & 0 & -5 \\ -1 & 5 & 0 \end{bmatrix}$ is

- a) Orthogonal b) Idempotent **c) Skew symmetric** d) symmetric

12. If $A = \begin{bmatrix} 1 & 5 & 2 \\ 3 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 1 & 4 \\ 2 & 1 \end{bmatrix}$, then rank of AB is

- a) 0 b) 1 **c) 2** d) 3

13. Which of the following is false?

- a) A square matrix A be an idempotent matrix, if $A^2 = A$
b) A square matrix A be an involutory matrix, if $A^2 = I$
c) A square matrix A be an orthogonal matrix, if $AA^* = A$
d) A square matrix A be an nilpotent matrix, if $A^n = 0$

14. An eigen value of a square matrix A is $\lambda = 0$, then

- a) $|A| \neq 0$ b) A is symmetric **c) A is singular** d) A is skew symmetric

15. $\begin{bmatrix} -2 & -9 & 5 \\ -5 & -10 & 7 \\ -9 & -21 & 14 \end{bmatrix}$ then $\lambda_1 + \lambda_2 + \lambda_3 =$

- a) -16 **b) 2** c) -6 d) -14

16. If A and B are the symmetric matrices, then the matrix AB is symmetric only if

- (a) $AB=BA$** (b) $AB=-BA$ (c) $AB = I$ (d) either $A = 0$ or $B = 0$

17. If A and B are the idempotent matrices, then the matrix A+B will be idempotent only if and only if

- (a) $AB=BA \neq 0$ **(b) $AB=BA=0$** (c) $AB = -BA$ (d) $AB = 0$ but $BA \neq 0$

18. Every square matrix can be uniquely expressed as

- (a) a sum of two symmetric matrices (b) a sum of two anti-symmetric matrices
(c) a symmetric and anti-symmetric matrix (d) linear combination of any Two matrices

19. A matrix $A = [a_{ij}]$ is Hermitian if

- (a) $a_{ij}=a_{ji}$ **(b) $A^+=A$** (c) $a_{ij}=0$ for $i \neq j$ (d) its all diagonal elements are zero

20. A square matrix A is of order $n \times n$, then what is the value of $|kA|^n$?

- (a) $k I A I$ **(b) $k^n I A I$** (c) $I A I / k^2$ (d) $k I A I^n$

21. A square matrix A necessarily possesses an inverse if

- (a) its all diagonal elements are zero **(b) $\det A \neq 0$**

(c) $\det A \neq 0$

(d) it is a diagonal matrix

22. If A and B are orthogonal matrices, then the product AB is

(a) symmetric (b) antisymmetric (c) **orthogonal** (d) unitary

23. The product of two unitary matrices A and B is

(a) **unitary** (b) symmetric (c) antisymmetric (d) orthogonal

24. The trace of matrix $\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ is

(a) $a_{11} + a_{22} + a_{33}$ (b) $(a_{22}a_{33} - a_{32}a_{23})$ (c) $(a_{11}a_{33} - a_{13}a_{31})$ (d) $a_{11} + a_{13} + a_{31} + a_{33}$

25. The matrix $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ is

(a) unit matrix (b) **orthogonal matrix** (c) both (a) and (b) (d) neither (a) nor (b)

26. The matrix $\begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{i}{\sqrt{2}} \\ -\frac{i}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \end{bmatrix}$ is

(a) only Hermitian

(b) only unitary

(c) **Hermitian and unitary both**

(d) neither Hermitian nor unitary

27. The eigen vectors of Hermitian matrix are

(a) **real**

(b) imaginary

(c) complex

(d) ± 1

28. The product of eigen values of the matrix $\begin{bmatrix} \alpha & 1 & 0 \\ 0 & \beta & 1 \\ 0 & 0 & \gamma \end{bmatrix}$ is

(a) **$\alpha\beta\gamma$** (b) $1 / \alpha\beta\gamma$ (c) $\frac{\alpha\beta\gamma}{\sqrt{\alpha^2 + \beta^2 + \gamma^2}}$ (d) $\frac{(\alpha\beta + \beta\alpha + \gamma\alpha)}{\alpha\beta\gamma}$

29. The eigen values of matrix $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ are

(a) $\pm e^{i\theta}$ (b) **$e^{\pm i\theta}$**

(c) $\cos\theta \pm \sin\theta$ (d) $\pm \tan\theta$

30. The eigen values of an anti-symmetric matrix are

(a) ± 1 (b) $\pm i$

(c) zero or real

(d) **zero or imaginary**

31. The eigen values of an orthogonal matrix are

(a) zero

(b) imaginary

(c) real

(d) **of unit modulus**

32. A is a skew-symmetric matrix, of odd order then the determinant of A is

(a) -1

(b) **0**

(c) 1

(d) a real number

33. If A and B are two matrices conformal for the product AB, then the value $(AB)^T$ is

- (a) $A^T B^T$ (b) $B^T A^T$ (c) A^T / B^T (d) $A^T + B^T$

34. A square matrix A possesses an inverse if

- (a) A is singular (b) **A is non singular** (c) A is imaginary (d) A is real

35. A square matrix is said to be orthogonal if

- (a) A is singular (b) A is non singular (c) **$A^T A = I$** (d) $A = -A^T$

36. A non singular matrix possesses

- (a) **unique inverse** (b) two inverse (c) no inverse (d) none of these

37. The trace of a square matrix is

- (a) **the sum of its diagonal terms** (b) the sum of its nondiagonal terms
(c) the product of its diagonal terms (d) the product of its nondiagonal terms

38. The matrix $\begin{bmatrix} 1 & 2+3i & 3+i \\ 2-3i & 2 & 1-2i \\ 3-i & 1+2i & 3 \end{bmatrix}$ is

- (a) **Hermitian** (b) Skew Hermitian (c) Idempotent (d) Orthogonal

39. The inverse of the matrix A ie., $A^{-1} =$

- (a) $|A|^{-1} \text{adj } A$ (b) **$\text{Adj } A / |A|$** (c) $\text{adj } A / |A|^2$ (d) $|A|^{-2} \text{adj } A$

40. The product of a singular matrix with its adjoint is

- (a) a unit matrix (b) **a null matrix** (c) an orthogonal matrix (d) square matrix

41. If $A = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$, then the matrix AB is

- (a) $\begin{bmatrix} -4 & 2 \\ 2 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} -4 & 2 \\ 0 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & 2 \\ 0 & -2 \end{bmatrix}$ (d) $\begin{bmatrix} 6 & 2 \\ 0 & 2 \end{bmatrix}$

42. If $AY = PY$, then $Y =$

- (a) ± 1 (b) 0 and +1 (c) **0 and +2** (d) 1 and 2

43. The rank of matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ is equal to

- (a) 1 (b) 2 (c) **3** (d) 4

44. For Two matrices A and B

- (a) $AB=BA$ (b) **$AB \neq BA$** (c) $AB = I$ (d) $AB = 0$

45. For two matrices A and B, $(A+B)^2$ is equal to

- (a) A^2+B^2+2AB (b) A^2+B^2+AB (c) **$A^2+B^2+AB+AB$** (d) A^2+B^2

46. The Inverse of matrix $\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$ is

- (a) $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ (b) $1/2 \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$ (c) $1/\sqrt{2} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$ (d) does not exist

UNIT III: SPECIAL FUNCTIONS I AND PARTIAL DIFFERENTIAL EQUATIONS

1. Which of the following equation is Poisson's equation?

- a) $\nabla^2 u = 0$ b) $\nabla^2 u = -\frac{\rho}{\epsilon_0}$ c) $\rho \nabla^2 u = \epsilon_0$ d) $\nabla^2 u - \frac{\partial^2 u}{\partial t^2} = \frac{\rho}{\epsilon_0}$

2. In Heat flow equation $\nabla^2 u = \frac{1}{h^2} \frac{\partial u}{\partial t}$, the quantity h is called

- a) Planck's constant b) conductivity c) Heat flow constant d) diffusivity

3. Find the value of the integral $\int_{-1}^1 x P(x) P(x) dx$

- a) zero b) $\frac{2}{2n+1}$ c) $\frac{1}{4n^2-1}$ d) $\frac{2n}{4n^2-1}$

4. Find the value of $\int_{-1}^1 x^n P(x) dx$

- a) zero b) $\frac{2}{2n+1}$ c) $\frac{2^n (n!)^2}{(2n+1)!}$ d) $\frac{2^{n+1} (n!)^2}{(2n+1)!}$

5. Find the value of $\int_{-1}^1 \frac{dp}{dx}(x) dx$

- a) zero b) n c) $\frac{1}{n}$ d) **n (n+1)**

6. Find the value of $\frac{2}{5} P_3(x) + \frac{3}{5} P_1(x)$

- a) zero b) **x^3** c) $\frac{x^3}{5}$ d) x^2

7. What is $P_n'(1)$?

- a) one b) n c) $\frac{1}{2} n(n+1)$ d) -1

8. What is the value of $J_{1/2}(\pi/2)$?

- a) zero b) **one** c) $\pi/2$ d) $\pi/3$

9. What is the value of $J_{3/2}(\pi/2)$?

- a) zero b) **$2/\pi$** c) 1 d) -1

10. $\nabla^2 \phi = 0$ is ----- equation

- a) **Laplace's equation** b) Helmholtz differential equation
c) Heat flow equation d) Wave equation

21. If $P_n(x)$ is Legendre polynomial for order n , then $P_n'(-x)$ is equal to

- a) $(-1)^{n+1}P_n'(x)$ b) $(-1)^n P_n'(x)$ c) $(-1)^n P_n(x)$ d) $P_n''(x)$

22. If $P_n(x)$ is Legendre polynomial of order n , then the value of $3x^2+3x+1$ can be expressed as

- a) $2P_2+3P_1$ b) $4P_2+2P_1+P_0$ c) $3P_2+3P_1+P_0$ d) $2P_2+3P_1+2P_0$

23. If $P_n(x)$ is Legendre polynomial, then the value of $\int_{-1}^{+1} P_n(x)P_m(x)dx$ ($m \neq n$) is equal to

- a) 0 b) 1 c) $\frac{2}{(2m+1)(2n+1)}$ d) $\frac{m!n!}{2(m+n)!}$

24. The Legendre polynomial $P_n(x)$ has

- a) n real zero between 0 and 1 b) n zeros of which only one is between -1 and $+1$
c) $(2n-1)$ real zeros between -1 and $+1$ d) no real zero between 0 and 1

25. The value $P_3(x)$ is

- a) $\frac{1}{2}(3x^2-1)$ b) $3x$ c) $\frac{1}{2}(5x^3-3x)$ d) $\frac{1}{2}(5x^3-1)$

26. Heat flow equation is

- a) $\nabla^2\Phi=1$ b) $\nabla^2\Phi=0$ c) $\nabla^2\Phi=\frac{1}{h^2}\frac{\partial\phi}{\partial t}$ d) $\nabla^2\Phi=\frac{1}{c^2}\frac{\partial^2\phi}{\partial t^2}$

27. D'Alembert's solution of one dimensional vibrating string is

- a) $f(x-ct)$ b) $f(x+ct)$ c) $f_1(x-ct) + f_2(x+ct)$ d) $f_1(x-ct) \times f_2(x+ct)$

28. Which of the following is the wave equation?

- a) $\frac{\partial^2 u}{\partial x^2} = c^2 \frac{\partial^2 u}{\partial t^2}$ b) $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}$ c) $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ d) $\nabla^2 u + k^2 u =$

0

29. Which of the following is one-dimensional variable linear heat flow equation?

- a) $\frac{\partial^2 u}{\partial x^2} = \frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}$ b) $\frac{\partial^2 u}{\partial x^2} = \frac{1}{h^2} \frac{\partial u}{\partial t}$ c) $\frac{\partial^2 u}{\partial x^2} = 0$ d) $\frac{\partial^2 u}{\partial x^2} + k^2 u = 0$

30. The partial differential equation is $\frac{\partial^2 u}{\partial t^2} - c^2 \frac{\partial^2 u}{\partial x^2} = 0$ is

- a) **Wave Equation** b) Heat Equation c) Laplace Equation d) Helmholtz equation

31. If X is the function of x only, Y is the function of y only and Z is the function of z only, then the

solution of Laplace's Equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} = 0$ may be expressed as

- a) $u = X+Y+Z$ b) $u = XYZ$ c) $u = XYZ / X+Y+Z$ d) $u = X+Y+Z / XYZ$

12. The Cauchy – Riemann equations are

a) $\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = r \frac{\partial v}{\partial r}$

b) $\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = -r \frac{\partial v}{\partial r}$

c) $\frac{\partial u}{\partial r} = -r \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = \frac{1}{r} \frac{\partial v}{\partial r}$

d) $\frac{\partial u}{\partial r} = r \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = \frac{1}{r} \frac{\partial v}{\partial r}$

13. The poles of the function $\frac{z^2}{(z-1)^2(z-2)}$ are

a) +1,-2

b) +1,+1,+2

c) +1,-1,+2

d) +1,-1,-2

14. Cauhy's theorem of residue is

a) $\int_c f(z) dz = 2\pi i$

b) $\int_c f(z) dz = 2\pi i$ (sum of residues of f(z))

c) $\int_c f(z) dz = 2\pi i$ (sum of residues)

d) $\int_c f(z) dz = 2\pi i$ (sum of residues of f(z) at the poles within C)

15. The Analytic function f(z) whose real part is $x^2 - y^2$ is

(a) z

(b) z^2

(c) $|z|^2$

(d) z^{-2}

16. The function $f(z) = |z|^2$ with $z = x + iy$ is

(a) differentiable for all the values of x and y (b) differentiable for only positive values of x and y

(c) **differentiable at x=0,y=0 only**

(d) differentiable only at x=1 and y=1

17. The necessary condition for the function $f(z) = u + iv$ to be analytic at all points in the region of R

are

(a) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ provide they exist (b) $|z|^2 = x^2 + y^2$ only

(c) u and v are harmonic functions

(d) $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$ provide they exist

exist

18. The function $\frac{1}{(z-1)^{1/2}}$

(a) is analytic function in the region $|z| < 2$ (b) has a pole at $z=1$

(c) **has a branch point at z = 1**

(d) has an essential singularity at $z = 1$

19. The complex function $f(z) = e^{-1/(z-1)^2}$ has at a point $z=1$

(a) a pole of order 1

(b) **a pole of order 2**

- (c) on isolated essential singularity (d) a non-isolated essential singularity
20. The function $f(z) = \frac{1}{z^2 - 1}$ in the contour C given by $x^2 + y^2 = 4$, has
- (a) no simple pole (b) a simple pole at $z = 1$
 (c) **two simple poles at $z = \pm 1$** (d) two simple poles at $z = \pm i$
21. The residue of the function $f(z) = \frac{z^2}{z^2 + 4}$ at $z = 2i$ is
- (a) $e^{i\pi/2}$ (b) $e^{i\pi}$ (c) $e^{3i\pi/2}$ (d) $e^{-i\pi/2}$
22. A function that is analytic at all points of the z-plane and finite at infinity
- (a) must have a singularity (b) must be zero
 (c) **must be a constant** (d) cannot exist

UNIT V: GROUP THEORY

- If A and B are two elements of a group g under multiplication, then the element of group G must be
 a) A+B b) A-B **c) AB** d) A/B
- If E is an identity element of a group G and A any element in the same group, then
 a) A+E=A b) AE=0 **c) AE=A** d) AE=E
- If all the elements of a group may be expressed by the powers of a single element, the group is called
a) cyclic group b) sub group c) non- Abelian group d) power group
- In a group $G = [E, A, A^2]$, what is the element conjugate to A^2 ?
 a) E b) A **c) A²** d) 1
- The group formed by three cube roots of unity is
 a) non-Abelian b) Abelian but non-cyclic **c) Abelian and cyclic** d) cyclic
- The number of irreducible representations of an abelian group equals to
 a) highest order of elements **b) order of group** c) zero d) lowest order of elements
- The number of elements in the group is
 a) Identity of group **b) Order of a group** c) Inverse of group d) All the above
- A one-one mapping of a finite group is
a) Isomorphism b) Homomorphism c) Automorphism d) All the above

9. The set of all non-singular square matrices of same order with respect to matrix multiplication is

- a) Quasi-group b) Monoid c) **Group** d) Abelian group

10. If $G = \{1, -1, i, -i\}$ is a multiplicative group, then order of G is

- a) One b) Two c) Three d) **four**

11. The order of identity element in group G is

- a) **One** b) Zero c) Order of group d) Less than order of group

12. Two groups $G = (G_1, G_2, \dots, G_n)$ and $H = (H_1, H_2, \dots, H_n)$ are isomorphic if

- (a) $G_1 H_1 = G_2 H_2$ (b) $G_1 / H_1 = G_2 / H_2$ (c) **$G_1 G_2 = H_1 H_2$** (d) $G_1 / G_2 = (H_1 / H_2)^2$

13. Two groups are said to be isomorphic if they have

- (a) **same number of elements and same multiplication table**
(b) same multiplication table but different number of elements
(c) same number of elements but different multiplication table
(d) different number of elements and different multiplication table

14. The factor group of an Abelian group is necessarily

- (a) **an Abelian group** (b) cycle group
(c) non-Abelian group (d) permutation group

15. The group of order 3 is

- (a) **always a cyclic group** (b) never a cyclic group
(c) may or may not be a cyclic group (d) does not contain identity element

16. If A is conjugate to B and C , then

- (a) **B and C are necessarily conjugate with each other**
(b) not conjugate with each other
(c) may or may not be conjugate with each other
(d) conjugate only if B or C is identity element

17. Set of all even numbers from a group under the law of

- (a) ordinary multiplication (b) **ordinary addition**
(c) ordinary addition and ordinary multiplication both
(d) neither ordinary addition nor ordinary multiplication

18. The classes of D_3 group are

(a) (E);(AB) and (CDF)

(b) (EA);(BC) and (DF)

(c) (E);(A,B,C) and (D,F)

(d) (EAB);(CD) and (F)

19. Any matrix which commutes with all matrices of an irreducible representation must be a constant.

Thus statement is called

(a) Legendre Theorem

(b) Cayley Theorem

(c) Lagrange Theorem

(d) Schur's lemma

Section B

UNIT I: VECTOR CALCULUS

1. Find the constant p for which $\mathbf{A} \times \mathbf{B} = \mathbf{C}$ where $\mathbf{A} = \mathbf{i} + 2\mathbf{k}$, $\mathbf{B} = \mathbf{i} + p\mathbf{j} - \mathbf{k}$ and $\mathbf{C} = -2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$.
2. If $\mathbf{A} = x^2y \mathbf{i} - 2xz \mathbf{j} + 2yz \mathbf{k}$, find $\text{curl curl } \mathbf{A}$.
3. A rigid body is rotating with constant angular velocity $\boldsymbol{\omega}$. Show that $\text{curl } \mathbf{v} = 2\boldsymbol{\omega}$, where \mathbf{v} is the linear velocity.
4. Prove that $\nabla r^n = nr^{n-2}\mathbf{r}$.
5. Find the value of a , b and c so that the function of $\mathbf{f} = (x + 2y + az) \mathbf{i} + (bx - 3y - z) \mathbf{j} + (4x + cy + 2z) \mathbf{k}$ is irrotational.
6. Show that $\text{curl grad } \phi = 0$.
7. Define basis.
8. Find the value of a if $\mathbf{A} = a\vec{i} + \vec{j} + \sqrt{5}\vec{k}$ subtends an angle of 60° with $4\vec{i} - 5\vec{j} + \sqrt{5}\vec{k}$.
9. Show that $\text{div} (r^n \vec{r}) = (3+n) r^n$.
10. Differentiate linear dependent from linear independent vector.

UNIT II: LINEAR ALGEBRA

1. If $\mathbf{A} = \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$; $\mathbf{B} = \begin{bmatrix} \cos \beta & -\sin \beta \\ \sin \beta & \cos \beta \end{bmatrix}$ show that $\mathbf{AB} = \mathbf{BA}$.

2. Find the adjoint and inverse of the following matrix: $\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 2 \\ 3 & 1 & 2 \end{bmatrix}$

3. Diagonalise the following matrix: $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$
4. Show that the matrix $\begin{bmatrix} 13 & 16 & 19 \\ 14 & 17 & 20 \\ 15 & 18 & 21 \end{bmatrix}$ is singular.
5. Show that the given matrix $\begin{bmatrix} 1/\sqrt{2} & i/\sqrt{2} \\ -1/\sqrt{2} & -1/\sqrt{2} \end{bmatrix}$ is unitary.
6. Find the adjoint of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 5 & 0 & 4 \\ 2 & 6 & 7 \end{bmatrix}$
7. Find the inverse of the matrix $\begin{bmatrix} 1 & -1 & 3 \\ -1 & 1 & 2 \\ 3 & 2 & -1 \end{bmatrix}$
8. Show that the following matrices are orthogonal
 - i) $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
 - ii) $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
 - iii) $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$

UNIT III: SPECIAL FUNCTIONS I AND PARTIAL DIFFERENTIAL EQUATIONS

1. Show that $P_n(1) = 1$.
2. Write any four Recurrence formulae for $P_n(x)$ in Legendre polynomial.
3. Show that $2J_n'(x) = J_{n-1}(x) - J_{n+1}(x)$.
4. Write the Recurrence formulae for Bessel polynomial.

UNIT IV: COMPLEX ANALYSIS

1. Show that the function $e^x(\cos y + i \sin y)$ is an analytic function, find its derivative.
2. Using Cauchy's Riemann equations show that $f(x) = z^3$ is analytic in the entire z -plane.
3. Show that the function $z|z|$ is not analytic everywhere.
4. Evaluate the $\int_c \frac{1}{z} \cos z dz$ where c is the ellipse $9x^2 + 4y^2 = 1$.
5. Determine the poles and residues at each pole of the function

$$f(z) = \frac{z^2}{(z+2)(z-1)^2}$$

6. Determine the poles and residues at each pole of the function $f(z) = \cot z$

7. Define pole and residue.
8. Define an analytic function of a complex variable.
9. State the necessary and sufficient conditions for a function to be analytic.
10. State Cauchy Riemann conditions for analyticity of a function of complex variable in Cartesian and Polar coordinates.
11. Explain the term singular point of an analytic function.
12. Define a pole of order m.
13. Find the kind of singularities of the following :
 - (a) $\frac{\cos\pi z}{(z-a)^2}$ at $z=0$ and $z=\infty$
 - (b) $\tan(1/2)$ at $z=0$
 - (c) $\operatorname{cosec}(1/2)$ at $z=0$
 - (d) $\sin \frac{1}{1-z}$ at $z=1$

Unit V

1. What do you mean by group? Give an example.
2. What are subgroups?
3. Define Abelian group.
4. What do you mean by Permutation group?
5. Define class.
6. Define homomorphism, isomorphism.
7. State rearrangement theorem.
8. Define factor group.
9. Write any two steps to be followed to construct the character table.
10. Define left coset and right coset.
11. Define invariant subgroup.
12. Define conjugate subgroup.

Section C

UNIT I: VECTOR CALCULUS

1. Calculate the angle between the surfaces $x^2 + y^2 + z^2 = 9$ and $x^2 + y^2 - z = 3$ at the point (2, -1, 2).
2. Prove that $\operatorname{curl}(\varphi A) = \varphi \operatorname{curl} A + \operatorname{grad} \varphi \times A$.

- For the position vector $\mathbf{r} = x \mathbf{i} + y \mathbf{j} + z \mathbf{k}$ show that (i) $\text{div } \mathbf{r} = 3$ (ii) $\text{div } (\mathbf{r}/r^3) = 0$ (iii) $\text{div } (\mathbf{r}^n \mathbf{r}) = (3+n)r^n$.
- State and prove Green's theorem.

UNIT II: LINEAR ALGEBRA

- Calculate the characteristic equation of the following matrix and verify the Cayley

Hamilton theorem.
$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & 1 \end{bmatrix}$$

- Solve the system of equations $4x + 2y + z = -8$; $3x - y + 2z = 4$; $-x - y - z = 2$; by Cramer's method.

- If $A = \frac{1}{9} \begin{bmatrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{bmatrix}$, Show that $A^{-1} = A^T$ being transpose of matrix A.

- If a matrix A satisfies a relation $A^2 + A - I = 0$ Prove that A^{-1} exists and $A^{-1} = I + A$, where I is the identity matrix.

- Calculate the characteristics equations of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ Hence find the eigen values of A.

- Calculate the eigen values and Eigen vectors of

$$A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

UNIT III: SPECIAL FUNCTIONS I AND PARTIAL DIFFERENTIAL EQUATIONS

- To show that $P_n(x)$ is the coefficient of z^n in the expansion of $[1 - 2xz + z^2]^{-1/2}$ in ascending powers of z .
- Construct Rodrigue's formula for Legendre polynomials.
- Show that $J_n(x)$ is the coefficient of z^n in the expansion of $e^{\frac{x(z-1/z)}{2}}$ in ascending and descending powers of z and also $J_{-n}(x)$ or $(-1)^n J_n'(x)$ is the coefficient of z^{-n} in the above expression.
- Prove the following Recurrence formulae for $J_n(x)$

- $xJ_n'(x) = nJ_n(x) - J_{n+1}(x)$

- $xJ_n'(x) = -nJ_n(x) + xJ_{n-1}(x)$

UNIT IV: COMPLEX ANALYSIS

1. Derive the C-R equations in polar form.
2. Construct an analytic function $f(z)$ of the which real part is $e^x \cos y$.
3. Let $f(z) = u(r, \theta) + iv(r, \theta)$ be an analytic function. if $u = -r^3 \sin 3\theta$, then construct the corresponding analytic function $f(z)$ in terms of z .
4. Evaluate the complex integral $\int_c \frac{e^z}{z^2+1} dz$ over the circular path $|z| = 2$.
5. Evaluate the following integral using Cauchy integral formula $\int_c \frac{4-3z}{z(z-1)(z-2)} dz$ where c is the circle $|z| = \frac{3}{2}$.
6. Find the Taylor series expansion of a function of the complex variable $f(z) = \frac{1}{(z-1)(z-3)}$ about the point $z=4$. Find its region of convergence.
7. Evaluate the integral using residue theorem $\int_c \frac{1+z}{z(2+z)} dz$
8. State and prove Cauchy integral formula
9. Define residue at a pole. Derive the formula for residue of a pole of order n and residue at infinity.
10. State and Prove Cauchy Integral Theorem

$$\int f(z) dz = 0$$

11. Discover the analytic function, whose real part is $x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$

12. Construct the analytic function $f(z) = u + iv$ where $u = -r^3 \sin 3\theta$

13. Evaluate the integral

$$\oint \frac{dz}{z^2 + z}$$

14. Evaluate $\int \frac{dz}{z^2 - 1}$, where C is a circle $x^2 + y^2 = 4$.

15. Calculate all Laurent series of function $f(z) = \frac{1}{(1 - z^2)}$ with centre at $z = 1$.

16. Calculate the residue of $f(z) = \frac{e^z}{z^2 + a^2}$ at its singularities.

UNIT V: GROUP THEORY

1. Define a cycle group. Show that the cyclic groups are Abelian.
2. Prove that the group of order two is always cyclic.
3. Prove that the group of order three is always cyclic.
4. Prove that the group of order four may or may not be a cyclic group.
5. Define a group. Show that $(1, i, -1, -i)$ form a cycle group under multiplication.
6. Define isomorphic and homomorphic groups. Differentiate between them and give at least two properties of each.
7. State and explain rearrangement theorem in group theory.
8. Explain in detail the reducible and irreducible representation by giving suitable example.
9. Construct the character table of the dihedral group D_3 .
10. Construct the character table of C_{4v} group.
11. Demonstrate the steps to be followed to construct the character table.

Section D

UNIT I: VECTOR CALCULUS

1. For a position vector $\mathbf{r} = x \mathbf{i} + y \mathbf{j} + z \mathbf{k}$, show that i) $\text{curl } \mathbf{r} = 0$, ii) $\text{curl } \frac{\vec{k}}{r^3}$ iii) $\text{curl} \left(\frac{\mathbf{r}}{r^3} \right)$.
2. State and formulate Gauss divergence theorem.
3. State and formulate Stoke's theorem.
4. Design Schmidt's orthogonalization method in linear vector space.

UNIT II: LINEAR ALGEBRA

1. Evaluate the eigen values and normalized eigen vectors of the following matrix:

$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

2. If $A = \begin{bmatrix} 2 & 5 \\ 4 & 1 \end{bmatrix}$, then (i) Find whether A is singular or not (ii) Find eigen values of A (iii) Find trace of A (iv) Find AA^T (v) Verify Cayley Hamilton theorem.

3. Evaluate the values of a, b and c when $\begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ is orthogonal.

4. Assess by Cramer's rule the system of equations

$$x + 2y + 3z = 10$$

$$2x - 3y + z = 1$$

$$3x + y - 2z = 9$$

5. If $A = \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$, obtain A^2 . Find the scalar a and b such that $I + aA + bA^2 = O$, Where I is the unit matrix and O is the null matrix both of order two.

6. Evaluate the eigen values and normalised eigen vectors of the matrix

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

7. Evaluate the eigen values and normalised eigen vectors of the matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

8. Evaluate the eigen values and normalised eigen vectors of the following matrix

$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

9. Evaluate the characteristic equation of the following matrix and verify the Cayley – Hamilton theorem.

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & 1 \end{bmatrix}$$

10. Evaluate the matrix given by $A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ satisfies its own Eigen equation and hence find A^{-1} .

UNIT III: SPECIAL FUNCTIONS I AND PARTIAL DIFFERENTIAL EQUATIONS

1. Formulate Legendre differential equation and solve it by series integration method.

2. Show that $\int_{-1}^{+1} P_n(x)P_m(x)dx = \frac{2}{2n+1} \delta_{mn}$.
3. Solving Bessel's differential equation by series integration method, derive the expression for Bessel's function of first kind.
4. Formulate three-dimensional Laplace's equation in Cartesian coordinates.
5. Formulate the equation of motion for the vibrating string using D'Alembert's solution.
6. Formulate recurrence formulae of Legendre function.
7. Formulate recurrence formulae of Bessel function.

UNIT IV: COMPLEX ANALYSIS

1. State and prove the Cauchy's Riemann equations for a function of a complex variable to be analytic.
2. Formulate an expression for the Laurent's expansion of a complex function.
3. Apply calculus of residue to prove

$$\int_0^{2\pi} \frac{\cos 2\theta d\theta}{5+4\cos\theta} = \frac{\pi}{6}.$$

4. Construct Taylor series expansion.
5. Construct the Cauchy's integral formula.
6. Using complex variable techniques evaluate the real integral

$$\text{I. } \int_0^{2\pi} \frac{d\theta}{2+\cos\theta}$$

$$\text{II. } \int_0^{2\pi} \frac{\sin^2\theta d\theta}{5-4\cos\theta}$$

7. Construct Cauchy residue Theorem.
8. Apply calculus of residues to show that

$$i) \int_0^{2\pi} \frac{d\theta}{a+b\cos\theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a>b>0 \quad ii) \int_0^{2\pi} \frac{d\theta}{1+\epsilon\cos\theta} = \frac{2\pi}{\sqrt{1-\epsilon^2}}, 0 \leq \epsilon < 1$$

$$iii) \int_0^{2\pi} \frac{d\theta}{25-24\cos\theta} = \frac{2\pi}{7} \quad iv) \int_0^{2\pi} \frac{d\theta}{2+\cos\theta} = \frac{2\pi}{\sqrt{3}}$$

$$v) \int_0^{2\pi} \frac{d\theta}{5+4\cos\theta} = \frac{2\pi}{3}$$

9. Apply calculus of residues to prove that

$$\int_0^{2\pi} \frac{\sin^2 \theta d\theta}{a+b\cos\theta} = \frac{2\pi}{b^2} [a - \sqrt{a^2 - b^2}]; a > b > 0$$

UNIT V: GROUP THEORY

1. Construct the orthogonality theorem of irreducible representation of a group.
2. What is meant by representation of a group? Explain in detail the reducible and irreducible representation by giving suitable example.
3. Construct Schur's Lemma I and II.

Core III - ELECTRONICS AND EXPERIMENTAL METHODS - SUB CODE: 21PPHC13

SECTION-A

UNIT-I SEMICONDUCTOR PHYSICS

1. The resistivity of semiconductor lies within the range
 - a) 10^{-5} to $10^5 \Omega m$
 - b) 10^{-3} to $10^3 \Omega m$
 - c) **10^{-4} to $10^4 \Omega m$**
 - d) 10^{-2} to $10^2 \Omega m$
2. Due to increase in temperature, the resistance of semiconductor
 - a) **decreases**
 - b) increases
 - c) zero
 - d) infinity
3. How many electrons are occupied in the outermost orbit in germanium atom
 - a) 5
 - b) **4**
 - c) 3
 - d) 6
4. Forbidden energy gap in an insulator is about
 - a) **more than 5eV**
 - b) less than 5eV
 - c) zero
 - d) infinity
5. In semiconductor the forbidden energy gap is in the order of
 - a) 2eV
 - b) 0eV
 - c) **1eV**
 - d) 3eV
6. The resistivity of conductors is of the order of
 - a) $10^{-4} \Omega m$
 - b) $10^{-5} \Omega m$
 - c) $10^{-6} \Omega m$
 - d) **$10^{-7} \Omega m$**
7. At which temperature, the Fermi level in intrinsic semiconductor lies nearly midway between valance and conduction band
 - a) 2K
 - b) **0K**
 - c) 5K
 - d) 1K
8. Example of trivalent impurity is

- a) **gallium** b) germanium c) arsenic d) phosphorous
9. The potential barrier for a silicon PN junction is about
a) 0.3eV b) 1.1eV c) **0.7eV** d) 1.3eV
10. The negative resistance of the diode is due to tunneling effect is called
a) varactor diode b) photodiode c) gun diode d) **Esaki diode**
11. A photodiode works under which biasing condition
a) reverse b) forward c) zero d) backward
12. The heart of a liquid crystal display is
a) glass plate b) **an organic fluid** c) horizontal polarizer d) vertical polarizer
13. The example of infrared radiation material is
a) GaAsP b) GaP c) **GaAs** d) Ga
14. An activated element does not reflect the incident light and so it appears
a) bright b) slightly bright c) slightly dark d) **dark**
15. The most common LED array is
a) **seven segment display** c) liquid crystal display
b) fluorescent display d) electroluminescent display
16. A device which converts incoming light signal into electrical signal is
a) photo detector b) gunn diode c) tunnel diode d) zener diode
17. Under normal reverse bias the current in a P-N junction diode is given by
a) $I = I_0 (e^{-v/\eta kT} - 1)$ b) $I = B (e^{-v/\eta kT} - 1)$
c) $I = I_s (e^{-v/\eta kT} - 1)$ d) $I = \mu (e^{-v/\eta kT} - 1)$

UNIT-II OP-AMP APPLICATIONS

1. The operational amplifier is a
a) indirect coupled low gain amplifier b) indirect coupled high gain amplifier
c) direct coupled low gain amplifier d) **direct coupled high gain amplifier**
2. The bandwidth of ideal op amp is
a) **infinity** b) one c) two d) zero
3. In an integrator using op-amp, the feedback element is
a) voltage divider b) **capacitor** c) transistor d) resistor
4. In a differentiator using op-amp, the feedback element is

- a) voltage divider b) capacitor c) transistor d) **resistor**
5. With zero volt on both input, an op-amp ideally should produce an output equal to
 a) positive supply voltage c) negative supply voltage
 b) **zero** d) the CMRR
6. When the input of an op-amp comparator is a sine wave, the output is
 a) sine wave b) triangular wave c) **square wave** d) saw tooth wave
7. A phase meter can measure angles from
 a) **0 to 360°** b) 0 to 270° c) 0 to 90° d) 0 to 180°
8. A monostable multivibrator has one stable state and-----
 a) two quasi stable state c) **one quasi stable state**
 b) half quasi stable state d) zero quasi stable state
9. The Schmitt trigger is a
 a) zero voltage b) negative voltage c) voltage follower d) **voltage comparator**
10. The regenerative comparator is also referred to as
 a) square wave b) saw tooth wave c) **Schmitt trigger** d) triangular wave
11. The input to an op-amp comparator is a sine wave, the output is a -----
 a) **square wave** b) saw tooth wave c) triangular wave d) sine wave
12. The value of g_{md} is proportional to -----.
 a) **I_o** b) V_o c) V_{b1} d) R_e
13. In comparators, the total input swing between the two extreme output voltages is-----
 a) 300 mv b) 500 mv c) **200 mv** d) 100 mv
14. The amplitude of the square wave depends upon the -----.
 a) trigger amplitude b) offset voltage
 c) time period d) **Power supply voltage**

UNIT-III COUNTERS AND REGISTERS

1. _____ is used to count the number of clock cycles .
 a) **counters** b) register c) flip flop d) decoding gates
2. How many flip flops are there in a mod-128 counter?

- a) eight b) **seven** c) six d) five
3. If the countdown line is low and the count up control line is high, the counter will have
- a) count down waveform c) **count up waveform**
b) binary up down counter d) up down counter
4. An increase in speed of operation can be achieved by use of
- a) serial counter b) decade counter
c) asynchronous counter d) **parallel counter**
5. Every flip flop is triggered by the clock is
- a) **synchronous counter** b) asynchronous counter
c) serial counter d) decade counter
6. How many flip flops are required to construct a mod 12 counter?
- a) three b) **four** c) two d) five
7. The maximum number of output combination generated by a counter is known as
- a) maximum count b) division factor c) AND logic d) **modulus**
8. A group of flip flop that can be used to store a binary number is
- a) Counter b) decoding gates c) **register** d) encoding matrix
9. The register is used to store data is sometimes called as
- a) **data latch** b) serial register c) parallel register d) shift register
10. The information in a 4 bit shift register is 0011. What would be the information when one shift left is given?
- a) 0111 b) **0110** c) 1100 d) 0001
11. Flip flop is used to store _____ bit of information.
- a) **1** b) 2 c) 4 d) 8
12. If each flip flop is triggered by the previous flip flop, then the counter is called _____
- a) synchronous counter b) **asynchronous counter**
c) parallel counter d) decade counter
13. A three flip flop counter can be referred as _____ counter.
- a) mod-4 b) **mod-8** c) mod-10 d) mod 10
14. Pin number of 8 bit-SISO shift register is _____ .

- a) **54/74LS91** b) 54/74164 c) 54/74165 d) 54/74198
15. Pin number of 8 bit-SIPO shift register is _____ .
- a) 54/74LS91 b) **54/74164** c) 54/74165 d) 54/74198
16. Pin number of 8 bit-PISO shift register is _____ .
- a) 54/74LS91 b) 54/74164 c) **54/74165** d) 54/74198
17. Pin number of 8 bit-PIPO shift register is _____ .
- a) 54/74LS91 b) 54/74164 c) 54/74165 d) **54/74198**
18. _____ type of register is also named as data latch.
- a) SISO b) SIPO c) PISO d) **PIPO**

UNIT-IV D/A and A/D CONVERSION

- An A/D converter is referred to as an
 - encoding device**
 - decoding device
 - demultiplexer
 - multiplexer
- LSB has a weight of
 - $1/(2^n+1)$
 - $1/(2^n-1)$**
 - $1/2^n$
 - 2^n
- The second MSB provides an output voltage of
 - V/2
 - V/8
 - V/4**
 - V/6
- The process in which output voltage increases regularly as the input digital signal increases is known as
 - steady state accuracy
 - channel selection
 - multiplex
 - monotonicity**
- LSB of a 10-bit converter has a weight of
 - 1/1024**
 - 1/64
 - 1/1000
 - 1/16
- The simultaneous method is also known as
 - flash type D/A converter
 - flash type A/D converter**
 - D/A converter
 - A/D converter
- If comparator C_1 is high and C_2 and C_3 are low, the input must be between
 - $+v/4$ and $+v/2V$**
 - $+3v/4$ and $+v/2V$
 - $+3v/4$ and $+v/4V$
 - $+v/4$ and $+3v/4V$
- Using 1MHZ clock, the counter advances 1 count for every
 - nanosecond
 - second
 - microsecond**
 - picosecond

1. Define ripple counter.
2. List out the differences between synchronous and asynchronous counter.
3. Enumerate decoding gates.
4. Define what is up down counter.
5. Describe about decade counter.
6. Identify shift register.
7. Identify the different types of shift register.
8. List out the applications of shift registers.
9. Draw the pin out configuration of SISO shift registers.
10. Draw the pin out configuration of SIPO shift registers.
11. Why does the 7495 have two separate clock inputs?

UNIT-IV D/A and A/D CONVERSION

1. Define about D/A conversion.
2. Discuss about accuracy and resolution of A/D converter.
3. Explain A/D conversion.
4. Define A/D tracking type conversion.
5. Define A/D flash type conversion.
6. Define binary ladder.
7. State Millman's theorem.
8. Define monotonicity.
9. Enumerate steady state accuracy test.
10. Indicate differential linearity.

UNIT-V TRANSDUCER

1. Define transducers.
2. What is an electric transducer?
3. What are the advantages of an electrical transducer?
4. List out the classification of transducers.
5. Write any three uses of capacitive transducer.
6. Write the differences between transducer and inverse transducer.
7. Define piezoelectric effect.

8. Define piezoelectric resistive effect.
9. Define strain gauge? Mention its types.
10. Define what is meant by accelerometer.
11. Define gauge factor.
12. Explain about POT.
13. Write down the uses of piezoelectric materials.

SECTION-C

UNIT-I SEMICONDUCTOR PHYSICS

1. What are the cases that described in energy band theory?
2. Discuss the locations of Fermi level under suitable limiting conditions and give the necessary theory.
3. Write short notes on photodiode.
4. Explain its working principle of photoconductor.

UNIT-II OP-AMP APPLICATIONS

1. Describe the functioning of an inverting and non-inverting op amp. Derive an expression for its voltage gain.
2. Explain transfer characteristics in Differential amplifier.
3. Write short notes on comparator.
4. Explain regenerative comparator.
5. Consider the inverting amplifier, R_i is equal to infinity, $R_o = 10\Omega$ and $A_v = 10^5$. It is desired to design an amplifier whose nominal closed loop gain given by $-Z'/Z$, is -10. Determine the minimum values of Z' that can be used, if the gain is not to deviate by more than 1% of its nominal value.
6. Consider the differential amplifier $V_{cc} = V_{EE} = 5V$, $R_c = 1K\Omega$ and $R_s = 0$ for the transistors, assume $h_{fe} = 100$, $h_{oe} = 0$ and to determine h_{ie} . Find the differential gain A_d for dc common mode voltages equal to -2,0 and 2V.

UNIT-III COUNTERS AND REGISTERS

1. Explain the working of asynchronous counter.
2. Illustrate on decade counter.
3. Construct Counter modulus with neat diagram.

4. Write short notes on mod-5 counter.
5. Describe the universal shift register.

UNIT-IV D/A and A/D CONVERSION

1. What is binary equivalent weight of each bit in a 6-bit resistive divider?
2. Illustrate resistive divider and ladder type resistive network.
3. Explain accuracy and resolution of A/D and D/A converter.
4. What are the output voltages caused by each bit in a 5-bit ladder if the input levels are $0=0V$ and $1=+10V$?
5. Write about the tracking type A/D converter.

UNIT-V TRANSDUCER

1. What are the advantages and disadvantages of capacitive transducer?
2. Explain the summary of the factors influencing the choice of a transducer for measurement of a physical quantity.
3. Discuss about the transducers using change in area of plates.
4. Explain briefly the principle of change in dielectric constant for measurement of displacement.
5. Discuss about the transducers using change in distance between plates.

SECTION-D

UNIT-I SEMICONDUCTOR PHYSICS

1. Explain the working of PN junction diode? Discuss forward and reverse biasing of PN junction diode.
2. Explain the occurrence of negative differential resistance in the characteristics of tunnel diode. Mention its advantages and disadvantages of tunnel diode.
3. Describe the structure of LCD? Explain its working and give some of its uses.
4. What is Hall coefficient? Describe an experimental set up for the measurement of Hall voltage. Write some of the uses of Hall Effect?

UNIT-II OP-AMP APPLICATIONS

1. Explain the circuit of emitter coupled differential amplifier of the emitter resistance R_e is large.

2. Explain the different types of wave generator.
3. Illustrate regenerate comparators

UNIT-III COUNTERS AND REGISTERS

1. Explain the construction of synchronous counter.
2. Classify the different types of shift register with neat diagram.
3. Show the counter can count up to 1100.

UNIT-IV D/A and A/D CONVERSION

1. Explain simultaneous conversion of A/D converter.
2. How can construct high resolution A/D converter using comparator and discuss it.
3. Describe how many methods for digitalizing analog signals to reduce conversion time.
4. Explain single ramp and dual slope A/D converter. What advantages does the dual slope A/D converter offer over the single ramp A/D converter?

UNIT-V TRANSDUCER

1. Explain the types of transducer.
2. Illustrate the input, transfer and output characteristics of transducer.
3. Explain piezoelectric crystal and their modes of operation.
4. Give in detail about i) the theory of strain gauge ii) the types of strain gauge.

ELECTIVE I – CRYSTAL GROWTH AND THIN FILMS - 21PPHE11

Section A

UNIT I: INTRODUCTION

1. The spontaneous formation of crystalline nuclei in the interior of the parent phase is called
 - a) nucleation
 - b) seed
 - c) **homogeneous nucleation**
 - d) heterogeneous nucleation
2. The important phenomenon in crystal growth is
 - a) **nucleation**
 - b) super cooling
 - c) supersaturation
 - d) growth

3. When the pressure of a vapour P is less than, equal to or greater than the vapour pressure of the liquid phase at the same temperature is known as
 - a) atmospheric pressure
 - b) equilibrium pressure**
 - c) hypo pressure
 - d) hyper pressure
4. Supersaturated state is
 - a) stable
 - b) unstable**
 - c) neutral
 - d) semi stable
5. $KT \ln \frac{P_1}{P_2} = \frac{2\sigma V_H}{r}$ is
 - a) Gibbs Thomson equation**
 - b) Modified Thomson equation
 - c) Gibbs Thomson equation for solution
 - d) all
6. $\sum_i^n a_i \gamma_i =$
 - a) maximum
 - b) minimum**
 - c) infinity
 - d) zero
7. The number of critical nuclei formed per unit time per unit volume is known as
 - a) rate of growth
 - b) rate of nuclei
 - c) rate of nucleation**
 - d) rate of seed
8. The surface energy theory proposed by-----
 - a) Curie
 - b) Gibbs
 - c) Gibbs & Curie**
 - d) Noyes
9. Noyes, Whitney and Nerst proposed
 - a) Surface energy theory
 - b) diffusion theory**
 - c) adsorption theory
 - d) absorption theory.
10. Adsorption layer theory was introduced by
 - a) Volmer**
 - b) Curie
 - c) Gibbs
 - d) Noyes
11. The energy required to remove an atom from the perfectly flat surface and to place it on a site in the next layer is-----
 - a) $3W_B$
 - b) $4W_B$
 - c) W_B
 - d) $2W_B$**

UNIT II: GROWTH TECHNIQUES

1. A component which is present in a smaller quantity and that one which get dissolved in the solution is
 - a) homogeneous nucleation
 - b) heterogeneous nucleation
 - c) solute**
 - d) solvent
2. Which is not a water purification method
 - a) filtration
 - b) reverse osmosis
 - c) deionization
 - d) evaporation**
3. The stored water after reverse osmosis absorbs ----- from atmosphere.

- a) CO₂ b) N₂ c) O₂ d) H₂
4. It is difficult to grow rate of the crystal when the solubility is too
a) low **b) high** c) medium d) moderate
5. Nucleation will occur spontaneously in the----- zone.
a) metastable b) stable c) labile **d) stable & labile**
6. ----- Motor is preferred to impart rotation to the seed holder.
a) wiper **b) stepper** c) recorder d) all
7. ----- enables the complete dissolution of all the minute particle of the solute if at all present in the solution.
a) **seasoning at high temperature** b) low temperature
c) mounting at high temperature d) moderate temperature
8. Solvent is otherwise called as
a) solute b) solution **c) flux** d) mud
9. Biological macromolecules have been grown by ----- methods.
a) gel b) layer c) overlap d) hydrothermal
10. ----- method is suitable for materials which are highly soluble in water.
a) single diffusion b) complex – decomplexion
c) solubility reduction d) double diffusion

UNIT III: CHARACTERIZATION TECHNIQUE

1. In TEM the electrons are accelerated to _____
a) 10KeV b) 100KeV c) 1KeV **d) 100KeV and higher**
2. TEM offers high magnification ranging from -----
a) **50** b) 20 c) 500 d) 5
3. _____ scattering gives rise to diffraction pattern without any energy loss.
a) Inelastic **b) elastic** c) resonance d) Raman
4. The theoretical instrumental point to point resolution is proportional to -----.
a) $\lambda^{3/4}$ b) $\lambda^{3/2}$ c) $\lambda^{3/5}$ d) $\lambda^{3/7}$
5. _____ formation is responsible for the first exothermic peak.
a) Thin film **b) crystal** c) Nano d) semiconductors

9. _____ method is generally adopted when a material has a tendency to decompose
 a) **Flash evaporation** b) co evaporation c) sputtering d) spray
10. _____ sputtering can be done at pressure lower than that of the ordinary glow discharge.
 a) Low pressure b) reactive c) **R.F** d) high pressure
11. The process of removing the filament or strip in thermal evaporation is called _____
 a) evaporation b) **flash cleaning** c) sputtering d) spray

UNIT V: TECHNOLOGICAL APPLICATION OF THIN FILM

1. The unit of sheet resistance is expressed as
 a) **ohm/square** b) ohm c) square/ ohm d) mho
2. The resistance of an one square film is known as
 a) resistance b) conductance c) **Sheet resistance** d) sheet conductance
3. The resistors can broadly grouped as
 a) general purpose b) high stability c) high precision **d) all the above**
4. ----- films are used in entertainment equipments.
 a) metal b) cermet c) **Carbond** d) oxide
5. The mixture of ceramic materials and metals are called ----- films
 a) **Cermet** b) metal c) **Carbond** d) oxide
6. Cermet films are prepared by
 a) flashevapouration b) electron beam techniques
 c) rotating substrate by suitable temperature **d) all the above**
7. Which is the semi-noble metal?
 a) **Ni** b) Cr c) Ti d) C
8. The most commonly used cermet film for resistors is
 a) Cr+MgO b) **Cr+SiO** c) Cr+TiO d) Cr+ ZrO
9. The value of TCR is negative and called as -----
 a) PTC b) TCP c) **NTC** d) TCN
10. PTC are called as
 a) thermistors b) **Posistors** c) resistors d) inductors
11. Invaristors,

- a) $I \propto V$ b) $I \propto \frac{1}{V^n}$ c) $I \propto V^n$ d) $I \propto -V$

12. Gauge factor is given by the relation

- a) $\frac{\delta R/R}{\delta L/L}$ b) $\frac{\delta L/R}{\delta R/L}$ c) $\frac{\delta R/L}{\delta L/R}$ d) $\frac{\delta L/L}{\delta R/R}$

13. The loss factor is represented by

- a) $\sin \delta$ b) $\tan \delta$ c) $\cos \delta$ d) $\sec \delta$

14. Choose the organic material used as film material

- a) Toluene b) benzene c) metals d) **Polystyrene**

Section B

UNIT I: INTRODUCTION

1. List the significance of single crystals.
2. Name some basic growth methods.
3. What are the three basic steps for crystal growth?
4. Define seed or nuclei.
5. Indicate the four different stages in kinetics of phase change.
6. Describe what is called homogeneous nucleation.
7. Enumerate on heterogeneous nucleation.
8. Discuss on energy formation of a nucleus.
9. Examine what a substrate is.
10. Name some crystal growth theories.
11. Differentiate homogeneous nucleation and heterogeneous nucleation.

UNIT II: GROWTH TECHNIQUES

1. List the disadvantages of low temperature solution growth.
2. Identify the characteristics of a good solvent.
3. Recognize the method of crystallization in low temperature solution growth.
4. Examine the equipments required for the growth of crystal.
5. Indicate the criteria for the selection of crystallizer.
6. List the disadvantages of high temperature solution growth.
7. Quote advantages of crystallization at low temperature.

8. State the principle of gel growth.
9. Name the various types of gel.
10. Name the various water purification methods.
11. Define what is capping.
12. Explain the advantages of the temperature gradient method.

UNIT III: CHARACTERIZATION TECHNIQUE

1. Define TEM.
3. Define SEM.
4. Indicate what AFM is.
5. Classify the hardness test.
6. Define microhardness.
7. Define a thermogram.
8. Describe SDTA in thermogravimetric analysis.

UNIT IV: THIN FILM

1. Describe what is flash evaporation.
2. Enumerate the types of electron beam gun.
3. List the types of sputtering?
4. Define R.F sputtering.
5. Interpret what is flash cleaning.
6. Explain what are thin films.
7. Summarize what is Philips process.
8. Describe ellipsometry .
9. Define physical sputtering.
10. Discuss about reactive sputtering.
11. Define high pressure sputtering.
12. Define Gunter method.

UNIT V: TECHNOLOGICAL APPLICATION OF THIN FILM

1. Identify the primary criteria of the usefulness of a good film resistor.
2. Define thermistor.
3. Explain posistors.

4. Differentiate NTC and PTC.
5. Summarize on varistors.
6. Define gauge factor.
7. State what is pinch off effect.
8. Extend a note on thin film integrated circuits.
9. Examine what are semiconductor integrated circuits.

Section C

UNIT I: INTRODUCTION

1. Attain Gibbs Thomson equation for vapour.
2. Derive the Thomson equation for melt.
3. Obtain the Gibbs -Thomson equation for solution.
4. Explain spherical nucleus in detail with a neat diagram.
5. Describe cylindrical nucleus with a neat diagram.

UNIT II: GROWTH TECHNIQUES

1. Derive the expression of super saturation.
2. Explain the constant temperature bath with diagram.
3. Explore the filtration theory in detail.
4. Write about seed preparation, mounting and seasoning.
5. Examine the principle of flux growth.
6. Explain the structure of gel with a suitable example.
7. Write about the importance of gel technique.
8. Generalize how crystals play a major role in biology.

UNIT III: CHARACTERIZATION TECHNIQUE

1. Determine the cell parameters.
2. Discuss the diffraction analysis in detail.
3. Explain the interpretation of diffraction pattern.
4. Explain Vickers hardness test.
5. Discuss in detail Knoop hardness test.
6. Enumerate the instrumentation of SEM.

7. Discuss in detail the Microhardness test.
8. Demonstrate Differential Thermal Analysis in detail by sketching a neat diagram.

UNIT IV: THIN FILM

1. Explain the thermal evaporation method in detail.
2. Discuss the flash evaporation method with a neat diagram.
3. Describe about electron gun beam method.
4. What is cathodic sputtering? Explain.
5. Explore the principle behind R.F sputtering in detail.
6. How do you measure the thickness of surface layers using Ellipsometry?
7. Explain FECO method in detail with a neat diagram.
8. How does a multiple beam interferometer work?

UNIT V: TECHNOLOGICAL APPLICATION OF THIN FILM

1. Discuss about oxide and nitride films.
2. Discuss about metal films.
3. Discuss about strain gauge element.
4. Discuss about the film capacitor.
5. How thin films are used in micro-electronics and integrated circuits?
6. Discuss about Antireflection coating and high reflection coating.

Section D

UNIT I: INTRODUCTION

1. Write any two classical theory of nucleation in detail with a neat diagram.
2. Specify the significance of single crystals in detail.
3. Elaborate the theories of nucleation in detail.
4. Analyze KSV theory in detail with suitable example.
5. Analyze BCF theory in detail with suitable examples including neat diagrams.

UNIT II: GROWTH TECHNIQUES

1. Explain in detail about the method of crystallization.
2. Write the experimental procedure in gel growth.
3. Discuss the structure and list the types of Gel in detail.

4. Generalize the importance of Gel Technique.
5. Write about Low Temperature Solution growth in detail with a neat diagram.
6. Explain High Temperature Solution Growth in detail.

UNIT III: CHARACTERIZATION TECHNIQUE

1. Explain in detail the instrumental details and elemental analysis of TEM with a neat diagram.
2. Explain micro hardness and categorize the types in detail.
3. Explain in detail the instrumental details and elemental analysis of SEM.
4. Write the principle and working of X-Ray Diffraction with a neat diagram.
5. Explain Thermo gravimetric analysis in detail .
6. Explain the types of Differential Scanning Calorimetry with a neat diagram.

UNIT IV: THIN FILM

1. How do you measure the thickness of surface layers using Ellipsometry and Interferometry Methods?
2. Summarize Glow discharge sputtering method in detail.
3. Enumerate the preparation of thin films by electron gun beam method with a suitable diagram.
4. Develop a thin film using Cathodic Sputtering method.
5. Classify the types of Cathodic Sputtering in detail.

UNIT V: TECHNOLOGICAL APPLICATION OF THIN FILM

1. Discuss the applications of thin films dielectrics in detail.
2. Write the applications of optical films in detail.
3. Give a brief account on active devices.
4. Classify the applications of thin films in micro-electronics and integrated circuits.
5. Categorize some technological applications of thin films.

CORE I - MATHEMATICAL PHYSICS II - SUB.CODE:21PPHC21

Section A

UNIT I LINEAR DIFFERENTIAL EQUATIONS OF FIRST AND SECOND ORDER

- A differential equation involving derivatives with respect to a single independent variable is called
 - linear differential equation
 - non-linear differential equation
 - ordinary differential equation**
 - partial differential equation
- A differential equation involving partial derivatives with respect to more than one independent variable is called
 - linear differential equation
 - non-linear differential equation
 - ordinary differential equation
 - d) partial differential equation**
- The _____ of the differential equation is the order of the highest derivative which appears in it.
 - Order**
 - degree
 - ordinary differential equation
 - partial differential equation
- The _____ of a differential equation is the power of the highest derivative which appears in it.
 - Order
 - degree**
 - ordinary differential equation
 - partial differential equation
- Give an example of linear differential equation of second order and first degree
 - $\frac{d^2y}{dx^2} + a^2y = 0$
 - $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2} = \frac{d^2y}{dx^2}$
 - $x^3 \left(\frac{d^2y}{dx^2}\right)^3 + y \left(\frac{dy}{dx}\right)^4 + y^4 = 0$
 - $x+y=0$
- Give an example of non linear differential equation of second order and second degree
 - $\frac{d^2y}{dx^2} + a^2y = 0$
 - $\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2} = \frac{d^2y}{dx^2}$
 - $x^3 \left(\frac{d^2y}{dx^2}\right)^3 + y \left(\frac{dy}{dx}\right)^4 + y^4 = 0$
 - $x+y=0$
- If the degree of the dependent variable and all derivatives is one , such differential equations are called
 - linear differential equation**
 - non-linear differential equation
 - ordinary differential equation
 - partial differential equation
- If the degree of the dependent variable and/or its derivatives are of greater than one, such differential equations are called
 - linear differential equation
 - non-linear differential equation**
 - ordinary differential equation
 - partial differential equation
- If the roots are real and distinct, then the complementary function is
 - $C_1e^{m_1x} + C_2e^{m_2x}$
 - $(C_1 + C_2x)e^{mx}$
 - $e^{\alpha x}(C_1\cos\beta x + C_2\sin\beta x)$
 - $e^{\alpha x}(C_1\cos\beta x + C_2\sin\beta x)$
- If the roots are real and equal, then the complementary function is
 - $C_1e^{m_1x} + C_2e^{m_2x}$
 - $(C_1 + C_2x)e^{mx}$
 - $e^{\alpha x}(C_1\cos\beta x + C_2\sin\beta x)$
 - $e^{\alpha x}(C_1\cos\beta x + C_2\sin\beta x)$
- If the roots are complex, then the complementary function is

- a) $C_1 e^{m_1 x} + C_2 e^{m_2 x}$ b) $(C_1 + C_2 x) e^{mx}$
 c) $e^{\alpha x} (C_1 \cos \beta x + C_2 \sin \beta x)$ d) $e^{\alpha x} (C_1 \cos \beta x + C_2 \sin \beta x)$

UNIT II TENSORS

- If \vec{A}^i and \vec{B}_j are the components of contravariant tensor of rank one, then $\vec{A}^i \vec{B}_j$ are components of
 - Contravariant tensor of rank 0
 - Covariant tensor of rank 0
 - Mixed tensor of rank 2**
 - Mixed tensor of rank 0
- If $\vec{T}_k^{ij} = \sum_{lmn} T_n^{lm} \frac{\partial \vec{x}_i}{\partial x_l} \frac{\partial \vec{x}_j}{\partial x_m} \frac{\partial \vec{x}_k}{\partial x_n}$ then it is a
 - Third order contravariant tensor
 - Third order mixed tensor with one covariant and two contravariant indices**
 - Third order mixed tensor with two covariant and one contravariant indices
 - Third order covariant tensor
- The value of δ_{21}^{12} will be
 - 1
 - 0
 - 1**
 - 2
- S_{ij} and A_{ij} represent a symmetric and an antisymmetric real-valued tensor respectively in three dimensions. The number of independent components of S_{ij} and A_{ij} are
 - 3 and 6 respectively
 - 6 and 3 respectively**
 - 6 and 6 respectively
 - 9 and 6 respectively
- $A_{lm}^{ijk} B_i^m$ is a tensor of rank
 - 7
 - 3**
 - 5
 - 6
- The k^{th} Fourier component of $f(x) = \delta(x)$ is
 - 1
 - 0
 - $(2\pi)^{-1/2}$**
 - $(2\pi)^{-3/2}$
- $T_{ij} = \sum_{kl} T_{kl} \frac{\partial x_k}{\partial \vec{x}_i} \frac{\partial x_l}{\partial \vec{x}_j}$; T is a
 - Contravariant tensor
 - Covariant tensor**
 - Mixed tensor
 - Mixed tensor of rank 0
- What is the number of independent components of antisymmetric tensor of rank r in n-dimensional space?
 - $n^2 P_r$
 - $n^2 C_r$
 - $(n+1)P_r$**
 - $(n+1)C_r$
- If S_{ij} is a symmetric tensor and A_{ij} is anti-symmetric tensor, what is the product $A_{ij} S_{ij}$?
 - A tensor of mixed symmetry
 - A antisymmetric tensor
 - A symmetric tensor
 - Zero**
- Moment of inertia is a
 - Scalar
 - vector
 - a tensor of rank 2**
 - a tensor of higher rank.
- Kronecker delta δ_v^μ is
 - Scalar
 - vector
 - a tensor of rank 1
 - a tensor of rank 2.**

(a) equal only

(b) equal and unequal

(c) unequal only

(d) intermediate only

5. Newton-Raphson formula of successive approximation to find the approximate value of a root of the equation $f(x) = 0$ is

(a) $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

(b) $x_{n+1} = x_n + \frac{f'(x_n)}{f(x_n)}$

(c) $x_{n+1} = x_n - \frac{f'(x_n)}{(x_n)}$

(d) $x_{n+1} = x_n - \frac{f''(x_n)}{f'(x_n)}$

6. Simpson's 3/8th rule is

(a) $\int_{x_0}^{x_0+nh} y(x) dx = \frac{3h}{8} [(y_0+y_n) + 2(y_2+y_4+\dots) + 4(y_3+y_6+\dots)]$

(b) $\int_{x_0}^{x_0+nh} y(x) dx = \frac{3h}{8} [(y_0+y_n) + 4(y_2+y_4+\dots) + 4(y_3+y_6+\dots)]$

(c) $\int_{x_0}^{x_0+nh} y(x) dx = \frac{3h}{8} [(y_0+y_n) + 3(y_1+y_2+y_4+\dots) + 2(y_3+y_6+\dots)]$

(d) $\int_{x_0}^{x_0+nh} y(x) dx = \frac{3h}{8} [(y_0+y_n) + 3(y_3+y_6+\dots) + 2(y_1+y_2+y_4+\dots)]$

7. When the values of the function are given inside the range at equidistant intervals then it is called as

(a) interpolation with equal intervals

(b) interpolation with unequal intervals

(c) extrapolation with equal intervals (d) extrapolation with unequal intervals

8. Newton's -Raphson method is also referred to as the

(a) method of iterations

(b) method of tangents

(c) method of chords

(d) method of approximation

UNIT V FOURIER AND LAPLACE'S INTEGRALS TRANSFORMS

1. Which of the following represents Fourier transform?

(a) $g(\alpha) = \int_0^\infty f(t)e^{-i\omega t} dt$

(b) $g(\alpha) = \int_0^\infty f(t)e^{-\omega t} dt$

(c) $g(\alpha) = \int_0^\infty f(t)tJ_n(\alpha t) dt$

(d) $g(\alpha) = \int_0^\infty f(t)t^{\alpha-1} dt$

2. The Fourier sine transform of function $f(x) = e^{-\alpha x}$ is

(a) $\frac{s}{a^2+s^2}$

(b) $\frac{a}{a^2+s^2}$

(c) $\frac{s \sin ax}{\sqrt{(a^2+s^2)}}$

(d) $\frac{a \sin ax}{\sqrt{(a^2+s^2)}}$

3. The Fourier cosine transform of function $f(x) = e^{-\alpha x}$ is

(a) $\frac{s}{a^2+s^2}$

(b) $\frac{a}{a^2+s^2}$

(c) $\frac{s \cos ax}{\sqrt{(a^2+s^2)}}$

(d) $\frac{a \cos ax}{\sqrt{(a^2+s^2)}}$

4. Fourier transform of function $f(t) = e^{-t+1}$ is

(a) zero

(b) $\frac{2}{1+s}$

(c) $\frac{2}{1+s^2}$

(d) none of these

5. Laplace transform of $\frac{1}{s(s^2+1)}$ is

(a) (1-cos t)

(b) (1+ cos t)

(c) (1-sin t)

(d)

(1+sin t)

6. Laplace transform of t^n is
 (a) $n!/s^n$ (b) $n!/s^{n-1}$ (c) $n!/s^{n+1}$ (d) $(n+1)!/s^{n+1}$
7. Laplace transform of $t^{-1/2}$ is
 (a) $\sqrt{\pi}/s$ (b) $\sqrt{\pi}/\sqrt{s}$ (c) $s/\sqrt{\pi}$ (d) $1/\sqrt{\pi}s$
8. Laplace transform of $J_0(t)$ is
 (a) $\frac{1}{s}$ (b) $\frac{1}{\sqrt{(s^2+1)}}$ (c) $\frac{1}{s^2+1}$ (d) $\frac{1}{\sqrt{(s^2-1)}}$
9. Laplace transform of $\frac{\sin at}{t}$ is
 (a) $\tan^{-1}(\frac{s}{a})$ (b) $\cot^{-1}(\frac{s}{a})$ (c) $\sec^{-1}(\frac{a}{s})$ (d) does not exist
10. Laplace transform of $\frac{\cos at}{t}$ is
 (a) $\tan^{-1}(\frac{s}{a})$ (b) $\cot^{-1}(\frac{s}{a})$ (c) $\sec^{-1}(\frac{a}{s})$ (d) **does not exist**
11. Laplace transform of $t^2 + t$ is
 (a) $\frac{1}{s} + \frac{1}{s^2}$ (b) $\frac{1}{s^3} + \frac{1}{s^2}$ (c) $\frac{1}{s^2} + \frac{2}{s^3}$ (d) $\frac{2}{s^2} + \frac{3}{s^3}$
12. Inverse Laplace Transform of $\frac{1}{s^2+a^2}$ is
 (a) $\sin at$ (b) $\sinh at$ (c) $\cos at$ (d) $\cosh at$
13. Laplace transform of $t^n e^{at}$ is
 (a) $\frac{1}{(s+a)^n}$ (b) $\frac{1}{(s+a)^{n+1}}$ (c) $\frac{n!}{(s+a)^n}$ (d) $\frac{n!}{(s+a)^{n+1}}$
14. Laplace transform of $e^{at} \cos \omega t$ is
 (a) $\frac{s-a}{(s+a)^2 + \omega^2}$ (b) $\frac{s+a}{(s+a)^2 + \omega^2}$ (c) $\frac{s}{(s-a)^2 + \omega^2}$ (d) $\frac{s-a}{(s-a)^2 + \omega^2}$
15. Laplace transform of $\sin at$ is
 (a) $\frac{a}{s^2+a^2}$ (b) $\frac{s}{s^2+a^2}$ (c) $\frac{s}{s^2-a^2}$ (d) $\frac{s}{s^2-a^2}$
16. Laplace transform of $\cos at$ is
 (a) $\frac{a}{s^2+a^2}$ (b) $\frac{s}{s^2+a^2}$ (c) $\frac{a}{s^2-a^2}$ (d) $\frac{s}{s^2-a^2}$
17. Laplace transform of function $F(t)=1$ is
 (a) **1/s , for all values of s** (b) 1/s for $s > 0$
 (c) 1/s for $s < 0$ (d) $1/s^2$ for $s > 0$
18. Laplace Transform of e^{at} is
 (a) $\frac{1}{s-a}$ (b) $\frac{1}{s+a}$ (c) $\frac{2}{s+a}$ (d) $\frac{2}{(s+a)^2}$
19. Laplace Transform of $t^2 e^{-at}$ is
 (a) $\frac{2}{s+a}$ (b) $\frac{2}{(s+a)^2}$ (c) $\frac{2}{(s+a)^3}$ (d) none of these
20. The Laplace transform of function $F(t)=t(t > 0)$ is
 (a) $\frac{1}{s}$ (b) $\frac{1}{s^2}$ (c) s^2 (d) $\frac{1}{1+s^2}$
21. The Laplace transform of the function $f(t) = e^{-at} \sin 3t$ is

(a) $\frac{3}{s^2+9}$ (b) $(s-a)^2 + 9$ (c) $\frac{3}{(s+e)^2} + s$ (d) $\frac{9}{(s+3)^2 + s}$

22. Laplace transform of function $f(t) = e^{-t} \cos 2t$ is

(a) $\frac{s^2+2s+5}{(s^2+2s-3)^2}$ (b) $\frac{s^2-2s+5}{(s^2+2s-3)^2}$ (c) $\frac{4s+4}{(s^2-2s-3)^2}$ (d) $\frac{4s+1}{(s^2+2s-3)^2}$

23. Inverse Laplace transform of $f(s) = \frac{k}{s^2+k^2}$ is

(a) $\sin kt$ (b) $\cos kt$ (c) $\sinh kt$ (d) none of these

24. Inverse Laplace transform of function $f(s) = \frac{a}{s^2-a^2}$ is

(a) $\sin at$ (b) $\cos at$ (c) $\sinh at$ (d) $\cosh at$

Section B

UNIT I LINEAR DIFFERENTIAL EQUATIONS OF FIRST AND SECOND ORDER

1. Find the solution of the differential equation,

2. $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$

3. $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4y = 0$

4. $(D^2 - 5D + 4)y = 0$

5. $(D^2 - D - 2)y = 0$

6. $(D^2 + a^2)y = 0$

7. $(D^2 - a^2)y = 0$

8. $(e^y + 1) \cos x \, dx + e^y \sin x \, dy = 0$

9. $\frac{dy}{dx} + 2xy = 2e^{-x^2}$

10. $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 0$

11. $(D^2 + 4)y = \sin 3x$

12. $x^4 \frac{dy}{dx} + x^3 y = -\sec(xy)$

13. $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 0$

14. $(D^2 - 4D + 1)^2 y = 0$

15. $(D^2 + 4)y = \cos 2x$

16. $(D^2 - 4D + 4)y = x^3 e^{2x}$

UNIT II TENSORS

1. Define contravariant tensors.
2. Define covariant tensors.
3. Explain Asymmetric tensor.
4. Define inner product.
5. Define outer product.
6. If A_k^{ij} and B_q^p are tensors, show that $A_k^{ij} B_q^p$ is not a tensor.
7. If A_{ij} is antisymmetric tensor, find the component A_{11}

UNIT III SPECIAL FUNCTIONS

1. Write the recurrence formula for Hermite differential equation.
2. Write the Rodrigue's formula for Lagurre polynomials.
3. Write the recurrence formula for Lagurre differential equation.
4. Write the differential equation of Hermite and Lagurre polynomial.

UNIT IV NUMERICAL METHODS

1. Evaluate $\int_1^4 f(x)dx$ from the following table by Simpson's 3/8 rule.

X	1	2	3	4
f(x)	1	8	27	64

2. Give the Lagrange's interpolation Formula.
3. Evaluate $\int_1^4 f(x)dx$ from the following table by Simpson's 3/8 rule.

X	1	2	3	4
f(x)	1	8	27	64

4. Give the Lagrange's interpolation Formula.
5. Solve the following equation by Gauss elimination method.

$$x + y = 2$$

$$2x + 3y = 5$$

6. What is the Lagrange's formula to find 'y' if five sets of values (x_0, y_0) , (x_1, y_1) , (x_2, y_2) , (x_3, y_3) and (x_4, y_4) are given?
7. Find the polynomial which takes the following values using Newton's forward interpolation formula

X:	0	1	2
Y:	1	2	1

8. Using Lagrange's formula, find the polynomial to the given data

X:	0	1	3
Y:	5	6	50

9. Evaluate $\int_0^\pi \sin x dx$ by Trapezoidal rule by dividing ten equal parts.
10. Using Gauss elimination method solve: $5x + 4y = 15$, $3x + 7y = 12$.

UNIT V FOURIER AND LAPLACE'S INTEGRALS TRANSFORMS

1. Define Fourier integral transform of a function and state its linearity property.
2. State and Prove linearity theorem of Fourier transform.
3. State and explain change of scale property of Fourier transform.
4. State and explain the shifting property of Fourier transform.
5. State Parseval's theorem regarding Fourier transform.
6. What do you mean by Fourier transform of a derivative of a function?
7. Laplace transforms of
 - i) 1
 - ii) k(constant)
 - iii) t
 - iv) Kt
 - v) $t^n, n \geq 0$ (integer)
 - vi) e^{at}
 - vii) e^{-at}
8. Find the Laplace transform of $t^n, n > -1$. What will be the Laplace Transform for \sqrt{t} .
9. Find the Laplace Transform of
 - i) $\sinh at$
 - ii) $\cosh at$
 - iii) $\sin at$
 - iv) $\cos at$
10. Find the Laplace Transform of the following functions
 - i) $\sin^2 t$
 - ii) $\cos^2 t$
11. Find the Laplace Transform of $\sinh \omega t - \sin \omega t$
12. Find the Laplace Transform of the following functions
 - i) $e^{at} \cos \omega t$
 - ii) $e^{at} \sin \omega t$
13. Find the Laplace Transform of the following functions
$$F(t) = \frac{e^{at} - 1}{a}$$
14. Find the Laplace Transform of the following functions
 - i) $t \sin at$
 - ii) $t \cos at$
15. Find the Laplace Transform of
 - i) te^{at}
 - ii) $t^n e^{at}$
 - iii) $t^3 e^{-2t}$

Section C

UNIT I LINEAR DIFFERENTIAL EQUATIONS OF FIRST AND SECOND ORDER

1. $(D^2 - 5D + 4)y = 4x^2$
2. $(D^2 - D - 2)y = 2x^2 + \sin x$
3. $(D^2 + a^2)y = e^{-ax}$
4. $(D^2 - a^2)y = x + \sin ax + e^{ax}$
5. $(D^2 - 1)y = -\frac{2}{1+e^x}$
6. $(1 - x^2)(1 - y)dx = xy(1 + y)dy$
7. $\frac{dy}{dx} + 2xy = 2e^{-x^2}$
8. $\frac{dy}{dx} + \frac{y}{x} = \frac{y^2}{x^2}$
9. $(D^2 - 4D + 4)y = x^3 e^{2x}$
10. Solve : $\frac{dy}{dx} = \frac{x(2 \log x + 1)}{\sin y + y \cos y}$
11. $\cos(x + y)dy = dx$
12. $(2x^2 + 3y^2 - 7)xdx - (3x^2 + 2y^2 - 8)ydy = 0$

13. $(2xy + x^2)dy = (3y^2 + 2xy)dx$
14. $\frac{dy}{dx} = \frac{y}{x} + x \sin x \frac{y}{x}$
15. $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = 0$
16. $\frac{d^2y}{dx^2} + 6\frac{dy}{dx} + 9y = 5e^{3x}$
17. $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = 6e^{3x} + 7e^{-2x} - \log 2$
18. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = \sin hx + \sin \sqrt{2x}$
19. $\frac{d^2y}{dx^2} + y = 2 \cos x \cos 3x$
20. $(D^2 + 6D + 9)y = \frac{e^{-3x}}{x^3}$
21. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$
22. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = x \sin x$
23. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$

UNIT II TENSORS

1. Show that any tensor of rank 2 can be expressed as a sum of a symmetric and an antisymmetric tensor, both of rank 2.
2. Prove that $A_{\mu\nu}B^\mu C^\nu$ is an invariant if B^μ and C^ν are contravariant vectors and $A_{\mu\nu}$ is a covariant tensor.
3. Explain symmetric and antisymmetric tensor
4. Explain moment of inertia tensor of a rigid body.

UNIT III SPECIAL FUNCTIONS

1. Derive the expression for generating function of Lagurre Polynomials.
2. Derive the Rodrigues formula for Lagurre polynomials.
3. Derive the Rodrigues formula for Hermite polynomials.
4. Derive recurrence relation

$$(i) 2nH_{n-1}(x) = H'_n(x)$$

$$(ii) 2xH_n(x) - H_{n+1}(x) = H'_n(x)$$

4. Derive the recurrence relation for Lagurre polynomials.

UNIT IV NUMERICAL METHODS

1. Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using i) Trapezoidal rule ii) Simpson one third rule.
2. Find the equation of the parabola passing through the points (0,0), (1,1), and (2,20) using Lagrange's interpolation formula.

3. Evaluate the definite integral $\int_0^{\pi/2} \sin^2 x dx$ by using (i) Simpson's 1/3 rule and (ii) Simpson's 3/8 rule over the 6 intervals of time.
4. Using Lagrange's interpolation formula, find the equation of the cubic curve that passes through the points (-1, -8), (0, 3), (2, 1) and (3, 2).
5. Using Newton's forward formula, find $\sin(0.1604)$ from the following table:

X	0.160	0.161	0.162
sin x	0.1593182066	0.1603053541	0.1612923412

6. Given the value of $y = e^x$ when $x = 0.38$.

x	0	0.1	0.2	0.3	0.4
e^x	1	1.1052	1.2214	1.3499	1.4918

7. Solve by Gauss-elimination method.
- $3x+y-z=3$; $2x-8y+z=-5$; $x-2y+9z=8$

UNIT V FOURIER AND LAPLACE'S INTEGRALS TRANSFORMS

- State and prove convolution theorem in Fourier transform.
- Find the Laplace transform of i) $\frac{\sin at}{t}$ ii) $\frac{\cos at}{t}$ Does the transform of $\frac{\cos at}{t}$ exists?
- Find the inverse Laplace transform of i) $\frac{1}{s^2+a^2}$ ii) $\frac{a}{s^2-a^2}$ iii) $\frac{\omega}{(s+a)^2+\omega^2}$ by residue method.
- Find the inverse Laplace transform of i) $\frac{1}{\sqrt{(2s+5)}}$ ii) $\frac{e^{-1/s}}{s}$
- Find the Inverse Laplace transform of $\frac{e^{-\pi s}}{s^2+1}$
- Use the convolution theorem to find the function whose Laplace Transform are
 i) $\frac{1}{(s+a)(s+b)}$ ii) $\frac{s^2}{(s^2+a^2)^2}$ iii) $\frac{1}{(s^2+a^2)^2}$

Section D

UNIT I LINEAR DIFFERENTIAL EQUATIONS OF FIRST AND SECOND ORDER

- $\frac{dy}{dx} + xy = x^3 y^3$
- $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$
- $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = x^2$ when $y(0) = 0$ and $y'(0) = \frac{1}{2}$

4. $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = 65 \cos 2x$
5. $y'' - 2y' + 2y = x + e^x \cos x$
6. $(D^2 - 4D + 3)y = 2xe^{2x} + 3e^x \cos 2x$
7. $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$
8. $(D^2 + 5D + 6)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$
9. $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$
10. $\frac{d^2y}{dx^2} + 9y = \sec 3x$
11. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = e^{-x} \sec^3 x$
12. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan x$
13. $y'' + 4y' + 3y = x$ satisfying the initial conditions $y(0) = \frac{4}{9}$ and $y'(0) = \frac{D}{3}$

UNIT II TENSORS

1. Explain inner and outer product of tensors.
2. Discuss the applications of the tensors in elasticity.

UNIT III SPECIAL FUNCTIONS

1. Derive the differential equation of the Lagurre polynomial.
2. Derive the differential equation of the Hermite polynomial.

$$\frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2ny = 0$$

UNIT IV NUMERICAL METHODS

1. Find the smallest positive root of the equation $xe^{-2x} = \frac{1}{2} \sin x$ correct to 3 decimal places using Newton-Raphson method.
2. The population of a town in the census is as given in the data. Estimate the population in the year 1996 using Newton's backward interpolation formula.

Year(x)	1961	1971	1981	1991	2001
Population (in 1000) (y)	46	66	81	93	101

3. Using the following data, evaluate $\int_1^7 f(x)dx$ by (i) Trapezoidal rule, (ii) Simpson's

rule

X	1	2	3	4	5	6	7
f(x)	2.105	2.808	3.614	4.604	5.857	7.451	9.467

4. Using Lagrange's interpolation formula find f(5) and f(6) from the following table.

X	1	2	3	4	7
Y=f(x)	2	4	8	16	128

5. Find the interpolating polynomial for y from the following data, using both Newton's Forward and backward formulae.

X	4	6	8	10
Y	1	3	8	16

6. The following table gives the population of a town during the last six census. Estimate, using Newton's interpolation formula, the increase in the population during the period 1946 to 1948.

Year	191	1921	1931	1941	1951	1961
Population (in thousands)	12	13	20	27	39	52

UNIT V FOURIER AND LAPLACE'S INTEGRALS TRANSFORMS

1. Prove that Fourier transform of the squared modulus of a function is given by self-convolution integral.
2. State and prove Parseval's and modulation theorem.
3. State and Prove Fourier Mellin Theorem.
4. Obtain the Laplace transform of the function $f(t) = \sinh at \sin at$
5. Find the Inverse Laplace transform of
 - i) $\frac{1}{s(s^2+w^2)}$
 - ii) $\frac{1}{s^2(s^2+w^2)}$
 - iii) $\frac{1}{s^2(s^2-w^2)}$
6. Find the Inverse Laplace transform of $\frac{s^2+2s+3}{s(s-3)(s+2)}$

7. Find the Inverse Laplace transform of $\frac{1}{s(s-2)^3}$
8. Find the Inverse Laplace transform of $\frac{1}{(s+1)(s^2+1)}$
9. Find the Inverse Laplace transform of $f(s) = \frac{1}{s^2} \left(\frac{s-1}{s+1} \right)$
10. Find the Inverse Laplace transform of $f(s) = \frac{s-1}{s^2-6s+25}$
11. Find the Inverse Laplace transform of $F(s) = \log \left(\frac{s^2-1}{s^2} \right)$
12. Find the Inverse Laplace transform of $\ln \frac{s^2+\omega^2}{s^2}$

CORE II ELECTROMAGNETIC THEORY SUB.CODE:21PPHC22

Section A

I. Choose the correct answer:

UNIT I

1. The electric field E at the centre of a uniformly charged conductor is
 (a) $qr/4\pi\epsilon_0R^3$ (b) $q/4\pi\epsilon_0r^2$ (c) **zero** (d) $q/4\pi\epsilon_0R^2$
2. When a negative charge is placed at the centre of the sphere, then the direction of electric field on the Gaussian surface is
 (a) Radially outward (b) **Radially inward**
 (c) Along the tangent to the surface (d) along the surface
3. The electric field inside a conducting material of radius R is
 (a) $qr/4\pi\epsilon_0R^3$ (b) $q/4\pi\epsilon_0r^2$ (c) **zero** (d) $q/4\pi\epsilon_0R^2$
4. The differential form of Gauss's law is
 (a) **$\nabla \cdot \mathbf{E} = \rho/\epsilon_0$** (b) zero (c) $E = \rho/\epsilon_0$ (d) $E = \dot{P}/\epsilon_0$
5. The electric field intensity E due to an infinite uniformly charged plane sheet at a point distance r from the sheet is related as
 (a) $E \propto r$ (b) $E \propto 1/r$ (c) $E \propto 1/r^2$ (d) **E is independent of r**
6. Poisson's equation is given as
 (a) **$\nabla^2 V = -\rho/\epsilon_0$** (b) $\nabla^2 V = \rho/\epsilon_0$ (c) $\nabla^2 V = 0$ (d) $V = 0$
7. Laplace equation is given as
 (a) $\nabla^2 V = -\rho/\epsilon_0$ (b) $\nabla^2 V = \rho/\epsilon_0$ (c) **$\nabla^2 V = 0$** (d) $V = 0$

8. The electric field intensity on the surface of a charged conductor is
 (a) Zero (b) **directed normal to the surface**
 (c) directed tangential to the surface (d) directed along 45 to the surface
9. The electric displacement is given by
 (a) $\nabla \cdot \mathbf{D} = \rho_f$ (b) $\nabla \cdot \mathbf{D} = 0$ (c) $\nabla \cdot \mathbf{B} = \rho_f$ (d) $\nabla \cdot \mathbf{A} = \rho_f$
10. The dielectric constant of vacuum is
 (a) **1** (b) 0 (c) ∞ (d) 0.1
11. The constant χ_e is called
 (a) Magnetic susceptibility (b) **electric susceptibility**
 (c) Permeability (d) dielectric constant
12. The permittivity of the material is given by
 (a) $\epsilon = E(1 + \chi_e)$ (b) $\epsilon = (1 + \chi_e)$ (c) **$\epsilon = \epsilon_0(1 + \chi_e)$** (d) $\epsilon_0 = \epsilon(1 + \chi_e)$
13. When all space is filled with a homogeneous linear dielectric, the field everywhere is simply reduced by
 (a) Zero (b) **one** (c) infinity (d) ϵ_0
14. The electric potential of the system of any closed loop is
 (a) infinity (b) differential vectors (c) **zero** (d) Eigen values
15. The work done to move a point charge is given by
 $W = Q[v(r)]$ (b) $W = Q[v(\infty)]$ (c) $W = Q[v(r) + v(\infty)]$ (d) **$W = Q[v(r) - v(\infty)]$**

UNIT II

1. The study of stationary charges that produce electric fields constant in time is called
 (a) **Electrostatics** (b) magnetostatics (c) statics (d) mechanics
2. The continuity equation is given by
 (a) **$\nabla \cdot \mathbf{J} = 0$** (b) $\nabla \cdot \mathbf{D} = 0$ (c) $\nabla \cdot \mathbf{B} = \rho_f$ (d) $\nabla \cdot \mathbf{A} = \rho_f$
3. The permeability of free space is
 (a) **$\mu_0 = 4\pi \times 10^{-7} \text{ N/amp}^2$** (b) $\mu_0 = 4 \times 10^{-7} \text{ N/amp}^2$
 (c) $\mu_0 = 2\pi \times 10^{-7} \text{ N/amp}^2$ (d) $\mu_0 = 2 \times 10^{-7} \text{ N/amp}^2$
4. The integral version of Ampere's law is
 (a) $\oint E \cdot dl = 0$ (b) **$\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 \mathbf{I}_{enc}$** (c) $\oint E \cdot xdl = 0$ (d) $\oint B \cdot xdl = 0$
5. The magnetic dipole moment is given by

(a) $\mathbf{m} = \frac{1}{2} \oint (\mathbf{r} \times d\mathbf{l})$ (b) $\mathbf{m} = \frac{1}{2} \oint (a \mathbf{x} d\mathbf{l})$ (c) $\mathbf{m} = \frac{1}{2} \oint (b \mathbf{x} d\mathbf{l})$ (d) $\mathbf{m} = \frac{1}{2} \oint (c \mathbf{x} d\mathbf{l})$

6. The orbital dipole moment is

(a) $\mathbf{I} = \mathbf{e}/\mathbf{T}$ (b) $I = 2e/t$ (c) $I = e/2T$ (d) $I = 4e/t$

7. The potential of a volume current is given as

(a) $\mathbf{J}_b = \nabla \times \mathbf{M}$ (b) $\mathbf{J}_b = \nabla \times \mathbf{E}$ (c) $\mathbf{J}_b = \nabla \times \mathbf{B}$ (d) $\mathbf{J}_b = \nabla \times \mathbf{R}$

8. The potential of the surface current is given by

(a) $\mathbf{K}_b = \mathbf{M} \times \hat{\mathbf{n}}$ (b) $\mathbf{K}_b = \mathbf{P} \times \hat{\mathbf{n}}$ (c) $\mathbf{K}_b = \mathbf{M} \times \mathbf{p}$ (d) $\mathbf{K}_b = \mathbf{E} \times \mathbf{p}$

9. The bound volume charge is

(a) $\rho_b = -\nabla \cdot \mathbf{P}$ (b) $\rho_b = \nabla \cdot \mathbf{P}$ (c) $\rho_b = \nabla \cdot \mathbf{E}$ (d) $\rho_b = -\nabla \cdot \mathbf{R}$

10. The magnetic susceptibility is represented by

(a) χ_m (b) χ (c) χ_e (d) χ_t

11. The magnetic lines are concentric around the wire in the plane of the paper if the wire is

(a) Opposite to the plane **(b) Perpendicular to the plane**
 (c) Parallel to the plane (d) towards the plane

12. The vector potential A in magnetostatics is given by

(a) $\mathbf{B} = \nabla \times \mathbf{A}$ (b) $\mathbf{B} = \mathbf{A}$ (c) $\mathbf{B} = \nabla \times \mathbf{E}$ (d) $\mathbf{E} = \nabla \times \mathbf{B}$

13. If $\nabla \cdot \mathbf{B}$ is zero, the flux over any closed surface will be equal to

(a) $\nabla \times \mathbf{B}$ **(b) zero** (c) $\mathbf{B} \cdot d\mathbf{s}$ (d) $(\nabla \times \mathbf{B}) \cdot \nabla$

14. The value of permittivity of free space is given as

(a) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C/Nm}$ (b) $\epsilon_0 = 8.85 \times 10^{-14} \text{ C}^2/\text{Nm}^2$
(c) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$ (d) $\epsilon_0 = 8.00 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

15. The steady currents produce magnetic fields that are constant in time are known as

(a) Electrostatics **(b) Magnetostatics** (c) staticfield (d) EM waves

16. The changing of

P: magnetic field induces an electric field

Q: electric field induces a magnetic field

(a) P is true and Q is False **(b) Both P and Q are true**
 (c) Both P and Q are false (d) P is false and Q is true.

17. The Lorentz force law is given by

(a) $\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$ (b) $\mathbf{F} = (\mathbf{E} + \mathbf{v} \times \mathbf{B})$ (c) $\mathbf{F} = q(\mathbf{v} \times \mathbf{B})$ (d) $\mathbf{F} = q\mathbf{E}$

UNIT III

1. Gauss law in electrodynamics is given by

- (a) $\nabla \cdot \mathbf{E} = \rho/\epsilon_0$ (b) $\nabla \cdot \mathbf{M} = \rho/\epsilon_0$ (c) $\nabla \cdot \mathbf{Q} = \rho/\epsilon_0$ (d) $\nabla \cdot \mathbf{T} = \rho/\epsilon_0$

2. Faraday's law is given by

- (a) $\nabla \times \mathbf{B} = \frac{\partial \mathbf{E}}{\partial t}$ (b) $\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$ (c) $\nabla \times \mathbf{E} = 0$ (d) $\nabla \times \mathbf{B} = 0$

3. In magnetostatics

- (a) $\nabla \cdot \mathbf{B} = 0$ (b) $\nabla \times \mathbf{B} = 0$ (c) $\nabla \cdot \mathbf{E} = 0$ (d) $\mathbf{V} = 0$

4. The kronecker delta δ_{ij} is _____ if the indices are the same

- (a) **1** (b) 0 (c) α (d) 0.1

5. The kronecker delta δ_{ij} is _____ if the indices are the different

- (a) 1 (b) **0** (c) α (d) 0.1

6. The differential version of Poynting theorem is given as

- (a) $\nabla \cdot \mathbf{S} = -\partial/\partial t(\mathbf{U}_M + \mathbf{U}_{EB})$ (b) $\nabla \cdot \mathbf{S} = -\partial\rho/\partial t$ (c) $\nabla \cdot \mathbf{S} = 0$ (d) $\nabla \cdot \mathbf{S} = -\partial E/\partial t$

7. The energy flux density is given as

- (a) **$\mathbf{S} \cdot d\mathbf{a}$** (b) $T \cdot da$ (c) $E \cdot da$ (d) $J \cdot da$

8. The expression for Poynting's vector is given as

- (a) **$\mathbf{S} = 1/\mu_0(\mathbf{E} \times \mathbf{B})$** (b) $\mathbf{S} = 0$ (c) $\mathbf{S} = -\mathbf{V}$ (d) $\mathbf{S} = -1/\mu_0(\mathbf{E} \times \mathbf{B})$

9. Maxwell's stress tensor is represented as

- (a) \vec{T} (b) $-\vec{T}$ (c) T (d) E

10. The momentum flux density is given as

- (a) \vec{T} (b) **$-\vec{T}$** (c) T (d) E

11. The Poynting's theorem says that the work done on the charges by the electromagnetic force is equal to

- (a) Increase in energy stored in the field (b) **decrease in energy stored in the field**
(c) Speed of particle (d) Vector Space.

12. The first Maxwell law is based on which law?

- (a) Lenz law (b) Ampere's law
(c) Faraday's law (d) **Faraday and Lenz law**

13. The dipole formation in a magnet is due to

- (a) Interaction in a north pole with air (b) Interaction in a south pole with air
(c) Interaction between the north and South Pole (d) Interaction of north and South Pole separately with air

14. The Gauss law for magnetic field is valid in

- (a) Air (b) Conductor (c) dielectric **(d) All cases**

15. The steady current is given by

- (a) $I = e/T$** (b) $I = T$ (c) $T = e/I$ (d) $T = 2I$

UNIT IV

1. The complex index of refraction is given by

- (a) ck/ω** (b) ck^2/w (c) ck (d) ck^2

2. The skin depth of the wave is given by

- (a) $d=1/k$** (b) $d= 1/k$ (c) $d=1/2k$ (d) $d=k^2$

3. According to ohm's law current density in a conductor is proportional to _____

- (a) Magnetic field **(b) Electric field** (c) momentum (d) dipole moment

4. The retarded potentials satisfy the _____ gauge condition.

- (a) Lorentz** (b) coulomb (c) faraday (d) Maxwell

5. The zone in which the fields survive at large distances is called

- (a) Radiation zone** (b) transmission zone (c) conduction zone (d) normal zone

6. The retarded vector potential is represented as

- (a) A** (b) C (c) D (d) J

7. The potential in which the charge and current densities are evaluated at advanced time are called

- (a) Advanced potentials** (b) normal potentials (c) potentials (d) energy

8. If there is no scalar potential the charge density is

- (a) 1 **(b) 0** (c) 2 (d) 0.1

9. For an oscillating magnetic dipole the magnetic dipole moment is

- (a) Minimum **(b) maximum** (c) 0 (d) ∞

10. A rotating electric dipole can be thought of as the superposition of _____ oscillating dipoles

- (a) 1 **(b) 2** (c) 3 (d) 4

UNIT V

1. When two or more modes have same cut off frequency they are said to be _____ modes.
(a) **Degenerate** (b) generate (c) dominant (d) predominant
2. The mode with the lowest cut off frequency is called
(a) Degenerate (b) generate (c) **dominant** (d) normal
3. The lossless guide may be resolved into _____ waves.
(a) **2** (b) 1 (c) 9 (d) 4
4. _____ Wave guide has a hollow metallic tube with a rectangular cross section.
(a) **Rectangular** (b) circular (c) triangular (d) oblate
5. _____ Wave guide is a tubular conductor.
(a) Rectangular (b) **circular** (c) triangular (d) oblate

Section – B

II. Answer in about 50 words each:

UNIT I

1. Define Coulomb's law.
2. Define Electric field and give its unit.
3. Define Electric potential and give its unit.
4. What are dielectrics? Explain.
5. Give the expression for Poisson's equation and Laplace's equation.
6. What is electrostatics?
7. Differentiate the two and three dimensions of Laplace equation.
8. Obtain the equation of total free charge enclosed in the volume in the presence of dielectric.

UNIT II

1. State Ampere's law.
2. State and explain Biot – savart's law.
3. What is magnetic vector potential?
4. Define magnetic energy.
5. What are bound currents?

6. List the application of Gauss's law
7. Compare Magnetostatics and Electrostatics.

UNIT III

1. What are gauge transformations?
2. Define Poynting's vector.
3. Define Maxwell's stress tensor.
4. State Poynting's theorem.
5. What are Lorentz and coloumb gauges?

UNIT IV

1. Define electric dipole radiation.
2. Define magnetic dipole radiation.
3. Define Snell's law.
4. What are the Fresnel's equations?
5. Give expressions for reflected and transmitted amplitudes.
6. Define skin depth of a electromagnetic wave.

UNIT V

1. What is a waveguide?
2. What is a rectangular wave guide?
3. What is a cylindrical waveguide?
4. What are cavity resonators?
5. What is Q of cavity resonator?

Section –C

III. Answer all the questions in 200 words each by choosing either (a) or (b):-

UNIT I

1. Explain continuous charge distribution with a neat diagram.
2. Find the energy of a uniformly charged spherical shell of total charge q and radius R .

3. Find the field outside a uniformly charged solid sphere of radius R and total charge q .
4. Obtain the electric field inside a dielectric.

UNIT II

1. Explain Magnetic vector potential.
2. Discuss the effects of the magnetic field on atomic orbits.
3. Explain the physical interpretation of bound currents in electrodynamics.
4. Explain the action of Ampere's law in magnetized materials.

UNIT III

1. Explain Maxwell's stress Tensor and obtain an expression for it.
2. Discuss in detail about Lorentz and Coulomb gauges.
3. Explain in detail pointing vector and pointing theorem.

UNIT IV

1. Explain the action of EM waves in conductors.
2. Derive the wave equation for E and B .
3. Explain electric dipole radiation.
4. Explain magnetic dipole radiation with a neat diagram.

UNIT IV

1. Explain in detail about rectangular cavity in wave guides.
2. What are cavity resonators? Explain.
3. Explain the cylindrical wave guides in detail.

Section – D

(3 x12 = 36)

IV. Answer in about 400 words each:

UNIT I

1. Derive an expression for Gauss law in differential form.

2. Find the relation between susceptibility, permittivity and dielectric constant.
3. Derive the Poisson's and Laplace equations in all three dimensions.
4. Justify the consequences of work done to move a point charge for energy of a point charge distribution and continuous charge distribution.

UNIT II

1. Use the multipole expansion of potential and identify the monopole and dipole terms. Hence find the dipole moment of two charges separated by a distance d .
2. State and explain Ampere's circuital law and give its application.
3. Obtain the boundary conditions on the field vectors D , E , B and H .

UNIT III

1. Explain in detail the potential formulations of electrodynamics.
2. Obtain an expression for the differential form of Poynting theorem.
3. Derive the Maxwell's equation and solve for both the differential and integral part.

UNIT IV

1. Obtain expressions for the reflection and transmission at oblique incidence.
2. Elucidate the reflection and transmission at normal incidence.
3. What are the different types of radiations in electromagnetic waves?
4. Obtain the wave equations for E and B .

UNIT V

1. Explain in detail about rectangular wave guides in TE and TM mode.
2. Explain the types of cavity in detail.
3. Explain in detail about waveguides in different modes.

CORE III- THERMODYNAMICS AND STATISTICAL MECHANICS – 21PPHC23

Section A

Choose the correct answer:

UNIT-I-Thermodynamics

1. Thermodynamics is concerned with the ----- of heat into work.
(a) **Transformation** (b) radiation (c) conservation (d) convection
2. -----law of thermodynamics forms the basis of concepts of temperature.
(a) first law (b) **zeroth law** (c) second law (d) third law
3. The substance undergoing a -----change must not lose heat by conduction, convection or radiation.
(a) adiabatic change (b) isothermal change (c) irreversible change (d) **reversible change**
4. The two pieces of ice are pressed together, a single piece is formed on releasing pressure with a phenomenon of
(a) **regelation** (b) absorption (c) liberation (d) contraction
5. The coefficient of volume of elasticity is expressed as
(a) $E = \text{stress}/\text{linear strain}$ (b) $E = \text{strain}/\text{bulk stress}$
(c) **$E = \text{stress}/\text{volume strain}$** (d) $E = \text{strain}/\text{normal stress}$
6. The internal energy can be expressed as
(a) **$dQ = dU + dW$** (b) $dW = dU + dV$
(c) $dS = dQ + dW$ (d) $dW = dQ + dQ$
7. Clausius –Clapeyron Latent heat equation can be expressed as
(a) $dQ/dT = L/T(V_1 - V_2)$ (b) $dP/dT = L/T(V_2 - V_1)$
(c) **$dS/dT = P/Q(V_2 - V_1)$** (d) $dT/dQ = -P/S(V_2 - V_1)$
8. Joule –Thomson effect for a perfect gas is -----.
(a) 4 (b) 1 (c) **0** (d) 2
9. An ensemble average is the average at a fixed time over all the elements in the-----.
(a) particles (b) groups (c) **ensemble** (d) space
10. No two trajectories can never cross in -----.
(a) **γ - space** (b) δ -space (c) η -space (d) μ -space

UNIT-II-Thermodynamic potentials

- The initial Gibbs Function of a system is
(a) $G_i = n_i g_{1i} + n_2 g_{2i}$ (b) $G_i = n_i g_{1i} + n_2 g_{2i}$ (c) $G = n_i g + n_2 g_{2i}$ (d) $G = n_i g_1 + n_2 g_{2i}$
- The ideal gases of the chemical potential, have no change in its temperature and -----
(a) Pressure (b) **Volume** (c) Mass (d) Velocity
- In the case $\mu=g$, the chemical potential equals the specific -----
(a) Phase rule (b) **Gibbs function** (c) phase equilibrium (d) Helmholtz function
- The first and the second of a PVT system leads to the result of-----
(a) $dU = TdS - PdV$ (b) $dS = TdS - PdV$ (c) $dV = TdS - PdV$ (d) $dT = TdS - PdV$
- In surface tension, entropy of a film per unit area is -----
(a) **$-d\sigma/dT$** (b) $d\sigma/dP$ (c) $-d\sigma/dV$ (d) $d\sigma/dT$
- Isothermal work of reverse voltaic cell is -----
(a) $d'W_T = dU_T + d'Q_T$ (b) zero (c) **$d'W_T = -dU_T + d'Q_T$** (d) $d'W_T = -dU_T$
- The energy density, the frequency and temperature are found by an relation known as -----
(a) stefan's law (b) **planck's law** (c) radiation (d) phase rule
- In Black body radiation, the Gibbs function G is equal to -----
(a) 1 (b) 2 (c) **0** (d) both (a) & (c)
- Total energy E of a magnetic system is -----
(a) $E=0$ (b) **$E= U - H M$** (c) $E= \text{constant}$ (d) $E = U + H M$
- The moisture content of a steam, has the fractional amount in -----
(a) Solid phase (b) rough surface (c) **liquid phase** (d) none of the above

Unit-III-Basis of Statistical Mechanics

- In hypothetical space the instantaneous translational state of the molecule is given by.
(a) phase space (b) **representative point** (c) ensemble (d) coordinates
- An ensemble average is the average at a fixed time over all the elements in the
(a) microscopic states (b) statistical mechanics (c) **ensemble** (d) phase trajectory
- Locus of phase points forms a $2f-1$ dimensional hyper surface is called.

- (a) **energy surface** (b) phase space (c) phase line (d) ensemble average
4. The principle of conservation of extension in phase can be expressed as
 (a) $\frac{d(\Delta\Gamma)}{dt} = 1$ (b) $\frac{d(\Delta\Gamma)}{M} = \infty$ (c) $\frac{d(\Delta\Gamma)}{dt} = \mathbf{0}$ (d) $\frac{d(\Delta\Gamma)}{dM} = 1$
5. Thermal de Broglie wavelength associated with a molecule of a gas at temperature T can be expressed as
 (a) $\lambda = \frac{h}{(2\pi mkT)^{1/2}}$ (b) $\lambda = \frac{T}{(2\pi mkh)^{1/2}}$ (c) $\lambda = \frac{m}{(2\pi khT)^{1/2}}$ (d) $\lambda = \frac{k}{(2\pi mhT)^{1/2}}$
6. Gibbs paradox is resolved because of the appearance of the extra term
 (a) $-M \ln N$ (b) $N \ln (-N)$ (c) **$-N \ln N$** (d) $M \ln (-M)$
7. The set of microscopic states contained in a volume element $\Delta\Gamma$ corresponds to set of----- quantum states.
 (a) $\Delta\Gamma/h^f$ (b) $E/\Delta\Gamma$ (c) $\Delta\Gamma/V^f$ (d) $h/\Delta\Gamma$
8. Density of electrons is of the order of -----
 (a) 10^{21} per cm^3 (b) 10^{26} per cm^3 (c) **10^{22} per cm^3** (d) 10^{24} per cm^3

UNIT-IV-Ensemble & Statistical Thermodynamics

1. Canonical ensemble is related to
 (a) size of the system (b) the freedom of the systems
 (c) the number of particles In systems (d) **thermal equilibrium of systems**
2. In a grand canonical, the comprising system are capable of exchanging
 (a) only energy (b) only constituent particles
 (c) **energy and constituent particles** (d) particles in the composite system
3. The fundamental volume in phase space which is regarded as equivalent to one microstate is
 (a) h^{3N} (b) h^{2N} (c) h^{3N} (d) h
4. The classical partition function Z gives the _____
 (a) **sum of states of the system** (b) sum of energy of the system
 (c) sum of momentum of the system (d) sum of particles in the system
5. Relation between total energy E and the microcanonical partition function Z is
 (a) $E = -N \partial/\partial t \log z$ (b) **$E = NK^2(\partial (\log z) / T)_v$**

(c) $E = -NKT \log z$ (d) $E = NKT \frac{\partial}{\partial V} \log z$

6. Relation between free energy F and the microcanonical partition function Z is

(a) $E = -N \frac{\partial}{\partial t} \log z$ **(b) $E = -NKT \log z$**

(c) $E = -NKT^2 \log z$ (d) $E = NK \frac{\partial}{\partial V} \log z$

7. In a microcanonical ensemble, a system A of fixed volume is in contact with large reservoir B. Then

(a) A can exchange only energy with B (b) A can exchange only particles with B

(c) A can exchange neither energy nor particles with B

(d) A can exchange both energy and particles with B

8. In a canonical ensemble, a system A of fixed volume is in contact with large reservoir B. Then

(a) A can exchange only energy with B (b) A can exchange only particles with B

(c) A can exchange neither energy nor particles with B

(d) A can exchange both energy and particles with B

9. In a grand canonical ensemble, a system A of fixed volume is in contact with large reservoir B. Then

(a) A can exchange only energy with B (b) A can exchange only particles with B

(c) A can exchange neither energy nor particles with B

(d) A can exchange both energy and particles with B

10. The statistical weight Ω_M of the ensemble associated with a particular macrostate $\{m_i\}$ of the canonical ensemble is

(a) $\Omega_M \{m_i\} = M!/K$ (b) $\Omega_M \{m_i\} = M!/M$

(c) $\Omega_M \{m_i\} = M!/m_i!$ **(d) $\Omega_M \{m_i\} = M!/\prod_i m_i!$**

11. Phase space depends on the number of particles N_i in the quantum state I of the system because it affects the -----.

(a) number of particles **(b) number of dimensions**

(c) number of energy states (d) number of systems

12. A particular quantum state of the system is denoted by _____.

(a) ψ_{N_i} (b) ψ_{N_1} (c) ψ_{N_2} (d) ψ_{N_3}

13. Classically canonical partition for a system can be represented as

(a) $Z = \int \exp \left[-\frac{E(q,p)}{KT} \right] d\Gamma$ **(b) $Z = \int \exp \left[-\frac{E(q,p)}{KT} \right] d\Gamma$**

$$(c) Z = \int \exp \left[-\frac{E(q,p)}{K} \right] d\Gamma$$

$$(d) Z = \int \exp \left[-\frac{E(q,p)}{T} \right] d\Gamma$$

14. In quantum statistics canonical partition function for a system can be represented as

$$(a) Z = \sum \exp[-E_i/T]$$

$$(b) Z = \sum [-E_i/KT]$$

$$(c) Z = \sum \exp[-E_i/T]$$

$$(d) Z = \sum \exp[-E_i/KT]$$

15. The translational contribution to entropy is

$$(a) S = NK \ln(ez/N) + 3/2 N$$

$$(b) S = NK \ln(ez/N) + 3/2 K$$

$$(c) S = NK \ln(ez/N) + 3/2 NK$$

$$(d) S = N \ln(ez/N) + 3/2 NK$$

16. The Quantum concentration can be expressed as

$$(a) n_Q = 1/\lambda^3$$

$$(b) n_Q = 1/\lambda^2$$

$$(c) n_Q = 1/\lambda^1$$

$$(d) n_Q = 1/\lambda^0$$

17. The Thermal de Broglie wavelength associated with the molecule of a gas at temperature T is

$$(a) h/(2\pi mkT)^{1/3}$$

$$(b) h/(2\pi mL T)^{1/3}$$

$$(c) h/(2\pi m p T)^{1/2}$$

$$(d) h/(2\pi mu T)^{1/3}$$

18. The entropy of the ensemble is given by

$$(a) S_M = K \ln \Omega_k$$

$$(b) S_M = K \ln \Omega_M$$

$$(c) S_M = K \ln \Omega_l$$

$$(d) S_M = K \ln \Omega_j$$

19. The fundamental volume in phase space which is regarded as equivalent to one microstate is -----.

$$(a) h^{3N}$$

$$(b) h^{5N}$$

$$(c) h^N$$

$$(d) h^{2N}$$

20. A general expression for the average occupation numbers when N is large is called -----.

(a) **distribution function.**

(b) partition function

(c) characteristic equation.

(d) properties of a system

UNIT-V-Ising model and Fluctuations

1. A second order phase transition is characterized by

(a) a Latent heat

(b) **a discontinuous change in its specific heat**

(c) a change in volume

(d) irreversible behaviour during warming and cooling

2. Stoke's law for a spherical particle of radius r moving with speed $v = 1/T$ in a medium of viscosity η_v is given as

$$(a) 6\pi \eta_v r v$$

$$(b) 6\pi \eta_v r d$$

$$(c) 6\pi \eta_v r s$$

$$(d) 6\pi \eta_v r t$$

3. The transition from the non-ferromagnetic state to the ferromagnetic state is called a

(a) **phase transition of the second kind**

(b) phase transition of the first kind

(c) phase transition of the third kind

(d) phase transition of the fourth kind

4. The change of symmetry can occur due to the change in the
 (a) **ordering of the crystal** (b) dimension of the crystal
 (c) lattice points of the crystal (d) atoms of the crystal
5. Total magnetic moment associated with the spin is
 (a) $M = \mu(N_+ - N_-)$ (b) **$M = \mu(N_+ - N_-)$** (c) $M = \mu(N_- - N_+)$ (d) $M = -\mu(N_+ - N_-)$
6. In quasi-chemical approximation of FG a(++) pair and (- -) pair combine to form _____ pairs according to the reaction.
 (a) 3(+ -) (b) 4(+ -) (c) **2(+ -)** (d) 5(+ -)
7. A one – dimensional linear lattice cannot be _____
 (a) para magnetic (b) ferrie magnetic (c) **ferro magnetic** (d) electro magnetic
8. The total number of possible configurations for a two-dimensional Ising model is -----
 (a) **2^N** (b) 3^N (c) 4^N (d) 6^N
9. A single break in a linear Ising chain destroys the long range order and increases the energy by -----
 (a) 3ε (b) 4ε (c) 6ε (d) **2ε**
10. For an ideal gas the extensive quantities of C_v and \bar{E} are proportional to the
 (a) number of atoms (b) number of energy states
 (c) **number of molecules** (d) number of ensembles
11. The classical result for the energy fluctuations of black-body radiation is
 (a) $C^3(E\Delta\Gamma)^2/8\pi\Gamma^2d\Gamma$ (b) $C^3(E\Delta\Gamma)^2/8\pi L\Gamma^2d\Gamma$
 (c) **$C^3(E\Delta\Gamma)^2/8\pi V\Gamma^2d\Gamma$** (d) $C^3(E\Delta\Gamma)^2/8\pi a\Gamma^2d\Gamma$
12. The mean square distance travelled is given by the mean square fluctuation
 (a) $x^2=1/2\pi(\pi/a^3)^{1/2}$ (b) $x^2=1/4(\pi/a^3)^{1/2}$
 (c) $x^2=1/3(\pi/a^3)^{1/2}$ (d) **$x^2=1/2(\pi/a^3)^{1/2}$**
13. Particle diffusion constant D can be expressed as
 (a) $1/8 \Gamma^2 T$ (b) **$1/2 \Gamma^2 T$** (c) $1/3 \Gamma^2 T$ (d) $1/4 \Gamma^2 T$
14. The position of a particle has been recorded under a microscope at intervals of $T=30s$ is
 (a) **$RT/ N_a 3\pi\eta_v r$** (b) $RT/ N 3\pi\eta_v r$ (c) $RT/ N_a 3\pi\eta_v$ (d) $RT/ N_a \pi\eta_v r$
15. Einstein's temperature is defined as-----.

- (a) $h\nu/k$ (b) **$h\nu/k$** (c) $h\nu = 1/k$ (d) $h\nu = 1/K$
16. Debye T^3 law is given by-----.
- (a) $12J/5 R(T/\Theta_D)^3$ (b) $12J^4/R(T/\Theta_D)^3$
(c) $12J^4/5 R(T/\Theta_D)^2$ (d) **$12J^4/5 R(T/\Theta_D)^3$**
17. ----- is second approximation which works for high and intermediate temperatures.
- (a) Nernst theory (b) **Einstein's theory**
(c) Debye theory (d) Dulong-Petit theory
18. The chemical potential of the system is related to the partition function as -----.
- (a) $\beta K_B T \ln z$ (b) $\sigma K_B T \ln z$ (c) $-\varepsilon K_B T \ln z$ (d) **$-K_B T \ln z$**
19. Transitions come under a group of phenomena called ----- phenomena.
- (a) **cooperative** (b) distinguishable (c) indistinguishable (d) ordered
20. Thick link corresponds to-----.
- (a) $\sigma \sinh \beta \varepsilon$ (b) $\sigma \sigma' \cosh \beta \varepsilon$ (c) $\sigma \sigma' \tanh \beta \varepsilon$ (d) **$\sigma \sigma' \sinh \beta \varepsilon$**
21. The relation connecting curie temperature and the energy levels is given by-----. 2ε
- (a) $3\varepsilon / \ln 3$ (b) $4\varepsilon / \ln 3$ (c) $6\varepsilon / \ln 3$ (d) **$2\varepsilon / \ln 3$**
22. The fluctuation is large for ----- occupied state.
- (a) low energy (b) **high energy** (c) free energy (d) Ionized energy
23. The total energy of quanta in the frequency range is-----.
- (a) $Nh\nu/2$ (b) $Nh\nu/\ln 3$ (c) **$Nh\nu$** (d) $2\varepsilon / Nh\nu$
24. Spins of the atoms of ferromagnetic substances polarized below the -----.
- (a) critical point (b) Einstein's temperature
(c) Debye's Temperature (d) **curie temperature**
25. The phonon assembly is called-----.
- (a) particles (b) ensemble (c) **phonon gas** (d) inert gas

Section B

UNIT-I-Thermodynamics

1. Relate the macroscopic and microscopic properties.
2. Define the specific heat at constant volume.
3. What is internal energy?
4. State the second law of thermodynamics.
5. Why C_p is greater than C_v ?

UNIT-II-Thermodynamics of Magnetism

1. State black body radiation.
2. What is chemical potential?
3. What is known as vapour pressure?
4. State Stefan-Boltzmann law.
5. State the principle of phase equilibrium.

UNIT-III-Basis of Statistical Mechanics

1. State ergodic hypothesis.
2. What is phase space?
3. What is ensemble?
4. State the principle of conservation of density in phase.
5. State the postulate of equal a priori probability.

UNIT-IV-Ensemble & Statistical Thermodynamics

1. Give the relation of Sackur-Tetrode equation.
2. Record the comparison of various ensembles.
3. What is Gibbs paradox?
4. Apply the Boltzmann counting for the ideal gas in canonical ensemble.
5. Define grand partition function.
6. Write a short note on Fermi Dirac Statistics.
7. Give the relation of Grand Partition Function.
8. Compare the various ensembles with partition function and thermodynamic function.
9. What is Distribution function?
10. Write a short note on partition function.
11. Formulate Bose-Einstein distribution function.

UNIT-V-Ising model and Fluctuations

1. Define the term Ising model.
2. Recall the phase transition of the second kind.
3. Write a short note on Bragg-Williams approximation.
4. What is Brownian motion?
5. Define the term Ising model.
6. Explain briefly about one dimensional random walk.
7. Write about the Fluctuation in Fermi Dirac case.

Section C

UNIT-I-Thermodynamics

1. Derive the first law of thermodynamics.
2. Explain the reversible and irreversible process with suitable examples.
3. Derive Clausius -Clapeyron's equation.
4. Explain the change of entropy in a reversible process.
5. Derive Gibbs –Duhem Equation.

UNIT-II-Thermodynamics of Magnetism

1. Explain how the chemical potential increases with n for an ideal gas?
2. Evaluate the dependence of vapor pressure on total pressure.
3. Define an expression for an vapor pressure of a liquid drop.

UNIT-III-Basis of Statistical Mechanics

1. Evaluate the arbitrary extension in phase space.
2. Explain the density distribution of microcanonical ensemble with suitable schematic lattice representation.
3. How the particles are distributed using Fermi Dirac statistics?
4. Categorise the Maxwell Boltzmann statistics in terms of symmetry on counting.

UNIT-IV-Ensemble & Statistical Thermodynamics

1. Explain how the chemical potential increases with n for an ideal gas?
2. Evaluate the translational contribution to entropy is in agreement with the Sackur-Tetrode equation.

UNIT-V-Ising model and Fluctuations

1. Explain the phase transition of the second kind.
2. Describe the two dimensional Ising model with neat sketch of a lattice.
3. Obtain the Bragg Williams approximation.
4. Demonstrate the Brownian motion interms of fluctuations.
5. Explain the concentration fluctuations in quantum statistics.

Section D

UNIT-I-Thermodynamics

1. Derive in Detail about the Maxwell's thermodynamic relation.
2. Sketch the P -V diagram and explain the dependence of heat and work on path.
3. Formulate the second law in terms of entropy with the neat sketch of T-S diagram.

4. ----- is a command to the microprocessor to perform a given task on specific data.
- a) Operand b) Opcode **c) Instruction** d) Code
5. In a two byte instruction, the first and second byte specifies ----- & ----- respectively.
- a) Opcode and operand** b) Operand and opcode
c) Mnemonics and values d) None
6. Meaning of the instruction MVI B, 4FH
- a) Load the '4FH' data into the register b) Move the data from 4F to B
c) Move the data from B to 4F **d) Load the '4F' data into the register**
7. Data bus is
- a) Unidirectional **b) Bidirectional**
c) Depending upon the process the direction may vary d) None
8. Add B means -----.
- a) Add 8 bit data to the content of A b) Add the content of memory to A
c) Add the content of B register to the content of A
d) Add directly the D register to B register
9. In an arithmetic operation, when a carry is generated by digit D_3 and passed to Digit D_4 , ----- flag is set.
- a) Carry b) Parity **c) Auxiliary carry** d) D flag
10. -----, ----- are 16 bit registers used to hold memory addresses.
- a) Flags and buses b) Internal memory, accumulator
c) Timing and control unit **d) Program counters and stack pointer**

Unit II: Microprocessor Programming and Counters and Time Delays

1. The beginning of the stack is defined in the program by using the ----- instruction
- a) LOD SP **b) LXI SP** c) POP SP d) PUSH SP
2. The stack space grows ----- in the numerically ----- order of memory address.
- a) Upward, decreasing** b) Downward, decreasing
c) Decreasing, increasing d) Upward, increasing

3. ----- is a group of instructions written separately from the main program to perform a function that occurs repeatedly in the main program.
- a) Stack b) Repeat **c) Subroutine** d) Clock
4. -----, ----- are the instructions used at the end of program and subroutine respectively
- a) HAL, RET b) RET, HLT c) CALL, RET **d) HLT, RET**
5. Time delay is possible with the help of -----.
- a) One register b) Register pair
c) Loop within a loop technique **d) All**
6. Time needed to execute an instruction having 7 T states by a microprocessor of frequency 2MHz is
- a) 3.5 second b) 7 microsecond **c) 3.5 microsecond** d) 7 second
7. ----- loop repeats a task until certain data conditions are met.
- a) Continuous loop **b) Conditional loop** c)Both d) None
8. Loops are set up by using the looping technique along with ----- and -----.
- a) Stack and subroutine b) Start and stop
c) LXI and HLT **d) Counting and indexing**
9. ----- is used to interface the 8085 microprocessor with other devices
- a) 8555 b) 7409 c) 555 **d) 8255**
10. A/D converter, D/A converter acts as -----, ----- devices respectively for the microprocessor based system.
- a) Input, output** b) Output, input c) Interrupt, input d) Input, interrupt

Unit III: Microprocessor Interfacing

1. Content of the control register is said to be as -----.
- a) Bit Set/Reset b) I/O control **c) Control word** d) reset
2. In mode 0 of I/O mode port A, B and C are used as -----
- a) Simple I/O ports** b) Complex I/O ports c) Latched ports **d) Handshaking ports**
3. 8255A has -----pins.

- a) 20 b) 30 c) 24 **d) 40**
4. Stepper motor interface require ----- power supply
a) 12 V b) 24V c) 9V d) None
5. In order to save the motor from damaging in stepper motor interface ----- is required
a) Analog locking system b) Locking system
c) Stepper motor saving system **d) Digital locking system**
6. In order to produce waveform the basic requirements are
a) ADC only b) DAC only
c) ADC, DAC, 8085 **d) ADC, DAC, 8085, 8255**
7. Familiar ADC is -----.
a) 0804 b) 0808 c) 0809 **d) Both b, c**
8. Well known DAC is
a) 0804 b) 0808 c) 0809 d) Both b, c
9. 0, 0 value in A₀, A₁ respectively denotes ----- port
a) Port A b) Port B c) Port C d) Port D
10. BSR mode is enabled for ----- value of the D₇.
a) 0 b) 1 c) 0/1 d) Any value except 0

Unit IV: Microcontroller Programming

1. The way using which the data sources or destination addresses are specified in the instruction mnemonic for moving the data is called -----.
a) Address specification **b) Addressing mode** c) Both d) None
2. The 8051 can access ----- working register.
a) 19 b)10 c)9 **c) 8**
3. During the arithmetic operations ----- are affected
a) Flags b) Program c) Time delay d) Instruction
4. In 8051, ADDC instruction affect ----- flags.
a) Carry b) Auxiliary carry c) Overflow **d) All the above**
5. 8051 has ----- flags
a) 8 **b) 4** c) 2 d) 1

6. In 8051, MUL instruction affect ----- flags
 a) Carry b) Auxiliary carry c) **Both a, b** d) Overflow
7. ADD A, #data denotes -----.
 a) Add data to accumulator b) **Add immediate data to accumulator**
 c) Both d) None
8. SUBB A, @Ri denotes -----.
 a) Subtract direct byte from A with borrow b) Subtract register from A with borrow
 c) **Subtract indirect RAM from A with borrow** d) Subtract immediate data from A with borrow
9. The instruction ----- multiplies the unsigned 8 bit integer values held in the accumulator and B register.
 a) **MUL AB** b) MUL c) MUT AB d) MUT
10. ----- instruction is used to separate eight bits of data in the accumulator into sub fields.
 a) Addition b) Subtraction c) Multiplication d) **Divide**

Unit V: Addressing Modes and Delay

1. ----- addressing can access any on chip variable or hardware register.
 a) Register b) **Direct Byte** c) Register indirect d) Immediate
2. In register indirect addressing mode R0 and R1 of each register bank can be used as -----
 a) Hardware register b) Index c) Pointer register d) **Index or pointer register**
3. In ----- addressing mode source operand is a constant rather than a variable.
 a) Register b) Direct Byte c) Register indirect d) **Immediate**
4. MOV A, Rn denotes -----.
 a) **Copy the content of register Rn of selected register bank to A**
 b) Copy the content of register A of selected register bank to Rn
 c) Both d) None
5. The programmer can select a register bank by modifying bits ----- and ----- in PSW.
 a) 1, 2 b) 2, 3 c) **3, 4** d) 4, 5
6. For Boolean operator AND mnemonic in 8051
 a) AND b) ANN c) ANX d) **ANL**

7. Rotate byte left is denoted by ----- mnemonic in 8051
 a) **RL** b) RLC c) Both d) None
8. Which of the following comes under logical operations?
 a) AND b) OR c) ADD **d) Both a,b**
9. SWAP is used to-----.
 a) **Exchange the low and high nibbles in a byte** b) Remove the unwanted bytes
 c) Add the needed bytes d) Adding and removing process of selected bytes
10. For Boolean operator NOT mnemonic in 8051
 a) NOT b) NO c) CLR **d) CPL**

Section B

Unit I: Microprocessor Architecture and Instruction Set

1. What is flag?
2. Write about register in 8085?
3. List out the classification of instruction set.
4. Define instruction.
5. What is operation code and operand?
6. Write about branching operations.

Unit II: Microprocessor Programming and Counters and Time Delays

9. What do you know about looping and counting?
10. What is stack?
11. Discuss about subroutine.
12. Why we need time delay?
13. What is indexing?
14. What is interrupt?

Unit III: Microprocessor Interfacing

7. List out the techniques used in time delay.
8. Write about interfacing.

9. Draw the pin configuration of 8255 (PPI).
10. What is control word?
11. Why we need 8255(PPI)?
12. List out the classification of I/O modes of 8255 and explain them briefly.

Unit IV: Microcontroller Programming

6. List out the addressing modes of 8051.
7. List out the instructions used in 8051 during the addition operation?
8. List out the instructions used in 8051 during the subtraction operation?
9. Write the name of flags in 8051.
10. What do you know about INC A?

Unit V: Addressing Modes and Delay

8. What is register addressing?
9. What is register indirect addressing?
10. Compare register addressing with register indirect addressing.
11. How will you implement time delay in 8051?
12. Discuss immediate addressing briefly.

Section C

Unit I: Microprocessor Architecture and Instruction Set

6. Explain 8085 programming model with neat diagram.
7. Explain the classification of instruction set of 8085 in detail.
8. What is data transfer operation in 8085? Write about in detail.
9. What is logic operation in 8085? Write about in detail.
10. List out the set of instructions in arithmetic instruction category of 8085 microprocessor.

Unit II: Microprocessor Programming and Counters and Time Delays

6. Write the steps involved while writing assembly language program and explain it with an example.
7. List out the types of looping and explain them in detail.

8. List out the instructions used for the use of stack in 8085 microprocessor.
9. Briefly write about 8085 interrupt.

Unit III: Microprocessor Interfacing

5. What is time delay? Explain it using one register.
6. Briefly explain time delay using register pair.
7. Enumerate interfacing concept.
8. Interface stepper motor with 8085 microprocessor using 8255.

Unit IV: Microcontroller Programming

5. Explain in detail about addressing modes of 8051.
6. Write about addition operation in 8051.
7. Write about subtraction operation in 8051.
8. Write about multiplication operation in 8051.
9. Write about division operation in 8051.

Unit V: Addressing Modes and Delay

5. Explain in detail about register addressing.
6. What do you know about direct byte addressing?
7. Briefly discuss about register indirect addressing.
8. Write about immediate addressing.

Section D

Unit I: Microprocessor Architecture and Instruction Set

6. Enumerate 8085 architecture in detail.
7. Write in detail about Instruction format.
8. List out the 8085 instruction set and explain its operation with example.
9. Write in detail about arithmetic instruction and branch operation.

Unit II: Microprocessor Programming and Counters and Time Delays

6. Discuss in detail about stack.
7. Write in detail about subroutine.
8. Write an assembly language program for a traffic signal controller using stack and subroutine in 8085 microprocessor.

Unit III: Microprocessor Interfacing

5. Explain the time delay using a loop within a loop technique.
6. Write a note on 8255A programmable peripheral interface in detail.
7. Discuss in detail about interfacing keyboard and seven segment display.
8. How will you generate waveform using ADC and DAC.

Unit IV: Microcontroller Programming

5. Discuss about arithmetic instruction of 8051 in detail.
6. Explain logical instruction of 8051 in detail.
7. How will you interface 8051 with LED display and keyboard.

Unit V: Addressing Modes and Delay

5. Discuss in detail about logical instructions of 8051.
6. Discuss in detail about time delay for 8051.
7. How will you assemble and run an 8051 program? Illustrate it with an example.

Section A

Unit I: Fundamentals of wave mechanics

1. The phenomena of interference, diffraction and polarization can be only explained on the basis of _____ of light

- a) Dual theory b) **Wave theory** c) Particle theory d) None

2. The wavelength of the wave associated with material Particle $\lambda =$

- a) h/v b) h/c c) **h/p** d) c/h

3. The wave function is said to be _____ when is satisfied $\int \Psi^*(r,t)\Psi(r,t)d\tau = 1$

- a) **Normalized** b) Orthogonal c) Orthonormal d) None

4. $|\Psi|^2$ represents

- a) Probability amplitude b) **Probability density**

- c) Wave packet d) Wave function

5. _____ is defined as the average of the result of a large number of measurements on independent systems.

- a) Integral value of dynamical quantity

- b) Square of expectation of dynamical quantity

- c) Differential value of dynamical quantity

- d) **Expectation values of dynamical quantity**

6. Energy operator

- a) $-i\hbar \frac{\partial}{\partial t}$ b) $i\hbar \frac{\partial}{\partial t}$ c) $\hbar \frac{\partial}{\partial t}$ d) $-\hbar \frac{\partial}{\partial t}$

7. $\text{dp}/dt =$ _____

- a) div S b) curl S c) $-\text{div S}$ d) $-\text{curl S}$

8. $\Delta E \cdot \Delta t =$ -----.

- a) \hbar b) $\hbar/8\pi$ c) $(3/2) \hbar$ d) None

9. Norm of a vector \mathbf{a} ,

- a) (\mathbf{a}, \mathbf{a}) b) $(\mathbf{a}, \mathbf{a})^{3/2}$ c) $(\mathbf{a}, \mathbf{a})^{5/2}$ d) $(\mathbf{a}, \mathbf{a})^{1/2}$

10. Hamiltonian operator $H =$

- a) $-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} + V(x)$ b) $\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} - V(x)$ c) $-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} - V(x)$ d) $\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} + V(x)$

Unit II: Operators

1. Hermitian operators have _____ eigen values.

- a) Complex b) different c) natural d) **Real**

2. Eigen values of π – operator.

- a) 1 b) -1 c) **both** d) none

3. Projection operator is _____.

- a) **Idempotent** b) Involutory c) Nilpotent d) Square matrix

4. If an operator obey $AA^\dagger = I$, then it is _____ operator.

- a) linear b) parity c) **unitary** d) Hermitian

5. Quantum Mechanical representation in discrete base is _____.

a) Finite b) infinite c) Infinite, uncountable **d) infinite, countable**

6. Quantum Mechanical representation in continuous base is -----.

a) Finite b) infinite **c) Infinite, uncountable** d) infinite, countable

7. If two Hermitian operators commute, then their product is also ----- operator.

a) Unitary **b) Hermitian** c) Projection d) None

8. π – operator is ----- operator.

a) linear b) Complex c) Both d) None

9. Two eigen functions of Hermitian operators, belonging to different eigen values are -----.

a) orthonormal b) real **c) orthogonal** d) complex

10. $\langle a|b \rangle =$ -----.

a) $\langle a|b \rangle^*$ **b) $\langle b|a \rangle^*$** c) Both d) None

Unit III: Applications of Schrodinger equation to one, three, Dimensional problems

1. Example of barrier penetration

a) Nucleation **b) α – decay** c) carbon dating d) None

2. Reflection coefficient R can be obtained by _____.

a) $1 - T$ b) T/T' c) T'/T d) $T - T'$

3. Ground state energy of a harmonic oscillator

a) $(n+1/2)\hbar\omega$ **b) $1/2\hbar\omega$** c) $(3/2)\hbar\omega$ d) $(n+1/2)h\omega$

4. Particle undergoing _____ motion in one dimension is called one dimensional Harmonic oscillator.

- a) Uninterrupted **b) Harmonic motion** c) Vertical d) Rotational

5. $\Psi_{100} = \frac{1}{\sqrt{\pi}} \frac{1}{a_0^{3/2}} e^{-r/a_0}$ is the wave function of _____.

- a. particle in a box b) harmonic oscillator c) rigid rotator **d) hydrogen atom**

6. $\frac{n^2 \pi^2 \hbar^2}{2mL^2}$ is the energy state of the -----.

- a) Particle in a box** b) Hydrogen atom c) Helium atom d) Alkali atom

7. The phenomenon of the particle's penetrating the potential barrier is called the ----- effect.

- a) Speed **b) Tunnel** c) Both d) None

8. The particle consisting of two spherical particles attached together, separated by a finite fixed distance capable of rotating about an axis passing through the centre of mass and normal to the plane containing two particles, constitutes, a -----.

- a) Two particle system b) Rigid body c) **Rigid rotator** d) None

9. A hydrogen atom contains -----.

- a) one proton one electron** b) Two proton one electron
c) one proton two electron d) two proton two electron

10. ----- represents the rotational energy eigen value of the rigid rotator.

- a) $m^2 \hbar^2 / 2I$** b) $-(m^2 \hbar^2 / 2I)$ c) $\hbar^2 / 2I$ d) $m^2 / 2I$

Unit IV: Matrix representation and Angular momentum

1. $L \times L =$ -----.

a) 0 b) infinite c) $i\hbar L$ d) $-i\hbar L$

2. $[L_y, L_z] = \text{-----}$.

a) $-iL_x$ b) iL_x c) $i\hbar L_x$ d) $-i\hbar L_x$

3. $[S^2, S_z] = \text{-----}$.

a) **0** b) infinite c) $i\hbar L$ d) $-i\hbar L$

4. $J_+ =$

a) $J_x - J_y$ b) $-J_x + J_y$ c) **$J_x + J_y$** d) $-J_x + J_y$

5. Eigen values of $J^2 = \text{-----}$.

a) $j(j-1)\hbar^2$ b) **$j(j+1)\hbar^2$** c) Both d) None

6. $[J_+, J_-] = \text{-----}$.

a) **$2\hbar J_z$** b) $2\hbar J_x$ c) $-2\hbar J_z$ d) $2i\hbar J_z$

7. $[J_z, J_+] = \text{-----}$.

a) $-\hbar J_+$ b) **$\hbar J_+$** c) $i\hbar J_x$ d) $-\hbar J_x$

8. Eigen values of $L^2 = \text{-----}$.

a) $j(j-1)\hbar^2$ b) **$l(l+1)\hbar^2$** c) Both d) None

9. Eigen values of $J_z = \text{-----}$.

a) **$m_z \hbar$** b) $l(l+1)\hbar$ c) $m(m+1)$ d) None

10. $[J^2, J_{\pm}] = \text{-----}$.

a) ± 1 b) **0** c) Not defined d) All

Unit V: Identical particle and Spin

1. Particle that are described by antisymmetric wavefunctions are said to obey ----- statistics.

- a) Maxwell b) Bose – Einstein **c) Fermi – Dirac** d) All

2. No two Fermions can exist in the same quantum state. This statement belongs to ----- principle.

- a) Pauli exclusion** b) Boson c) Pauli inclusive d) Bose inclusive

3. Numerical value of Bohr magnetron is -----.

- a) 9.2032×10^{-15} J/ Tesla b) 9.2032×10^{-25} J/ Tesla
c) 9.2032×10^{-10} J/ Tesla **d) 9.2032×10^{-20} J/ Tesla**

4. $[S_x, S_y] =$ -----.

- a) $i\hbar S_z$** b) $i\hbar S_z$ c) $i\hbar S_z$ d) $i\hbar S_z$

5. Spin magnetic moment of every electron $\mu_s =$ -----.

- a) **$-(e/m_0)S$** b) $(e/m_0)S$ c) $(m_0/e)S$ d) $(m/e)S$

6. $\sigma_x \sigma_y =$ -----.

- a) $-i \sigma_x$ b) $i \sigma_x$ c) $-i \sigma_z$ **d) $i \sigma_z$**

7. $[\sigma^2, \sigma_x] =$ -----.

- a) 0** b) -1 c) 1 d) Infinite

8. $[\sigma_x, \sigma_y] =$ -----.

- a) $2i\sigma_z$** b) $-2i\sigma_z$ c) $2i\sigma_x$ d) $-2i\sigma_x$

9. In non – degenerate energy level, there is ----- eigen function corresponds to each eigen value.

- a. one** b) two c) three d) four

10. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} =$ -----.

- a) σ_x** b) σ_y c) S_x d) S_y

Section B

Unit I: Fundamentals of wave mechanics

1. Explain wave particle duality.
2. Write about De – Broglie waves.
3. Recall time dependent and time independent Schrodinger equation.
4. Describe normalized wave functions.
5. Describe orthogonal wave function.
6. Recall Ehrenfest theorem.
7. Explain expectation value in Quantum Mechanics.
8. Define probability current density.

Unit II: Operators

1. List out operators in Quantum Mechanics.
2. Compare Bra and Ket vectors.
3. Write the condition of an operator to be a parity operator.
4. Recall the condition of a unitary operator.
5. Compare the representation in discrete bases with representation in continuous bases.
6. Explain the Hilbert Space.

Unit III: Applications of Schrodinger equation to one, three, Dimensional problems

1. Draw the wavefunction diagram for a particle in a box.
2. Recall the potential range of the One Dimensional Rectangular Potential Barrier.
3. Write in detail about reflection Coefficient.

4. Find the Probability of an α – particle leaks out in one second.
5. Estimate the ground state energy of a Harmonic Oscillator.
6. Write about Rigid Rotator in detail.

Unit IV: Matrix representation and Angular momentum

1. List out the expression of the followings in terms of space components:

a) L_x b) L_y c) L_z

2. Find the results of the followings:

a) $[L_x, L_y]$ b) $[L_y, L_z]$ c) $[L_z, L_x]$

3. Write about the total angular momentum operator.

4. Recall the eigen values of J^2 and J_z .

5. Find the $[J_+, J_-]$ and $[J^2, J_-]$.

Unit V: Identical particle and Spin

1. Compare symmetric and antisymmetric wave function.

2. Write the Pauli's Exclusive Principle.

3. List out the Pauli's spin matrices of electron.

4. Write about Statistical Weight.

5. Show that $(\sigma \cdot A) (\sigma \cdot B) = (A \cdot B) + i \sigma (A \times B)$.

Section C

Unit I: Fundamentals of wave mechanics

1. Summarize Time dependent Schrodinger equation.

2. Explain Time independent Schrodinger equation.
3. Present physical interpretation of wave function.
4. Solve and find the solution of Schrodinger equation.
5. Analyze the probability current density.
6. Illustrate the Uncertainty principle along with an example.

Unit II: Operators

1. Explain the Linear Vector Space.
2. Analyze the Bra and Ket Vectors in detail.
3. Explain the position representation.
4. Analyze the momentum representation.
5. Present the Linear and Projection Operator in detail.

Unit III: Applications of Schrodinger equation to one, three, Dimensional problems

1. Summarize the theory of Particle in a Box.
2. Present the Rectangular Potential Barrier.
3. Analyze the application of barrier penetration.
4. Explain One Dimensional Harmonic Oscillator in detail.

Unit IV: Matrix representation and Angular momentum

1. List out the expression of L_x , L_y , L_z in terms of x , y , z .
2. Find the results of the followings:

$$\text{a) } [L_x, L_y] \quad \text{b) } [L_y, L_z] \quad \text{c) } [L_z, L_x]$$

3. Write about total Angular momentum Operator.

4. Recall the Eigen values of J^2 , J_z .

5. Find $[J_+, J_-]$, $[J^2, J_-]$.

Unit V: Identical particle and Spin

1. Discuss particle Exchange Operator in detail.

2. Discuss Pauli Spin matrices of electron.

3. Compute Pauli eigen values and eigen functions.

4. Analyse electron spin function.

5. Discuss time dependence of Density matrix.

Section D

Unit I: Fundamentals of wave mechanics

1. Create expectation values of dynamical quantities.

2. Rewrite the Ehrenfest's theorem and prove it.

3. Outline the Uncertainty principle and investigate its application.

4. Rewrite the normalized and orthogonal wave function.

Unit II: Operators

1. Criticize Hermitian operator and its function.

2. Formulate the Quantum Mechanical representation in discrete bases.

3. Formulate the Quantum Mechanical representation in continuous bases.

4. Research on the topic Linear Vector Space.

Unit III: Applications of Schrodinger equation to one, three, Dimensional problems

1. Generate the solution of Three Dimensional Harmonic Oscillator.
2. Outline the theory of Rigid rotator.
3. Criticize the Hydrogen atom and evaluate its solution.
4. Analyze the particle in One Dimensional Infinite deep Potential Well.

Unit IV: Matrix representation and Angular momentum

1. Construct and analyze Schrodinger representation in Quantum Mechanics.
2. Estimate the eigen value of J_x and J_y .
3. Criticize the Clebsch Gorden coefficients.
4. Generate the Clebsch Gorden coefficients for $J_1 = \frac{1}{2}$ and $J_2 = \frac{1}{2}$.

Unit V: Identical particle and Spin

1. Formulate the Density Operator and Density Matrix .
2. Generate the Pauli's Spin matrices of electron.
3. Analyze Pauli's Exclusion Principle and its importance.
4. Generate the Commutation relation satisfied by the three components of Pauli's Spin matrices.

CORE II- ATOMIC AND MOLECULAR SPECTROSCOPY
SUB.CODE:21PPHC32

Section A

UNIT I - Spectra of Atoms

- The region in which Balmer series falls
(a) UV (b) **near UV and visible** (c) Infrared (d) far infrared
- Unit of magnetic moment is called _____.
(a) **Bohr Magnetron** (b) magnetron (c) muon (d) Neutron
- A magnetic moment when placed in a magnetic field experiences a _____.
(a) Force (b) **Torque**(c) moment (d) momentum
- The lines in the _____ series are found to be sharp.
(a) Principal (b) **sharp**(c) Diffuse (d) fundamental
- The separation in the first principal series of doublet of lithium is about _____ Å.
(a) **0.2** (b) 0.4 (c) 0.6 (d) 0.8
- Elements which show its own emission spectrum consisting of discrete lines is called _____ Spectra.
(a) **Line** (b) bar (c) square (d) dot

UNIT II - Microwave Spectroscopy

- _____ molecules are molecules in which all the atoms are arranged in a straight line.
(a) **Linear**(b) diatomic (c) triatomic (d) polyatomic
- An example of linear molecule is
(a) **HCl** (b) HCl₂ (c) SO₄ (d) SO₃
- OCS is an example of _____ molecule.
(a) **Linear**(b) diatomic (c) triatomic (d) polyatomic
- The moment of inertia of the linear molecule is
(a) **I_B=I_C, I_A=0**(b) I_B=I_C= I_A=0 (c) I_B=I_A, I_C=0 (d) I_B=I_C= I_A=1
- I_B=I_C≠ I_A, I_A≠0 is the condition for _____ molecules.
(a) **Symmetric top** (b) Spherical top (c) linear (d) polyatomic
- Methyl Fluoride is an example of _____ molecule.
(a) **Symmetric top** (b) Spherical top (c) linear (d) polyatomic
- I_B=I_C> I_A is the condition for _____ symmetric top.
(a) Oblate (b) **prolate** (c) spherical (d) antispherical
- I_B=I_C< I_A is the condition for _____ symmetric top.
(a) **Oblate** (b) prolate (c) spherical (d) antispherical
- Boron trichloride is an example of _____ symmetric top

- (a) **Oblate** (b) prolate (c) spherical (d) antispherical
10. If all the three moments of inertia are identical then the molecule is called a _____.
- (a) Symmetric top (b) **spherical top** (c) prolate (d) oblate
11. CH_4 is a _____ molecule.
- (a) Romboidal (b) orthorhombic (c) **tetrahedral** (d) diatomic
12. The spherical tops have moment of inertia
- (a) **$I_B=I_C=I_A$** (b) $I_B=I_C \neq I_A$ (c) $I_B=I_A, I_C=0$ (d) $I_B \neq I_C=I_A$
13. The moment of inertia of asymmetric tops are
- (a) **$I_C \neq I_A$** (b) $I_B=I_C \neq I_A$ (c) $I_B=I_A, I_C=0$ (d) $I_B \neq I_C=I_A$
14. Water and vinyl chloride are examples of _____ molecules.
- (a) Symmetric top (b) spherical top (c) diatomic (d) **asymmetric top**
15. μ is called the _____ of the system.
- (a) Moment of inertia (b) eccentricity (c) permeability (d) **reduced mass**
16. When the molecule rotates end over end rotation about a point c the centre of gravity is defined by _____
- (a) **Moment** (b) inertia (c) mass (d) volume
17. B is called the _____ constant.
- (a) **Rotational** (b) irrotational (c) symmetric (d) asymmetric
18. J is called the rotational _____.
- (a) **Constant** (b) variable (c) quantum number (d) state
19. The selection rule for a rigid diatomic rotator is
- (a) $\Delta J = 0$ (b) $\Delta J = 1$ (c) $\Delta J = -1$ (d) **$\Delta J = \pm 1$**
20. The source used in microwave spectroscopy is
- (a) **Klystron** (b) magnetron (c) muon (d) pion

UNIT III - Infra- Red- Spectroscopy

1. The frequency $\tilde{\omega}_0$ is referred as
- (a) **Band centre** (b) band gap (c) band spectra (d) scalar
2. The lines to the low frequency side are called
- (a) R branch (b) **P branch** (c) Q branch (d) S branch
3. The non linear N atomic molecule can have _____ different internal vibrations.
- (a) $3N-4$ (b) $3N-2$ (c) **$3N-6$** (d) $3N$
4. Water is the nonlinear and _____ molecule.
- (a) Monoatomic (b) diatomic (c) **triatomic** (d) polyatomic
5. _____ data allows us to consider two or three vibrational transitions.
- (a) **Infra red** (b) rotational (c) vibrational (d) coarse
6. Radiation scattered with a frequency lower than that of the incident beam is referred to as _____.

- (a) **Stokes radiation**(b) antistokes radiation (c) electric dipole (d) magnetic dipole
7. Stokes radiation is more _____ than antistokes radiations.
 (a) Dense (b) **intense** (c) moment (d) inertia
8. A molecular rotation or vibration cause some change in a component of molecular polarizability is called
 (a) **Raman active**(b) raman inactive (c) raman spectra (d) ramandeactive
9. All rotations of _____ are inactive in Raman.
 (a) **Spherical top** (b) symmetric top (c) asymmetric top (d) linear
10. J is called the rotational _____.
 (a) **Constant** (b) variable (c) quantum number (d) state
11. An example for stable covalent molecule is
 (a) C (b) O (c) N (d) **HCL**
12. The selection rule for harmonic oscillator undergoing vibrational changes is
 (a) $\Delta v = \pm 1$ (b) $\Delta v = \pm 2$ (c) $\Delta v = \pm 3$ (d) $\Delta v = 0$
13. The selection rule for anharmonic oscillator is
 (a) $\Delta v = \pm 1, \pm 2, \pm 3, \dots$ (b) $\Delta v = \pm 1$ (c) $\Delta v = \pm 2$ (d) $\Delta v = \pm 3$
14. The lines to the low frequency side are called
 (a) R branch (b) **P branch** (c) Q branch (d) S branch
15. The lines to the high frequency side are called
 (b) **R branch** (b) P branch (c) Q branch (d) S branch
16. The band centre of carbon monoxide spectrum is
 (a) 2134.28 (b) **2143.28** (c) 2128.34 (d) 2182.34
17. The non linear N atomic molecule can have _____ different internal vibrations.
 (a) $3N-4$ (b) $3N-2$ (c) **$3N-6$** (d) $3N$
18. The linear N atomic molecule can have _____ different internal vibrations.
 (b) $3N-4$ (b) $3N-2$ (c) $3N-6$ (d) **$3N-5$**
19. Water is the nonlinear and _____ molecule.
 (a) Monoatomic (b) diatomic (c) **triatomic** (d) polyatomic
20. Prism is usually made of KBr or _____
 (a) **NaCl** (b) BaCl (c) KCl (d) NaBr
21. Prism is usually made of NaCl or _____
 (b) **KBr** (b) BaCl (c) KCl (d) NaBr
22. The photoconductive detectors commonly used are _____
 (a) **Indium Antimonide** (b) indium chloride (c) NaCl (d) KBr
23. The carbon dioxide laser is made from a mixture of carbondioxide and _____
 (a) Oxygen (b) **nitrogen** (c) sulphur (d) carbon

UNITIV- Raman & Mossbauer Spectroscopy

- _____ spectroscopy is the study of the gamma ray absorption or emission spectra for transmittance between nuclear states.
(a) NMR (b) ESR (c) NQR (d) **Mossbauer**
- Radiation scattered with a frequency lower than that of the incident beam is referred to as _____.
(a) **Stokes radiation** (b) antistokes radiation (c) electric dipole (d) magnetic dipole
- Radiation scattered with a frequency higher than that of the incident beam is referred to as _____.
(b) Stokes radiation (b) **antistokes radiation** (c) electric dipole (d) magnetic dipole
- Stokes radiation is more _____ than antistokes radiations.
(a) Dense (b) **intense** (c) moment (d) inertia
- The polarizability of a molecule in various directions is conventionally represented by polarizability _____.
(a) Circle (b) cuboid (c) **ellipsoid** (d) rectangle
- When the field is applied along the bond axis, the polarizability is greater, the cross-section of an ellipsoid is
(a) More (b) **less** (c) equal (d) zero
- A molecular rotation or vibration cause some change in a component of molecular polarizability is called
(a) **Raman active** (b) raman inactive (c) raman spectra (d) ramandeaactive
- All rotations of _____ are inactive in Raman.
(a) **Spherical top** (b) symmetric top (c) asymmetric top (d) linear
- If the molecular shape has some symmetry this number will be reduced by _____.
(a) **Degeneracy** (b) valancey (c) dual nature (d) half
- _____ is a rare gas laser
(a) **Ar⁺** (b) Kr⁻ (c) Ar⁻ (d) ne
- Computer averaging of multiple scans is commonly used to improve signal to _____ ratio
(a) Mute (b) signal (c) **noise** (d) frequency

UNIT V - Resonance Spectroscopy

- One of the most important properties of nucleus is its _____.
(a) **Spin** (b) acceleration (c) velocity (d) gravity
- γ is a scalar called _____.
(a) Poisson's ratio (b) **gyromagnetic ratio** (c) magnetic (d) electromagnetic
- The resonance condition is achieved by applying a _____ frequency.
(a) **Radio** (b) resonance (c) alternate (d) fluctuating

- The transmitter and sample holder and receiver coils are constructed into a single unit called _____.
(a) **Probe** (b) twines (c) chips (d) sample holder.
- The spins in the upper state transfer the excess energy to the surroundings which is called as
(a) Spin spin relaxation (b) Spin lattice relaxation
(c) **Spin lattice rotation** (d) spin spin rotation
- The chemical shift of the solute depends on the _____ used.
(a) Solution (b) **solvent**(c) water (d) liquid
- In ESR spectrometer source of microwave radiation is in the region of
(a) 8.5 GHz (b) 8 GHz (c) **9.5GHz**(d) 9 GHz
- The value of nuclear spin for ${}^6\text{C}^{13}$ is _____.
(a) integer (b) **half integer**(c) zero (d) infinity
- In NMR Spectrometer the sample container is a glass tube of the order of _____.
(a) **5 mm**(b) 0.5 mm (c) 5.5 mm (d) 55 mm

Section – B

UNIT I - Spectra of Atoms

- List the different spectral series of Hydrogen.
- What are singlet states?
- State Hund's Rule.
- What are hyperfine structures?
- State stark effect.
- State Moseley's law.
- State Auger effect.

UNIT II - Microwave Spectroscopy

- List the different types of molecules with an example each.
- Define symmetric tops with examples.
- Define spherical tops with examples.
- Define asymmetric tops with examples.
- State the selection rules for a rotational spectrum?
- What are the parts of a microwave spectrometer?

UNIT III - Infra- Red - Spectroscopy

- Define zero point energy.

2. List the selection rules in IR spectrum.
3. Define hot bands.
4. What are overtones?
5. What are fundamentals?
6. How does vibration take place in complex molecules?
7. State the selection rules for linear molecules.

UNIT IV - Raman and Mossbauer Spectroscopy

1. Define Raman Effect.
2. Define Raman frequency.
3. Define Raman Spectra.
4. What are stokes and anti-stokes lines?
5. Define Mossbauer Spectroscopy.
6. Define inverse anti stokes Raman Effect.
7. Define chemical shift.
8. List the applications of Mossbauer spectroscopy.

UNIT V- Resonance Spectroscopy

1. Define coupling constant.
2. Define electron spin resonance.
3. Define relaxation.
4. What are bloch equations?
5. Define NMR imaging.
6. Define Electron Spin Resonance.
7. Define Larmor frequency.

Section –C

UNIT I- Spectra of Atoms

1. Explain the spectral transitions of Hydrogen spectra.
2. Discuss the important relations of orbital angular momentum L .
3. Explain Larmor precession with a neat diagram.
4. Explain how the introduction of spin led to the formalism of the vector atom model.
5. Enumerate in detail about spin-orbit interaction.

6. Discuss the angular momentum of many electron atoms.
7. Discuss the normal Zeeman effect with a neat diagram.
8. Discuss the anomalous Zeeman effect in detail.
9. Define Paschen-Bach effect and explain it in detail.
10. What are hyperfine structures? How does nuclear spin influence these structures?
11. Explain Stark effect in detail.
12. Discuss about the characteristic X-Ray spectra in detail.
13. State Moseley's law and discuss it in detail.

UNIT II- Microwave Spectroscopy

1. Explain in detail Rotational spectra of rigid diatomic molecules.
2. Explain the isotopic effect in rotational spectra.
3. Enumerate non rigid rotator with a neat diagram.
4. Explain linear polyatomic molecules in detail.
5. Discuss in detail the energy level transitions for rigid prolate and rigid oblate symmetric rotors.
6. With a neat energy level correlation diagram describe the asymmetric top molecules.
7. Draw a neat diagram of a microwave spectrometer and explain its working.
8. What is the change in the rotational constant B when hydrogen is replaced by deuterium in the hydrogen molecule ?
9. The first rotational line of $^{12}\text{C } ^{16}\text{O}$ is observed at 3.84235cm^{-1} and that of $^{13}\text{C } ^{16}\text{O}$ at 3.67337cm^{-1} . Calculate the atomic weight of $^{13}\text{C } ^{16}\text{O}$, assuming the mass of ^{16}O to be 15.9949.

UNIT III - Infra- Red - Spectroscopy

1. Calculate the vibrational energy of a diatomic molecule.
2. Discuss about vibrating diatomic molecule in detail with a neat diagram.
3. Describe diatomic vibration rotator with a neat diagram.
4. Discuss the symmetry of rotation-vibration band with a neat diagram.
5. Enumerate in detail the concepts of vibration of polyatomic molecules using IR spectroscopy.
6. Discuss symmetric top molecules in detail.
7. Give the instrumentation of IR spectrophotometer with a neat diagram.
8. Elaborate the principle and working of FTIR spectroscopy with a neat diagram.

UNIT IV - Raman and Mossbauer Spectroscopy

1. Discuss the classical theory of Raman Effect in detail.
2. Discuss the quantum theory of Raman Effect in detail.
3. Write about vibration Raman spectra in detail.
4. Write about Raman Spectrometer with a neat diagram.
5. Explain how structure of molecules can be determined by IR and Raman Spectroscopy.
6. Describer Mossbauer spectrometer with a neat diagram.
7. Elaborate on Resonance Raman Scattering.
8. Discuss Raman microscopy in detail.

UNIT V- Resonance Spectroscopy

1. Explain the chemical shift in NMR.
2. What is NMR imaging?
3. Explain in detail the magnetic properties of nuclei.

Section – D

UNIT I- Spectra of Atoms

1. Explain the spectral transitions of Hydrogen spectra.
2. Explain how the introduction of spin led to the formalism of the vector atom model.
3. Enumerate in detail about spin-orbit interaction.

UNIT II - Microwave Spectroscopy

1. Explain in detail the spectrum of a Non rigid rotator.
2. Discuss in detail the rigid diatomic molecule.
3. Enumerate in detail about the polyatomic molecules in microwave spectroscopy.

UNIT III - Infra- Red - Spectroscopy

1. Explain in detail the Anharmonic oscillator.
2. Discuss in detail about the diatomic vibrating rotator.
3. Give a brief note on the vibrations of polyatomic molecules in infrared spectroscopy.
4. Explain the techniques and instrumentation of infrared spectroscopy.

UNIT IV- Raman and Mossbauer Spectroscopy

1. Describe the pure rotational Raman spectra.
2. Explain the Raman activity of vibrations in detail.
3. Explain the effect of polarization of light and the Raman Effect.
4. Give a detailed note on the techniques and instrumentation of Raman spectroscopy.

UNIT V - Resonance Spectroscopy

1. Give the principle, theory and instrumentation of ESR spectrometer.
2. Explain the instrumentation of NMR spectroscopy.
3. Explain the indirect spin-spin interaction.

CORE III - SOLID STATE PHYSICS I

SUB. CODE: 21PPHC33

Section A

Unit I: Bonding in solids

1. Electrical forces are responsible for

a) Solid structures	b) adhesion	c) cohesion	d) orientation
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2. The equilibrium energy is called as

a) Cohesive energy	b) Lattice energy	c) Ionic energy	d) Binding energy
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3. The madelung constant of Caesium chloride is

a) 1.7626	b) 1.7456	c) 2.3212	d) 1.4321
------------------	-----------	-----------	-----------
4. What is the nature of bonding in CsCl?

a) dipole	b) metallic	c) ionic	d) covalent
-----------	-------------	-----------------	-------------
5. If all the atoms at the lattice points are identical, the lattice is called

a) crystal lattice	b) Bravais lattice	c) space lattice	d) reciprocal lattice
--------------------	---------------------------	------------------	-----------------------
6. Bond length of H-H bond is

a) 0.074nm	b) 0.065nm	c) 0.097nm	d) 0.143nm
-------------------	------------	------------	------------
7. Bond length of O-H bond is

a) 0.074nm	b) 0.065nm	c) 0.097nm	d) 0.143nm
------------	------------	-------------------	------------
8. Covalent bond is formed by sharing of pairs of

a) valence electrons	b) neutrons	c) holes	d) hole-pair
-----------------------------	-------------	----------	--------------
9. Covalent substances are -----in polar solvents.

a) soluble	b) insoluble	c) partly soluble	d) non reactive
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10. Density of ionic bonds are
 a) high b) low c) **intermediate** d) very high
11. The melting point of Carbon in diamond structure is
 a) 5270K b) **3280K** c) 5420K d) 4825K

Unit II: Crystal structure

- Type of NaCl lattice is
 a) BCC b) SC c) **FCC** d) HCP
- The c/a ratio of hexagonal close-packed structure is
 a) **1.633** b) 1.363 c) 1.336 d) 6.133
- Number of Bravais lattice in two dimension
 a) 4 b) **5** c) 6 d) 14
- Half the distance between the nearest neighbors in a crystalline solid without impurity is called -----
 a) Coordination number b) neighbor distance
 c) interatomic spacing d) **atomic radius**
- Lattice+Basis=-----
 a) Dimension b) **crystal structure** c) primitive cell d) crystal growth
- The basis associated with the primitive cell is called
 a) **primitive basis** b) associate basis c) structure basis d) primitive cell
- Lattice points per unit cell in BCC
 a) 1 b) **2** c) 4 d) 3
- Number of nearest neighbours in FCC
 a) 6 b) 8 c) **12** d) 14
- The packing Fraction for SC
 a) **0.524** b) 0.680 c) 0.740 d) 0.684
- The packing factor for diamond cubic structure is
 a) 0.24 b) 0.54 c) **0.34** d) 0.64
- The coordination number of SC structure is
 a) **6** b) 8 c) 12 d) 14
- The atomic packing factor of bcc structure is -----percentage.
 a) 52 b) **68** c) 78 d) 74

Unit III : Diffraction of waves and Reciprocal lattice

- In a simple cubic lattice $d_{100}:d_{110}:d_{111}$ is

- a) $1:1/\sqrt{2}:2/\sqrt{3}$ b) 1:2:3 c) $1/\sqrt{3}:2:1/\sqrt{4}$ d) 2:4:1
2. X-rays consist of -----.
- a) negatively charged particles b) positively charged particles
c) electromagnetic radiation d) a stream of neutrons
3. Bragg's law can be satisfied only for
- a) $\lambda \geq 2d$ **b) $\lambda \leq 2d$** c) $\lambda = 2d$ d) $\lambda > 2d$
4. The diffraction condition is
- a) $\Delta K \cdot G = 0$ b) $\Delta K \cdot G = 1$ c) $\Delta K \cdot G = -1$ d) $\Delta K = G$
5. The bcc lattice is reciprocal of the ----- lattice
- a) fcc** b) bcc c) sc d) hcp
6. In an X-ray crystal spectrometer, crystal is used as ----- grating.
- a) **Reflection** b) Refraction c) Diffraction d) Transmission
7. The points in the reciprocal lattice are called
- a) Coordinates of points **b) reciprocal lattice points**
c) Space coordinates d) space arrays
8. The reciprocal lattice of a bcc lattice is
- a) **fcc** b) sc c) bcc d) hcp
9. The reciprocal lattice of a fcc lattice is
- a) fcc b) sc **c) bcc** d) hcp
10. The reciprocal lattice of a hcp lattice is
- a) fcc b) sc c) bcc **d) hcp**
11. The reciprocal lattice of a sc lattice is
- a) fcc **b) sc** c) bcc d) hcp

Unit V: Electrons theory

1. The ratio of thermal to electrical conductivity is directly proportional to the absolute temperature is known as
- a) Hund's rule **b) Wiedeman Franz law** c) Mathiessen's rule d) Degeneracy
2. ----- refers to the change of electrical resistance of a crystal when magnetic field is imposed.
- a) **Magnetoresistance** b) Hall resistance
c) Ohmic resistance d) conductivity
3. The mobility of the charge carriers is obtained directly from the measurement of
- a) Magnetic field b) electric field c) Hall field **d) Hall voltage**
4. The ratio of resistivity at room temperature to its residual resistivity is called
- a) Magnetoresistance b) Ohmic resistance
c) Ohmic ratio **d) resistivity ratio**

5. ----- reflection is a characteristic feature of wave propagation in crystals.
 a) **Bragg** b) multiple c) internal d) Debye
6. The eigen function of the wave equation for a periodic potential are the product of plane wave with the -----of the crystal lattice.
 a) **Periodicity** b) potential energy c) kinetic energy d) wave function
7. The number of orbitals with the same energy is called
 a) Periodicity **b) degeneracy** c) quantum number d) fermi energy
8. The energy of the topmost filled energy level in the ground state of the N electron system is called as
 a) **Fermi energy** b) lattice energy c) potential energy d) internal energy
9. At absolute zero $F(E) = 1$ for
 a) **$E < E_f$** b) $E > E_f$ c) d) $E = E_f$ d) $E = 0$
10. At absolute zero $F(E) = 0$ for
 a) $E < E_f$ **b) $E > E_f$** c) d) $E = E_f$ d) $E = 1$

Unit IV: Crystal imperfections and lattice dynamics

1. Point imperfections are-----errors at isolated lattice points.
 a) point **b) lattice** c) vacancy d) location
2. The magnitude and direction of the displacement of atoms are determined by
 a) **Burger vector** b) grain boundaries c) schottky defects d) Point defect
3. Twins which form during the process of recrystallization are called
 a) Identical twins b) deformation twins **c) annealing twins** d) boundaries
4. Twins which form during plastic deformation of the material are called
 a) Identical twins **b) deformation twins** c) annealing twins d) boundaries
5. Tilt boundary is a surface imperfection is also called
 a) high angle boundary **b) low angle boundary**
 c) equal boundary d) twin boundary
6. The heat capacity per kmol of a substance is called
 a) Specific heat **b) molar heat capacity**
 c) Burger vector d) thermal conductivity
7. Solids consists of large number of atomic particles executing simple harmonic motion is called
 a) **Atomic oscillators** b) atomic vibrators
 c) phase shift oscillator d) multivibrator
8. -----refers to missing of an atom from its regular site.
 a) deformation **b) vacancy** c) defect d) imperfections
9. Point imperfections occurs when -----
 a) Presence of matrix atom **b) absence of matrix atom**
 d) Impurity atom d) pairing of atom

10. At low temperatures, the lattice specific heat varies as
a) T^2 b) T^3 c) $1/T^3$ d) T^4
11. Vacancies are produced and destroyed in a crystal as a result of
a) thermal fluctuations b) Oscillations c) Vibrations d) None
12. In Tilt boundary, the orientation difference between two neighbouring crystals is less than
a) 10° b) 30° c) 40° d) 20°

Section B

Unit I: Bonding in solids

1. Define Cohesive energy.
2. Define cohesion.
3. Define ionic bonding.
4. Define lattice energy.
5. List out any 5 properties of covalent bonds.
6. Define dipole bonds.
7. Define dispersion bonds.

Unit II: Crystal structure

1. Define lattice.
2. Define lattice points.
3. Define crystal structure.
4. Define Bravais lattice.
5. Define unit cell.
6. Calculate c/a ratio for an ideal hcp structure.
7. Define Weigner- Sietz cell
8. Define Miller indices.
9. Define coordination number.
10. Define nearest neighbor distance.
11. Define atomic radius.
12. Define atomic packing factor.
13. Define closet packing.

Unit III : Diffraction of waves and Reciprocal lattice

1. State Braggs law.

2. Define reciprocal lattice.
3. Define reciprocal lattice vector.
4. Write down the diffraction condition.
5. State Laue equations.
6. What is called the first Brillouin zone?

Unit IV: Crystal imperfections and lattice dynamics

1. Define point defect.
2. Define vacancies.
3. Define line imperfection.
4. Define screw dislocation.
5. Define Burger vectors.
6. Define grain boundaries.
7. Define tilt boundaries.
8. Define twin boundaries.
9. State Dulong- Petits law.
10. Define stacking defect.
11. Define Schottky defect.
12. Define Frenkel Defect.
13. Define heat capacity.
14. State T^3 law.
15. Define lattice specific heat.
16. Define lattice vibrations.
17. Define internal energy.

Unit V: Electrons theory

1. Define degeneracy.
2. Define Fermi energy.
3. State Fermi Dirac distribution law.
4. Define density of states.
5. Define electrical conductivity.
6. State Ohm's law.
7. State Wiedeman- Franz law.
8. What is Hall Effect?
9. Define Lorentz number.

Section C

Unit I: Bonding in solids

1. Show that $n > m$ for $U(r)$ to be minimum at $r=r_0$.
2. Relate metallic bond with the covalent bond.
3. Explain the general properties of various bonds.
4. List out the properties of Covalent bonds.
5. List out the properties of metallic crystals.
6. Relate intermolecular bond with the covalent bond.
7. Construct the expression for cohesive energy.

Unit II: Crystal structure

1. Discuss the seven systems of crystals.
2. Sketch and explain the simple cubic structure.
3. Sketch and explain the face centred cubic structure.
4. Sketch and explain the body centred cubic structure.
5. Sketch and explain the hcp structure.
6. Sketch the structure of Diamond.
7. Sketch the structure of NaCl
8. Sketch the structure of ZnS.

Unit III : Diffraction of waves and Reciprocal lattice

1. State and explain Bragg's law for X ray diffraction in crystals.
2. Explain in detail about the reciprocal lattice vector.
3. List out the diffraction conditions.
4. Explain the reciprocal lattice to sc lattice.
5. Explain the reciprocal lattice to fcc lattice.
6. Explain the reciprocal lattice to bcc lattice.

Unit IV: Crystal imperfections and lattice dynamics

1. Differentiate edge and screw dislocations.
2. Show that at lower temperatures C_v varies directly as T^3 .
3. Analyze Einstein's theory of specific heat.
4. State and explain Debye's T^3 law.
5. Analyze Debye's theory of heat capacity.
6. Explain density of states in one dimension.
7. Explain density of states in three dimension.
8. Analyze the thermal conductivity of phonons.
9. Explain the term thermal expansion.
10. Explain Umklapp processes.

Unit V: Electrons theory

1. Explain electrical conductivity hence deduce Ohm's law.
2. Discuss the experimental determination of Hall coefficient.
3. State and prove Bloch theorem.
4. Analyze the effect of temperature on the Fermi Dirac distribution function.

Section D

Unit I: Bonding in solids

1. Construct the expression for Lattice energy of ionic crystals.
2. Estimate the Madelung constant for ionic crystals.
3. Differentiate metallic bond and the covalent bond.
4. Differentiate hydrogen bond and the covalent bond.
5. Differentiate intermolecular bond and the covalent bond.
6. List out the general properties of various bonds.

Unit II: Crystal structure

1. Construct the expression for interplanar spacing of a crystal system.
2. Describe the seven system of crystals with suitable diagrams.
3. Show that the atomic packing factor for fcc and hcp metals are same.
4. Prove that the close packing of atoms in the hcp structure demands an axial ratio,
 $(c/a) = (8/3)^{1/2}$.

Unit III : Diffraction of waves and Reciprocal lattice

1. Investigate the method to determine the structure of a single crystals using X rays.
2. Analyze the powder crystal method of determining crystal structure.
3. Obtain the expression for diffraction condition and also find Laue equation.
4. Explain the construction and working of Bragg's spectrometer.
5. Explain the reciprocal lattice to sc and fcc lattice.
6. Explain the reciprocal lattice to sc and bcc lattice.

Unit IV: Crystal imperfections and lattice dynamics

1. Explain with neat sketches the different imperfections in a crystal.
2. Show that the number of Frenkel defects in equilibrium at a given temperature is proportional to $(NN_i)^{1/2}$.
3. Obtain an expression for the equilibrium concentration of vacancies at a given temperature in a metallic crystal.

- Derive an expression for number of Schotky defects in equilibrium.
- Analyse thermal resistivity of phonon gas.

Unit V: Electrons theory

- Give the theory of free electron gas in three dimensions.
- Define Hall Effect. Also derive the expression for Hall coefficient.
- Discuss the Kronig- Penny model for the motion of the electron in a periodic potential.
- Analyze the heat capacity of the electron gas.

ELECTIVE NANO SCIENCE AND TECHNOLOGY SUB.CODE:21PPHE31

Section-A

(20x1=20)

I Choose the correct answer:

Unit I

- The size of nanoparticle is
 a) 10^{-3}m b) 10^{-6}m c) **10^{-9}m** d) 10^{-12}m
- Synthesis of metal nanomaterials by Laser ablation is _____ method.
 a) **Physical** b) Chemical c) Biosynthesis d) Physico-chemical
- One nanometer is _____
 a) **One billionth of a metre** b) One trillionth of a metre
 c) One billionth of a centimeter d) One billionth of a millimeter
- The process of synthesis of nano powders is _____
 a) Sol-gel process b) Electro deposition c) Sputtering Technique d) **All are correct**
- Nano is _____ word and means dwarf.
 a) Latin b) **Greek** c) French d) English
- The term _____ was first defined by Norio Taniguchi.
 a) nano b) nanoscience c) nanophysics d) **nanotechnology**
- In the laser ablation method a laser vaporizes a _____ target.
 a) Carbon b) Hydrogen c) Diamond d) **Graphite**
- _____ would reduce silver ions into silver atoms in sonochemical reduction.
 a) **Hydrogen radicals** b) Hydroxyl radicals
 c) Water d) Hydrogen peroxide
- The application of ultrasound to chemical reactions is known as
 a) Radiation chemistry b) Thermochemistry
 c) **Sonochemistry** d) Applied chemistry
- The Scherrer's formula is given by
 a) **$D = K\lambda / B\cos\Theta_B$** b) $D = K / B\cos\Theta_B$ c) $D = K\lambda / \cos\Theta_B$ d) $D = \lambda / B\cos\Theta_B$

11. In the synthesis of _____ nanoparticles, polymers on the surface are generally referred to as capping materials.

- a) metallic b) **semiconductors** c) oxide d) insulator

Unit II

1. Carbon nanotubes are allotropes of

- a) Hydrogen b) **Carbon** c) Boron d) Sulphur

2. The shape of torus is

- a) **Doughnut** b) Linear cylindrical c) Spherical d) Tube-like

3. The composition of Buckminsterfullerene is

- a) C₅₀ b) C₅₅ c) **C₆₀** d) C₇₀

4. In electric arc – discharge method, the electrodes are

- a) Platinum wire b) **Graphite rod** c) Zinc rod d) Diamond

5. The bonding in carbon nanotubes is

- a) sp b) **sp²** c) sp³ d) dsp²

6. The target material used in the synthesis of CNTs by laser method is

- a) Coal b) Fullerene c) Quantum well d) **Graphite**

7. _____ is cylindrical in shape.

- a) **Fullerenes** b) Dendrimer c) Nanoparticle d) Nanotube

8. _____ is used to cut diamond.

- a) **Fullerite** b) Torus c) Nanobud d) SWCNT

9. Fullerenes are otherwise called as

- a) Torus b) **Buckyball** c) Nanobud d) SWCNT

10. _____ exists in cubic and hexagonal form.

- a) Fullerenes b) CNT c) Grtaphite d) **Diamond**

11. $-\pi < ka < \pi$ is suitable for _____ kind of CNT.

- a) chiral b) **armchair** c) zigzag d) rhombohedral

12. The resistivity of ropes of single walled nanotube ropes is _____.

- a) **10⁻⁴ ohm-cm** b) 10⁻⁴ mho-m c) 10⁴ ohm-cm d) 10⁴ mho-m

13. CNTs have been shown to exhibit superconductivity _____ .

- a) above 20K b) **below 20K** c) above 10K d) below 10K

UNIT III

1. Photochemical etching can be applied to a surface activated by _____ light.

- a) **Laser** b) maser c) infrared d) ultraviolet

2. Frequency doublers and quadruplers can bring the wavelength to _____ nm.

- a) 200 b) 300 c) **150** d) 250

3. The density of states is _____ for negative energies.
a) 1 b) **0** c) 2 d) 3
4. The infrared detector is sensitive for the wavelength range _____ μm .
a) **8.5 – 10** b) 10-12.5 c) 9.5-11.5 d) 11-13.5
5. The non-carbon nanotubes are known as _____.
a) Nanowells b) **nanowires** c) nanodots d) nanotubes
6. An example of semiconductor is _____.
a) **Si** b) Ni c) Pt d) Ti
7. In the quantum dot laser the quantum dots play the role of the _____ atoms.
a) Passive b) **active** c) neutral d) static
8. The process of size reduction in which all three dimensions reach the low nanometer range is called
a) Bulk b) quantum well c) **quantum dot** d) quantum wire
9. An example of neutral atom beam is _____.
a) **Li** b) Ga c) Cu d) Fe
10. The molecular weight of the resist material is _____.
a) 110-112 Da b) **105-106 Da** c) 109-110 Da d) 102-103 Da
11. Ohms law is given by
a) $V = IR^2$ b) $V = I^2R$ c) $V = I/R$ d) **$V = IR$**
12. A nanowire has dimensions of a few _____ meters.
a) mega b) **nano** c) pico d) giga
13. An example of dielectric is
a) TiO_2 b) **InP** c) GaN d) Si
14. The faces of the quantum dot lasers are coated with materials like
a) **ZnS** b) ZnSe c) ZnO d) ZnSSe
15. Quantum dots are superior to traditional organic dyes due to brightness as well as their _____.
a) reflectivity b) **conductivity** c) stability d) resistivity

UNIT IV

1. The discovery of Nano-crystalline Fe-based soft magnetic materials is _____ years old.
a) 24 b) 26 c) **25** d) 27
2. The nanoperm alloys based on Fe-Zr-B system contain larger concentrations of _____.
a) **Fe** b) Cu c) Zr d) B
3. The nanoperm alloys have very low energy losses at power frequencies _____ Hz.
a) 50 b) **60** c) 70 d) 80
4. In a coulomb blockade the tunnel junction behaves as a _____.

- a) resistor b) **capacitor** c) inductor d) transistor
5. The charge of an electron is _____ coulomb.
 a) 1.7×10^{-19} b) **1.6×10^{-19}** c) 1.5×10^{-19} d) 1.4×10^{-19}
6. Spintronics is also known as _____.
 a) **Magneto electronics** b) electronics
 c) Electrostatics d) magneto statics
7. Giant magnetoresistance was discovered in the year _____.
 a) 1986 b) **1988** c) 1984 d) 1982
8. Spin valves have replaced anisotropic magnetoresistance _____ in computer hard disk .
 a) **Sensors** b) multimeter c) voltmeter d) ammeter
9. A two fold degeneracy _____ the density of states.
 a) **Increases** b) decreases c) does not change d) increases and then decreases
10. The responsivity of the detector is the _____ generated per watt of incoming radiation.
 a) **Electric Current** b) magnetic force c) torsion d) electromagnetic force

UNIT V

1. _____ process is mainly used for the removal of ions
 a) Filtration b) infrafiltration c) **nanofiltration** d) microfiltration
2. _____ filtration works down to between 10 and 100 nm.
 a) Filtration b) infrafiltration c) microfiltration d) **ultrafiltration**
3. _____ is important for production of chemicals.
 a) Filtration b) infrafiltration c) microfiltration d) **catalysis**
4. Ultrafiltration can be used for _____.
 a) **Renal dialysis** b) optoelectronics c) recycling of batteries d) displays
5. Currently used light bulbs convert only _____ of electrical energy into light.
 a) 2% b) **5%** c) 7% d) 9%
6. Commercially available solar cells have efficiencies of range _____.
 a) **15-20 %** b) 20-25 % c) 25-30% d) 30-35%

7. The degree of efficiency of the internal combustion engine is about
a) 20-30% b) **30-40%** c) 40-50% d) 50-60%
8. Carbon supported noble metal particles have diameter of _____ range.
a) **1-5nm** b) 5-10nm c) 10-15 nm d) 15-20nm
9. The critical length scale of integrated circuits is _____.
a) 100nm b) 50 nm c) **< = 50nm** d) > = 50nm
10. Nanoscaled objects used for the construction of laser are called _____.
a) Quantum wells b) Quantum wires c) Quantum dots d) Quantum bulk
- 11.. Quantum computers have memory spaces called _____.
a) Bit b) byte c) nibble d) **qubit**

Section – B (7 x 2 = 14)

II Answer any SEVEN in about 50 words each:

UNIT I

1. What are fullerenes?
2. Distinguish nanoscience and nanotechnology.
3. Define nano.
4. List out the reduction process involved in synthesis of metallic nanoparticles.
5. Explain how silver nanoparticles are prepared by sonochemical reduction process.
6. Explain how TiO₂ nanoparticles are prepared by aerosol synthesis.
7. Write a note on Scherrer's formula.

UNIT II

1. What are carbon allotropes?
2. What do you understand by the term nanobud?
3. Distinguish hexagonal and rhombohedral form of graphite.
4. Differentiate SWNT and MWNT.
5. Write a note on aspect ratio in CNT.
6. Name any three method of chemical vapour deposition.
7. List the disadvantages in electric arc discharge method?

UNIT III

1. Define quantum well.
2. Define quantum wire.
3. Define quantum dot.
4. Draw the progressive generation of rectangular nanostructures.
5. Draw the progressive generation of curvilinear nanostructures.
6. Define bottom-up approach in preparation of quantum nanostructures.
7. Define top down method in preparation of quantum nanostructures.
8. Define Lithography.
9. List the types of lithography.
10. What is a Fermi gas?
11. State ohm's law.
12. Define density of states.
13. Give two uses of nanowires.

UNIT IV

1. List two examples of permanent magnetic materials.
2. Give two examples of Nano crystalline soft magnetic materials.
3. Define Superparamagnetism.
4. Define Curie or Neel temperature.
5. What is coulomb blockade?
6. What is Spintronics?
7. State Pauli's exclusion principle.
8. What is Giant magnetoresistance?
9. List the types of GMR.
10. List out the applications of GMR.
11. State Quantum Hall Effect.

UNIT V

1. Define nanomedicine.
2. Write the significance of nanoscience in cosmetics.
3. Write the uses of Nano in refineries.
4. List the use of Nano in aerospace.
5. List the application of Nano in food industry.
6. State the use of nanotechnology in optics.
7. Explain the use of Nano in surgery.
8. Define Nano nephrology.

9. Write about nanorobots.
10. Define tissue engineering.

SECTION –C (2x6=12 marks)

III Answer all the questions choosing either (a) or (b):-

UNIT I

1. Outline what nanostructures are and examine the different types of nanostructures with examples.
2. Analyze how nanoscience and nanotechnology was developed and outline the history of nanotechnology.
3. Demonstrate how oxide Nano particles are synthesized by Sol-Gel technique.
4. Describe about synthesis of semiconductor Nano particles.

UNIT II

1. Explain the formation of CNT by rolling graphene sheet.
2. What are the two types of CNT? Explain them in detail.
3. Briefly explain about i) diamond ii) graphite.
4. Discuss about the purification method involved in CNT.

UNIT III

1. Enumerate the preparation of quantum Nano structures.
2. Explain in detail Fermi gas and density of states.
3. Calculate the density of states in a semiconductor.
4. Describe Infrared detectors with a neat diagram.
5. List the uses of nanowires.
6. Discuss about epitaxially self- assembled quantum dots in detail.
7. List the applications of quantum dots.

UNIT IV

1. Discuss Nano crystalline soft magnetic materials in detail with a neat diagram.
2. What are permanent magnetic materials? Explain.
3. Explain the theoretical background of permanent magnetic materials.
4. Explain Superparamagnetism in detail.
5. Define coulomb blockade and describe electron tunneling through a barrier.
6. Explain the construction and working of a single electron transistor with a neat diagram.
7. Discuss in detail about Spintronics.
8. Explain quantum hall effect in detail.

UNIT V

1. List the energy applications of nanotechnology.
2. Give the applications of consumer goods in nanotechnology.
3. Explain in detail the medical applications of molecular nanotechnology.
4. Discuss the applications of nanotechnology in the field of chemistry and environment.
5. Describe the applications of nanotechnology in the field of information and communication.
6. Enumerate the application of nanotechnology in Heavy Industry.
7. How is nanotechnology useful in the field of Cancer treatment?

Section – D (3 x12 = 36)

IV Answer any THREE in about 500 words each:

UNIT I

1. Explain the following structural characterization techniques involved in nanomaterials.
 - i) X-Ray Diffraction
 - ii) Scanning Tunneling microscope
 - iii) Atomic Force Microscopy.
2. Explain the synthesis of metallic nanoparticles.

UNIT II

1. Elaborately discuss about the properties of CNT.
2. Briefly explain about the following synthesis method of CNT.
 - i) Discharge ii) Laser iii) Fluidized bed iv) solar production.

UNIT III

1. Calculate the density of states in 1, 2 and 3 dimensions of nanostructures.
2. Explain the production of quantum nanowires in detail.
3. Discuss the production, structure and applications of nanowires in detail.

4. Explain the construction and working of Quantum dot lasers with a neat diagram.

UNIT IV

1. Explain the discovery, types and applications of GMR.
2. Discuss Quantum Hall Effect in detail with a neat diagram.
3. What is Fractional Quantum Hall effect? Explain in detail.

UNIT V

1. Discuss the applications of nanotechnology in detail.
2. Explain the applications of nanomedicine in detail.

Core-I

Quantum Mechanics – II

Sub.Code:21PPHC41

Section A

UNIT I: Independent Quantum Approximation Methods I

1. Stationary perturbation theory is associated with finding the changes in energy levels and eigen functions of a system when a ----- is applied.
 - a) Hamiltonian
 - b) **Small disturbance**
 - c) large disturbance
 - d) None
2. First order correction to energy $E_k' =$ -----.
 - b) $\langle \mathbf{K} | \mathbf{H}' | \mathbf{K} \rangle$
 - b) $\langle m | \mathbf{H}' | \mathbf{K} \rangle$
 - c) $\langle \mathbf{K} | \mathbf{H}' | m \rangle$
 - d) all
3. Second order correction to energy $E_k'' =$ -----.
 - a) $\sum_l \frac{|\langle k | \mathbf{H}' | l \rangle|^2}{E_k^0 - E_l^0}$
 - b) $\sum_l \frac{|\langle k | \mathbf{H}' | k \rangle|^2}{E - E_k^0}$
 - c) $\sum_l \frac{|\langle k | \mathbf{H}' | l \rangle|^2}{E_k^0}$
 - d) $\sum_l \frac{|\langle k | \mathbf{H}' | l \rangle|^2}{E_l^0}$
4. For Harmonic oscillator, $\omega_0 =$ -----.
 - a) \sqrt{k}
 - b) \sqrt{m}
 - c) $\sqrt{\frac{m}{k}}$
 - d) $\sqrt{\frac{k}{m}}$
5. The change in the energy levels of an atom when it is placed in uniform external magnetic field is called ----- effect.

10. $\frac{\hbar^2}{me^2}$ represents

- a) angular momentum
c) wavelength

- b) Bohr's radius**
d) wave number

UNIT III: Time Dependent Quantum Approximation Method & Semi – Classical Theory of Radiation

1. Transition probability per unit time (ω) is -----.

- a) $\frac{2\pi}{h} \rho(k) |\langle k | H' | m \rangle|^2$ **b) $\frac{2\pi}{\hbar} \rho(k) |\langle k | H' | m \rangle|^2$**
c) $\frac{2\pi}{h} \rho(k) |\langle k | H' | m \rangle|$ d) $\frac{2\pi}{\hbar} \rho(k) |\langle k | H' | m \rangle|$

2. In time dependent perturbation theory $|a_k^{(1)}(t)|^2$ is -----.

- a) directly proportional to $\sin \frac{\omega_{kn}t}{2}$ b) inversely proportional to $\sin \frac{\omega_{kn}t}{2}$
c) **directly proportional to $\sin^2 \frac{\omega_{kn}t}{2}$** d) inversely proportional to $\sin^2 \frac{\omega_{kn}t}{2}$

3. Bohr's angular frequency ω_{kn} is -----.

- a) $\frac{E_k - E_n}{\hbar}$ b) $E_k - E_n$ c) $\frac{E_k - E_n}{h}$ d) $\frac{E_n - E_k}{h}$

4. In -----, $E_m - E_n = \hbar\omega$.

- a) absorption** b) emission c) transition d) all

5. In -----, $E_m - E_n = -\hbar\omega$.

- a) absorption **b) emission** c) transition d) all

6. For absorption,

- a) $E_m > E_n$** b) $E_m = E_n$ c) $E_m < E_n$ d) None

7. In electric dipole approximation, e^{ikr} is taken as -----.

- a) 0 **b) 1** c) 2 d) 3

8. In electric dipole approximation, an atom is replaced by -----.

- a) magnetic dipole b) magnetic monopole
c) electric dipole d) electric monopole

9. Probabilities of induced absorption and induced emission are -----.

- a) **equal** b) not equal c) not related d) None
10. By plank's distribution law, $I(\omega_{mn})$ is directly proportional to
- a) $(\omega_{mn})^3$ b) ω_{mn} c) $(\omega_{mn})^2$ d) all

UNIT IV: Scattering Theory

4. In scattering, the target may remain in its original state leads to ----- scattering.
- b) **Elastic** b) Inelastic c) Mie d) Rayleigh
5. Scattering cross-sections are usually measured in -----.
- b) Cm **b) barns** c)m d) m^2
6. Scattering cross – section has the dimension of -----.
- b) Volume** b) length **c) area** d) None
7. Scattering length has the dimension of -----.
- a) Volume **b) length** c) area d) None
8. In bound states, the energy eigen values are -----.
- a) positive & continuous b) positive & discrete
- c) negative & continuous **d) negative & discrete**
9. In -----, the scattering centre is initially at rest.
- a) Laboratory co – ordinate system** b) Centre of mass co – ordinate system
- c) Both d) None
10. In -----, the centre of mass of the two interacting particles is always at rest.
- a) Laboratory co – ordinate system **b) Centre of mass co – ordinate system**
- c) Both d) None
11. In ----- scattering, the target went to a different state after the process.
- a)Elastic **b) Inelastic** c) Mie d) Rayleigh
12. Scattering cross – section depends on -----
- a) $\sigma(\Theta)$ b) $\sin \Theta$ **c) both** d) None
13. The ratio of probability current density of the scattered wave per unit solid angle to the probability current density of the incident wave is called -----.

a) scattering cross – section

b) scattering amplitude

c) phase shift

d) scattering length

UNIT V: Relativistic quantum theory

1. The non-relativistic Hamiltonian $H=p^2/(2m)$ is _____ for relativistic case.
(a) applicable (b) not applicable (c) valid (d) **not valid**
2. The spin of a particle is determined by the transformation characteristics of wave functions under _____ transformations.
(a) Orthogonal (b) **Co-ordinate** (c) Identical (d) Continuous
3. The wave function ψ of Dirac equation has four components while that of the KG equation has _____ component.
(a) **One** (b) Two (c) Three (d) Four
4. In the hole theory, the hole is pushed away from the centre of the potential and behaves like _____.
(a) a wave (b) an atom (c) a particle (d) **an antiparticle**
5. For Dirac equation more degrees of freedom are available than the required degrees of freedom to describe the _____ motion.
(a) rotatory (b) **translatory** (c) linear (d) non-linear
6. Only four component potentials can be added to the KG equation as it will keep the equation in _____ form.
(a) ideal (b) relativistic (c) **covariant** (d) non-relativistic
7. In energy spectrum, $|\mathbf{p}|$ increases from zero, \mathbf{E}_+ starts from mc^2 and extends to _____.
(a) 0 (b) 1 (c) $-mc^2$ (d) **infinity**
8. The ratio of the spin magnetic moment to the spin angular momentum is equal to e/mc which is twice the value obtained for _____ motion.
(a) oscillatory (b) translatory (c) **orbital** (d) angular
9. Pauli equation is similar to the non-relativistic Schrödinger equation with the additional term
(a) $\frac{e\hbar\sigma B}{2mc}$ (b) $\frac{-e\hbar\sigma B}{2mc}$ (c) $\frac{e\hbar\sigma}{2mc}$ (d) $\frac{e\hbar\sigma B}{2m}$

Section – B

UNIT I: Independent Quantum Approximation Methods I

7. List out the types of perturbation theory.

8. Express the Hamiltonian of the Helium atom.
9. Tell about Stark effect.
10. Describe Zeeman effect.
11. Estimate the effective charge in the ground state nucleus of Helium.
12. Find the Zero point energy of one dimensional Harmonic Oscillator.
13. Write about the first order Stark effect in ground state of hydrogen atom.

UNIT II: Approximation Methods II

15. Recall the expression and value of Bohr's radius.
16. Tell the expression of ground state energy of hydrogen atom.
17. List out the connection formulas for penetration of a barrier.
18. Tell about alpha decay.
19. Recall Geiger – Nuttel law.
20. Explain transmission co – efficient.
21. Write Bohr – Summerfeld quantization rule.

UNIT III: Time Dependent Quantum Approximation Method & Semi – Classical Theory of Radiation

13. Explain time dependent perturbation theory.
14. Write about Fermi – Golden rule.
15. Recall Harmonic perturbation.
16. Explain absorption and induced emission.
17. Recall the transmission probability for absorption.
18. Recall electric dipole approximation.
19. Write the expression for Einstein - A co – efficient for spontaneous emission.

UNIT IV: Scattering Theory

11. Recall scattering cross – section.
12. Write about scattering amplitude.
13. Explain optical theorem.
14. Summarize Ramsaur – Townsend effect.
15. Discuss about partial waves.
16. Write the formula for Born approximation for phase shifts.

UNIT V: Relativistic quantum theory

1. What are the inadequacies of KG equation?
2. Derive plane wave solution.
3. Write the Dirac's assumptions.
4. Derive the probability and current densities.
5. Define negative energy states.
6. Define lamb shift.

Section –C

UNIT I: Independent Quantum Approximation Methods I

11. Outline the first order Zeeman effect.
12. Produce the ground state of Helium atom.
13. Compute the zero point energy of one dimensional Harmonic Oscillator.
14. Present the first order perturbation in stationary perturbation theory.
15. Research the second order perturbation in stationary perturbation theory.

UNIT II: Approximation Methods II

10. Analyze ground state of hydrogen atom.
11. Present Deuteron problem in detail.
12. Outline Vander Waal's interaction.
13. Compute connection formulas for penetration of a barrier.
14. Examine the potential well – an application to bound state.

UNIT III: Time Dependent Quantum Approximation Method & Semi – Classical Theory of Radiation

9. Compute Fermi – Golden rule.
10. Present Harmonic perturbation.
11. Examine second order perturbation theory.
12. Analyze electric dipole approximation.
13. Predict Einstein transition probability

UNIT IV: Scattering Theory

10. Analyze scattering cross – section.
11. Present scattering amplitude.
12. Explain scattering by an attractive square well potential.
13. Investigate Breit – Wigner formula.

14. Explain scattering length.
15. Construct an expression for phase shifts.

UNIT V: Relativistic quantum theory

1. Write about Dirac Hamiltonian and Dirac Matrices.
2. Evaluate the concept of spin from Dirac's Hamiltonian.
3. Deduce Dirac's relativistic equation for a free particle.
4. Show that the Spin - Orbit interaction energy is an automatic consequence of the Dirac equation.

Section – D

UNIT I: Independent Quantum Approximation Methods I

10. Formulate the stationary perturbation theory.
11. Criticize the perturbed Harmonic Oscillator.
12. Rewrite the first and second order Zeeman effect.
13. Formulate the first order Stark effect in Hydrogen atom.

UNIT II: Approximation Methods II

9. Rewrite the WKB method.
10. Argue the application of WKB method: probability of penetration of barrier.
11. Rewrite the theory of alpha decay and Geiger – Nuttel law.
12. Assemble connection formulas for penetration of a barrier.

UNIT III: Time Dependent Quantum Approximation Method & Semi – Classical Theory of Radiation

9. Formulate time dependent perturbation theory.
10. Formulate the application of time dependent perturbation theory to semi classical theory of radiation.
11. Criticize absorption, emission and their physical interpretation.

UNIT IV: Scattering Theory

8. Rewrite scattering by a central potential.
9. Criticize integral equation.
10. Generate the Born approximation.

11. Develop laboratory and centre of mass co – ordinate system.

UNIT V: Relativistic quantum theory

1. Write about Dirac's equation for a free particle and explain about Dirac's spinors.
2. Explain spin orbit energy in detail.
3. Discuss the intrinsic magnetic moment associated with the spin of the electron.
4. Obtain the radial equation for an electron in a central potential.
5. Develop the equation of continuity, starting from the Klein-Gordon equation.
6. Formulate the radial equation for an electron moving in a central potential.
7. Find the energy level of the hydrogen atom.

CORE II

SOLID STATE PHYSICS - II

SUB.CODE:21PPHC42

Section A

Unit I: Dielectrics

1. The unit of electric flux density is
c. Coulomb/m³ b. **Coulomb/m²** c. Coulomb/m² d. Coulomb/m
2. The number of lines of forces received by unit area is called
a. **Flux density** b. current density c. Electric potential d. Lorentz field
3.depends upon the presence of voids.
a. **Discharge breakdown** b. thermal breakdown
c. intrinsic breakdown d. imperfections
4.depends on the presence of electrons capable of migrating are called as.....
a. Discharge breakdown b. thermal breakdown
c. **intrinsic breakdown** d. imperfections
5.depends upon the presence of voids.
a. Discharge breakdown **b. thermal breakdown**
c. intrinsic breakdown d. imperfections
6.are ions displaced with respect to regular array of atoms.
a. **Interstitials** b. Vaccumancies

3. The term ferriemagnetic was coined originally to describe the -----type ferromagnetic spin order.
 a) **ferrite** b) ferrous c) cubic ferrites d) ferrimagnets
4. The magnetic susceptibility per unit volume in CGS system.
 a) $\chi = C/M$ b) $\chi = C/A$ c) $\chi = B/C$ **d) $\chi = M/B$**
5. Substances with a positive magnetic Susceptibility are called -----.
 a) **diamagnetic** b) paramagnetic c) ferromagnetic d) ferrie magnetic
6. The diamagnetic susceptibility per unit volume is
 a) $\chi = NMZ e^2/6mc^2\langle r^2 \rangle$ b) $\chi = NM e^2/6mC^2\langle r^2 \rangle$
 c) $\chi = NC e^2/6mC^2\langle r^2 \rangle$ d) $\chi = -NZ e^2/6mc^2\langle r^2 \rangle$
7. In low-energy state the magnetic moment is ----- to the magnetic field.
 a) **parallel** b) perpendicular c) equal d) zero

Unit IV:

1. The crystal exhibits an permanent dipole moment even in the absence of an external electric field is called
 a) piezoelectric crystal **b) ferroelectric crystal**
 c) paraelectric crystal d) diaelectric crystal
2.is a quantized spin wave.
 a. **Magnon** b. Bloch wall c. ferrite d. domain
3. Actual specimens are composed of small regions called
 a. Magnon b. Bloch wall c. ferrite **d. domains**
4. Inapplied fields the domain magnetization rotates towards the direction of the field.
 a. **Strong** b. weak c. zero d. infinite
5. in a crystal is the transition layer that seperates adjacent regions magnetized in different directions.
 a. Magnon **b. Bloch wall** c. ferrite d. domain

Unit V: Smart materials

1. Temperature at which transition from liquid to solid occurs is known as

Unit III: Magnetic properties of materials

1. What are superconductors?
2. What is transition temperature?
3. What is Meissner effect?
4. What are Cooper pairs?
5. What are high T_c superconductors?
6. Define tunnelling.
7. What are the properties of high T_c superconductors?
8. What is SQUID?

Unit IV: Ferroelectrics and Piezoelectric

1. Define magnetic susceptibility
2. Define paramagnetic substance.
3. Define ferromagnetic substance.
4. Define diamagnetic substance.
5. Define gyromagnetic ratio.
6. Define Bohr magneton.
7. Recall magnetic domains.

Unit V: Smart materials

1. What are metallic glasses?
2. Define glass transition temperature.
3. Define melting point temperature.
4. Define Austenite.
5. What are shape memory alloys? Give examples.
6. Distinguish between ordinary metal and metallic glass.
7. What is shape memory effect?
8. Define Quenching.
9. Define biomaterials.
10. Define ceramics.
11. What are biopolymers?
12. What are non linear materials?

13. Define pseudo electricity.
14. Define hysteresis.
15. Define non linear effect.

Section – C

Unit I: Dielectrics

1. Analyse ferro electric crystals.
2. Explain displacive transition.
3. Analyse first order phase transition.
4. Analyse second order phase transition.

Unit II: Superconductivity

1. State and prove Gauss law in dielectrics.
2. State and prove Gauss theorem.
3. State and prove Coulomb's law.
4. Demonstrate Ionic and orientational polarization.
5. Explain the frequency dependent polarization.

Unit III: Magnetic properties of materials

1. List out the characteristics of type I superconductors.
2. List out the characteristics of type II superconductors
3. Distinguish between type I and type II superconductors.
4. List out the properties of superconductors.
5. Analyse Josephson tunnelling.
6. Analyse Quantum tunnelling.
7. Explain the term magnetic mirror.

Unit IV: Ferroelectrics and Piezoelectric

1. Analyse antiferro magnetism
2. Analyse ferri magnetism.
3. Classify magnetic materials.
4. Analyse domain theory.

Unit V: Smart materials

1. List out the structural properties of metallic glasses.
2. List out the applications of metallic glasses.
3. List out the characteristic features of SMAS.
4. Describe the preparation of metallic glasses.
5. List out the properties of Ni – Ti alloy.
6. List out the applications of ceramics.

Section – D

Unit I: Dielectrics

1. Analyse Landau theory of phase transition.
2. Illustrate ferroelectric domains.
3. Demonstrate piezoelectricity.

Unit II: Superconductivity

1. List out and explain different types of dielectric breakdown.
2. Illustrate dipolar relaxation.
3. Deduce Clausius Mosotti relation.
4. Deduce the expression for electronic polarizability.

Unit III: Magnetic properties of materials

1. Illustrate Meissner effect.
2. Explain BCS theory with a special note on Cooper pairs.
3. Derive London equations.
4. Prove that all the superconductors are perfect diamagnets in the superconducting state.
5. Analyze high T_c superconductors.
6. Analyze the term SQUIDS

Unit IV: Ferroelectrics and Piezoelectric

1. Explain Langevin's theory of diamagnetism.
2. Explain Quantum theory of paramagnetism.
3. Analyse Weiss molecular field theory.
4. Illustrate ferromagnetic domains.

Unit V: Smart materials

1. Describe the preparation and structural properties of metallic glasses.
2. Discuss the characteristics of shape memory alloys and applications of SMA.
3. Explain biomaterial and its modern applications in the field of medicine.

CORE III

NUCLEAR AND PARTICLE PHYSICS

SUB.CODE:21PPHC43

Section A

UNIT I – Theories of Decay

1. Alpha particles are
 - (a) Electromagnetic radiations
 - (b) helium nuclei**
 - (c) neutral particles
 - (d) negatively charged
2. Which ray has the highest penetrating power?
 - (a) α -ray
 - (b) β -ray
 - (c) γ -ray**
 - (d) X-ray
3. The theory of alpha decay does not connect
 - (a) Kinetic energy of alpha particles
 - (b) nuclear charge
 - (c) Q-value of equation**
 - (d) the disintegration constant
4. Alpha decay is the nuclear process occurring under the
 - (a) Strong interaction**
 - (b) electromagnetic interaction
 - (c) weak interaction
 - (d) strong and weak interaction
5. The energy of the alpha particles of various isotopes
 - (a) Decreases with increasing mass number**
 - (b) Increases with increasing mass number
 - (c) Does not depend upon mass number
 - (d) Increases with decreasing mass number
6. The existence of the centrifugal barrier is associated
 - (a) with the nature of motion of particle**
 - (b) with the charge
 - (c) with the particle of zero angular momentum
 - (d) with the potential energy
7. Geiger Nuttal law is represented as

- (e) $\log_e \lambda = A \log_e R + B$ (b) $\log_e \chi = A \log_e R + B$
 (c) $\log_e \mu = A \log_e R + B$ (d) $\log_e \phi = A \log_e R + B$
8. Consider Fermi theory of beta decay. The number of final states of electrons corresponding to momenta between p and $p+dp$ is
 (b) Independent of p (b) proportional to pdp
 (c) **proportional to $p^2 dp$** (d) proportional to dp
9. The binding energy per nucleon is maximum for the nucleus
 (a) ^{56}Fe (b) ^4He (c) ^{208}Pb (d) ^{101}Mo
10. The order of magnitude of the binding energy per nucleon in a nucleus is
 (a) 10^{-5}Mev (b) 10^{-3}Mev (c) 0.1 Mev (d) **10 Mev**
11. Nuclei with the same number of neutrons are called
 (a) isomers (b) **isotones** (c) isotopes (d) isobars
12. Charge of a proton is
 (a) **$1.6 \times 10^{-19}\text{ c}$** (b) $1.6 \times 10^{-18}\text{ c}$ (c) $1.6 \times 10^{-159}\text{ c}$ (d) $1.6 \times 10^{-17}\text{ c}$
13. $1\text{ amu} = \text{Mev}$
 (a) 951 (b) **931** (c) 921 (d) 981
14. The most stable element is
 (a) iron (b) cobalt (c) **lead** (d) nicol

UNIT II- Nuclear Reaction

1. The volume of a nucleus in an atom is proportional to the
 (a) **mass number** (b) proton number
 (c) neutron number (d) electron number
2. Breit- Wigner formula is also called _____ formula
 (a) **Dispersion** (b) direct (c) indirect (d) diversion
3. Stripping and pickup reactions are called as _____ reactions.
 (a) **Direct** (b) indirect (c) mixed (d) ergic
4. The probability of occurrence of a particular nuclear reaction is described by _____.
 (a) central (b) centripetal (c) centrifugal (d) **cross section**
5. Blatt and Weisskopf suggested a classical approach for the analysis of reaction cross section by dividing up the incident beam into _____ zones.

- (a) Circular (b) **cylindrical** (c) oval (d) rectangular
6. Nuclear reactions are exoergic if
 (a) **Q>0** (b) Q<0 (c) Q=0 (d) Q<=0
7. Nuclear reactions are endoergic if
 (a) Q>0 (b) **Q<0** (c) Q=0 (d) Q<=0
8. Nuclear reactions are elastic collision reactions when
 (a) Q>0 (b) Q<0 (c) **Q=0** (d) Q<=0
9. The energy corresponding to the maximum energy is called
 (a) Beta energy (b) **Fermi energy** (c) fission (d) fussion

UNIT III- Nuclear Models and Nuclear Energy

1. Which is a magic number
 (a) One (b) **two** (c) three (d) four
2. The values of Z or N for nucleus to be highly stable are called _____ numbers.
 (a) original (b) **magic** (c) nuclear (d) stable
3. The typical nuclear excitation energies are about
 (a) 1Mev (b) **10Mev** (c) 0.1Mev (d) 0.01Mev
4. Most nuclei obey _____ coupling.
 (a) **J-J** (b) L-S (c) L-J (d) S-J
5. In nuclei spin orbit interaction is strong and gives rise to energy _____.
 (b) **splitting** (b) coupling (c) combination(d) excitation
6. The shell model predictions are represented by _____ lines
 (a) magnetic (b) electric (c) **schmidt** (d) electromagnetic
7. _____ is not a magic number.
 (a) 8 (b) 20 (c) 50 (d) **84**
8. The mystery of magic numbers was solved by
 (a) **Mayer & Jensen** (b) Mayer (c) Jensen (d) Maxwell
9. The early nuclear model was an assembly of protons and _____.
 (a) Neutrons (b) **electrons** (c) meurons (d) pions
10. The most classical nuclear model is
 (a) **Liquid drop model** (d) shell model (c) Fermi model (d) guass model

UNIT IV- Nuclear Forces

- The quadrupole moment of the nucleus is a
(a) scalar (b) vector (c) **tensor** (d) neutron
- An admissible potential between the proton and the neutron in a deuteron is
(a) coulomb (b) Harmonic (c) **finite square well** (d) infinite square well
- Nuclear forces are
(a) **Short range attractive forces** (b) short range repulsive forces
(c) long range attractive forces (d) long range repulsive force
- The ground state of the deuteron is a
(a) Pure S state (b) pure p state
(c) mixture of s and p state (d) **mixture of s and d state**
- Deuteron is the two nucleon bound system consisting of
(a) 2 protons and 1 electron
(b) 2 neutrons and 1 positron
(c) 1 proton and 1 neutron with opposite spins
(d) **1 proton and 1 neutron with parallel spins**
- Deuteron in its ground state has a total angular momentum $J= 1$ and a positive parity. The corresponding orbital angular momentum L and spin S combinations are
(a) $L=0, S= 1$ and $L= 2, S= 0$ (b) $L=0, S= 1$ and $L= 1, S= 1$
(c) **$L=0, S= 1$ and $L= 2, S= 1$** (d) $L=1, S= 1$ and $L= 2, S= 1$
- Atoms with nuclear spin equal to $\frac{1}{2}$ cannot have
(a) **Electric quadrupole moment** (b) fine structure
(c) Magnetic interactions (d) dipole interactions between atoms
- D-state probability in deuteron is roughly _____ %
(a) 6 (b) 2 (c) **4** (d) 5
- Nuclear forces are spin _____.
(a) independent (b) **dependent** (c) splits (d) 0

UNIT V- Elementary Particles

- Strange particles are produced in _____ interaction.
(a) **Strong** (b) weak (c) electromagnetic (d) magnetic

2. Strange particles decay in _____ interaction.
 (a) Strong (b) **weak** (c) electric (d) magnetic
3. The lifetime of muon is _____second.
 (a) 10^3 (b) 10^6 (c) **10^{-6}** (d) 10
4. Which of the following elementary particle is a lepton?
 (a) photon (b) **μ -meson** (c) pi meson (d) proton
5. The quarks are supposed to exist in following number of flavours
 (a) 2 (b) 4 (c) **6** (d) 8
6. The quark structure of Δ^{++}
 (a) **uuu** (b) udu (c) sss (d) ddd
7. Choose the particle with zero Baryon number from the list given below
 (a) **pion** (b) neutron (c) proton (d) Δ^+
8. Which one of the following has $\frac{1}{2}$ spin?
 (a) Proton (b) neutron (c) **photon** (d) neutrino
9. The baryon number of proton is
 (a) 2 (b) **1** (c) 0 (d) 3
10. The lepton number of proton is
 (a) 2 (b) 1 (c) **0** (d) 3
11. The baryon number of electron is
 (a) 2 (b) 1 (c) **0** (d) 3
12. The lepton number of electron is
 (a) 2 (b) **1** (c) 0 (d) 3
13. A stationary particle in free space is observed to spontaneously decay into photons. This implies that
 (a) The particle carries electric charge
 (b) The spin of particle must be 2 or greater
 (c) **The particle is a boson**
 (d) The mass of the particle is greater or equal to mass of hydrogen atom.

Section – B

UNIT I – Theories of Decay

1. Define half life of a radioactive nuclide.
2. Define average or mean life of a nuclide.
3. Obtain the relation between mean life and half life.
4. What is a neutrino?
5. Give the reaction for alpha decay.
6. Give the reaction for beta decay.
7. Give two properties of beta ray spectrum.
8. Define parity.

UNIT II- Nuclear Reaction

1. Define stripping nuclear reactions.
2. Define Q- value in nuclear reactions.
3. What are exoergic reactions?
4. What are endoergic nuclear reactions?
5. State the Reciprocity theorem.
6. State the statistical theory.

UNIT III- Nuclear Models and Nuclear Energy

1. Define nuclear fission.
2. What is a nuclear chain reaction?
3. Define spin orbit coupling.
4. What is the Schmidt line?
5. Define magnetic moment.

UNIT IV- Nuclear Forces

1. State the meson theory of nuclear forces.
2. What is electric quadrupole moment?
3. What are exchange forces.
4. Define effective range theory.
5. What is magnetic dipole moment of a deuteron?

UNIT V- Elementary Particles

1. What are elementary particles?

2. Define CPT theorem.
3. What are quarks?
4. What are hadrons?
5. What are hyperons?
6. Define a meson octet.

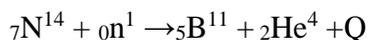
Section –C

UNIT I- Theories of Decay

1. Enumerate the general features of beta ray spectrum.
2. Explain parity in beta decay.
3. Explain in detail about internal conversion.
4. Explain Gamma decay in detail.

UNIT II- Nuclear Reaction

1. Obtain an expression for Breitweigner one level resonance formula.
2. Find the threshold energy for reaction.



Given mass of ${}_7\text{N}^{14} = 14.00307$ amu, ${}_0\text{n}^1 = 1.008665$ amu, ${}_5\text{B}^{11} = 11.009305$ amu,
 ${}_2\text{He}^4 = 4.002603$ amu.

3. What are stripping and pickup reactions? Give the theory of (d,p) stripping reactions.
4. Explain compound nuclear theory.

UNIT III- Nuclear Models and Nuclear Energy

1. Explain the importance of magic numbers.
2. Explain the salient features of the shell model.
3. What is liquid drop model? Explain.
4. Explain barrier penetration in detail.
5. Explain spin orbit coupling.
6. Obtain an expression for the energy released in fission.
7. What are magnetic moments? Explain.

UNIT IV- Nuclear Forces

1. Explain in detail the meson theory of nuclear forces.

2. Show that the D-state probability in deuteron is roughly 4 %.
3. Explain in detail the spin dependence and charge independence of nuclear forces.
4. Give a brief description of exchange forces. Explain their significance for nuclear structure.
5. Starting from wave function of a deuteron obtain an expression for root mean square radius.

UNIT V- Elementary Particles

1. Explain in detail the different types of interactions among elementary particles.
2. Explain with suitable example the law of conservation of baryons and leptons.
3. Obtain the Gellman- Okubo mass formula.
4. Explain the quark theory of elementary particles in detail.
5. Explain in detail the classification of elementary particles.
6. Demonstrate the SU(3) multiplets of elementary particles.
7. Present baryon octet and meson octet with a neat diagram.

Section – D

UNIT I- Theories of Decay

1. Explain Gamow's theory of α - decay. How is Geiger-Nuttal law obtained from it?
2. Explain the Fermi theory of beta decay and also give a brief description of the shape of the beta ray spectrum.
3. Discuss in detail the detection and properties of neutrino.
4. Explain in detail the multipole transitions in nuclei.

UNIT II- Nuclear Reaction

1. Give the theory of stripping reactions with particular reference to semi classical description and wave mechanical description.
2. Give an outline of the statistical theory of nuclear reactions and hence calculate the cross section of a specific reaction.
3. What is Q equation? Obtain the solution of the equation. Also discuss in detail about exoergic and endoergic reactions.

UNIT III- Nuclear Models and Nuclear Energy

1. Using liquid drop model discuss the theory of nuclear fission and obtain the limit of nuclear stability.
2. On the basis of liquid drop model give a simple derivation of Weizaker semi empirical mass formula.
3. Elaborate the Bohr Wheeler theory of nuclear fission.

UNIT IV- Nuclear Forces

1. Explain the ground and excited states of deuteron.
2. Obtain expressions for the magnetic and electric quadrupole moments.
3. Explain the effective range theory in detail.
4. Discuss the neutron – proton scattering below 10 Mev.
5. Give a detailed account of the meson theory of nuclear forces.

UNIT V- Elementary Particles

1. Are the following reactions allowed? Give reasons in support your answer.
 - (i) $p^+ + p^+ \rightarrow p^+ + p^+ + \pi^- + n^0$
 - (ii) $p^+ + p^+ \rightarrow k^+ + p^+$
 - (iii) $k^0 \rightarrow \pi^+ + \pi^- + \pi^0$
 - (iv) $k^+ + \pi^+ \rightarrow p^+ + p^+$
 - (v) $\pi^- + p^+ \rightarrow \pi^0 + n^0$
2. Give the theory of SU (3) symmetry and also construct the Boson Octet.
3. Write in detail the classification elementary particles.
4. Outline CPT theorem.
5. Categorize the quark model of elementary particles.

PG PSYCHOLOGY 2022-2024 QUESTION BANK

ADVANCED GENERAL PSYCHOLOGY – 21PPSC11

SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

1. Psychology is a _____ science
 - a) **Behavioural**
 - b) Simple
 - c) Philosophical
 - d) Theoretical
2. Biological Psychology is also known as _____
 - a) Brain Psychology
 - b) **Behavioural neuroscience**
 - c) Organic psychology
 - d) Physical psychology
3. Who is the father of experimental psychology?
 - a) Edward Thorndike
 - b) J.B. Watson
 - c) William James
 - d) **Wundt**
4. The invisible gorilla experiment focused on?
 - a) multi-tasking
 - b) practical intelligence
 - c) **selective attention**
 - d) divided attention
5. The first psychological lab was constructed in?
 - a) 1889
 - b) **1879**
 - c) 1979
 - d) 1989
6. Is the branch of psychology concerned with the assessment and treatment of mental illness, abnormal behavior, and psychiatric disorders.
 - a) counseling
 - b) **clinical**
 - c) social
 - d) biological
7. The research method is when a psychologist asks people questions about their thoughts, feelings, or behavior.
 - a) case study
 - b) experiment
 - c) observation
 - d) **survey**

8. In India, experimental psychology was introduced by

- a) **N.N. Senguptha**
- b) G.D. Boaz Bose
- c) J.P. Sinha
- d) C.M. Bhatia

9. Dualism was founded by.....

- a) Socrates
- b) **Descartes**
- c) Plato
- d) Wolff

10. Which does not come under philosophical assumptions of Personality Psychology?

- a) Optimistic vs Pessimistic
- b) Freedom vs Determinism
- c) **Social vs Interpersonal**
- d) Active vs Reactive

UNIT II

1. Which is the dorsal part of the diencephalon?

- a) hypothalamus
- b) **thalamus**
- c) amygdala
- d) massa intermedia

2. are groups of neurons of similar shape.

- a) **nuclei**
- b) caudate nucleus
- c) putamen
- d) paleglobe

3. Caused by degenerative disease with the symptoms of weakness, tremors, and rigidity of the limbs.

- a) **Parkinson's**
- b) Alzehmiers
- c) Dementia
- d) Asthma

4. contains most of the cell body of neurons that surrounds the cerebral aqueduct.

- a) red nucleus
- b) reticular formation
- c) substantia nigra
- d) **periaqueductal gray matter**

5. What is the miniature version of the cerebrum?

- a) cerebral cortex
- b) **cerebellum**
- c) pons
- d) medulla

6. Is a long, conical structure, thick as an adult little finger.

- a) vertebral column
- b) cerebral cortex
- c) **spinal cord**
- d) hindbrain

7. The cerebral cortex covers most of the surface of the cerebral hemisphere.

- a) limbic cortex **b) neocortex**
- c) corpus callosum d) cingulate gyrus

8. include everything in front of the central sulcus?

- a) frontal lobe** b) parietal lobe
- c) temporal lobe d) occipital lobe

9. The period of asymmetrical diversion lasts about.....

- a) 3 months** b) 4 months
- c) 6 months d) 2 months

10. Wight of the brain?

- a) 1300g **b) 1400g**
- c) 1600g d) 1700g

UNIT III

1. Which is known as the "glassy liquid"?

- a) CBF** b)Retina
- c)Viterous humour d)Black bile

2.The deficits of visual perception in the absence of blindness caused by brain damage is known as.....

- a)Visual agnosia b)prosopagnosia
- c)apperceptive visual agnosia d)fusiform

3.The receptive cell of the auditory apparatus is known as.....

- a)Organ of corti b)oval window
- c)deiters's cell d)hair cell

4.Which is one of the vestibular sacs?

- a) urticle** b)Cupula
- c)Ampula d)none of these

5. The receptor cells sensitive to light is known as.....

- a)rods b)fovea
- c)hue d)cones

6.A somatosense that includes sensitivity to stimuli that involves the skin is known as.....

- a)cutaneous senses** b)kinesthesia

- c)organic sense d)none of these
7. There are approximately how many taste buds in the tongue?
- a)10,000** b)20,000
- c)5000 d)30,000
- 8.The taste sensation produced by glutamate is known as....
- a)umami** b)sour
- c)sweet d)bitter
- 9.The olfactory bulbs is situated at the base of the
- a)brain** b)nose
- c)tongue d)none of these
- 10.Perception of body's own movement is known as.....
- a)kinesthesia** b)movement
- c)both a&b d) none of these

UNIT IV

1. Learning is different from.....
- a) growth **b) maturation**
- c) development d) practice
2. The founder of Behaviorism is.....
- a) John B. Watson** b) B.F.Skinner
- c) Ivan Pavlov d) Thorndike
3. A naturally occurring stimulus that leads to an involuntary response is
- a) neutral stimulus b) conditioned stimulus
- c) unconditioned stimulus** d) stimulus
4. Pavlov's experiment initially aimed at studying thein dogs?
- a) respiration b) blood flow
- c) heart functioning **d) digestive system**
5. Classical conditioning is learning through.....
- a) experience b) reinforcement
- c) association** d) Punishment
6. The Comes before the US.

6. Maintenance Rehearsal is a procedure in which memory....

- a) STM
- b) **LTM**
- c) echoic
- d) iconic

7. There are how many types of memory?

- a) 5
- b) **3**
- c) 4
- d) 2

8. Memories leave a trace in the

- a) **brain**
- b) mind
- c) heart
- d) soul

9. is the partial or complete loss of memory.

- a) **amnesia**
- b) Parkinson
- c) dementia
- d) alzheimer

10. Dissociative amnesia is also called.....

- a) dissociative fugue
- b) **psychogenic**
- c) selective
- d) continuous

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

1. Define Psychology.
2. Define Experimental psychology.
3. Define biological psychology.
4. Define social psychology.
5. Define clinical psychology.
6. Define quantitative psychology.
7. List any four methods used in psychology.
8. List any four sub-fields of psychology.
9. Describe the survey.
10. Describe naturalistic observation.

UNIT II

1. Describe nerves.

2. Describe brain.
3. Define action potential.
4. Define membrane potential.
5. Define ectoderm.
6. Describe synapse.
7. List the parts of the forebrain.
8. Explain the function of basal ganglia.
9. Explain the functions of neurotransmitters.
10. List any four neurotransmitters.

UNIT III

1. Define oval window.
2. Define sensory transduction.
3. List five qualities of taste.
4. Define olfactory bulb.
5. Define perception.
6. List any four principles of perception.
7. Describe schema theory.
8. Describe top-down processing.
9. Describe bottom-up processing.
10. Explain any one significant feature of the constructivist approach.

UNIT IV

1. Define learning.
2. Define cognitive learning.
3. List the key proponents of behaviorism.
4. Describe spontaneous recovery.
5. Explain positive reinforcement.
6. Describe fixed ratio reinforcement.
7. Describe the cognitive map.
8. Describe insight learning.
9. Explain latent learning.

10. Differentiate between fixed and varied interval reinforcement.

UNIT V

1. Define memory.
2. Define echoic memory.
3. Describe STM.
4. Describe LTM.
5. Explain procedural memory.
6. Explain confabulation.
7. Define forgetting.
8. Define retrograde amnesia.
9. Define anterograde amnesia.
10. Explain motivated forgetting.

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Provide a short note on psychology.
2. Provide a note on the various sub-fields of psychology.
3. Explain the various methods used in psychology.
4. Provide a short note on your favorite field of psychology.

UNIT II

1. Provide an overview of the communication in the nervous system.
2. Provide a note on the interaction between neurons.
3. Provide a note on various neurotransmitters and their functions.
4. Provide a note on Forebrain.

UNIT III

1. Provide a note on the ear and its functions.
2. Provide a note on the eyes and its functions.
3. Provide a note on perception.
4. Analyze the determinants of attention.

UNIT IV

1. Provide a note on classical learning.
2. Provide a note on operant learning.
3. Provide a note on cognitive learning.
4. Provide a note on social learning.

UNIT V

1. Explain the types of memory.
2. Provide a note on LTM.
3. Provide a note on the ways to improve memory.
4. Provide a note on forgetting.
5. Explain the types of dissociative amnesia.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Give a detailed note on your own understanding of psychology.
2. Give a detailed note on any two sub-fields of psychology.
3. Give a detailed note on the methods used in psychology.
4. Elaborate on counseling psychology.
5. Summarize sub-fields of psychology.

UNIT II

1. Summarize the communication in the neurons.
2. Give a detailed note on the interaction between neurons.
3. Summarize neurotransmitters and their functions.
4. Summarize the brain and its functions.

UNIT III

1. Summarize the five senses.
2. Summarize perception.
3. Give a detailed note on the two approaches to perception.

4. Summarize attention.

UNIT IV

1. Give a detailed note on classical learning.

2. Give a detailed note on operant learning.

3. Summarize cognitive learning and observational learning.

4. Elaborate on the Bobo doll experiment and its findings.

UNIT V

1. Summarize memory.

2. Give a detailed account of the various types of memory with an example.

3. Summarize forgetting.

4. Mention the ways that you will improve your memory with various examples.

DEVELOPMENTAL PSYCHOLOGY – 21PPSC12

SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

- _____ period covers the time from conception to birth.
 - Infancy
 - Prenatal**
 - Post natal
 - Germinal
- _____ method involves looking for relationship between two variables.
 - Survey research
 - Quasi experimental method
 - Correlational method**
 - Longitudinal method
- _____ is an experiment where participants cannot be randomly assigned to the independent variable.
 - Quasi experiment**
 - True experiment
 - Non _experimental method
 - Sequential method
- _____ is a type of research design in which you collect data from many different
 - Time lag method
 - Sequential method
 - Survey method
 - Cross sectional study**
- _____ is an transitional phase of growth and development between childhood and adulthood.
 - Old age
 - Early adulthood
 - Adolescence**
 - late adulthood
- _____ period is the Frist 4 weeks of a childs life.
 - neonatal**
 - Postnatal
 - Prenatal
 - Childhood
- Children between the age of are in the age period commonly referred to as middle childhood.
 - 0-18 months
 - 1-3 years
 - 6-12 years**
 - 3-5years
- _____ means the change that occurs in his/her physical& mental behaviour besides the growths & life change continues.
 - Growth
 - Transition
 - development**
 - Multiplication

9. _____ refers to ages nearing or sur passing the expectancy of human beings , and is thus the end of human life cycle.

- a). Middle age
- b). Late childhood
- C). Adulthood
- d). **Old age**

10. Rapid physical changes occurs _____ period.

- a). Old age
- b). Late adulthood
- c). **Adolescence**
- d). Toddler

UNIT II

1. _____ includes the activity of running, jumping, skipping.

- a) Fine motor skill
- b) gross motor skill**
- c) play skill
- d) growth skill

2. According to Levinson what is the period between 17-33?

- a) early adult transition
- b) novice period**
- c) culminating phase
- d) settling down stage

3. Neonates born weighing less than _____ pounds are considered as low birth weight.

- a) 4 ½
- b) 6 ½
- c) 5 ½**
- d) 7 ½

4. _____ are automatic reactions to stimulation that enable infants to respond to the environment before learning takes place.

- a) motor skills
- b) neonatal development
- c) reflexes**
- d) automatic stimulation

5. Motor development from the center and upper body is called_____

- a) proximodistal**
- b) caudalcephadal**
- c) cephalocaudal
- d) somatosophidal

6. Piaget divide sensorimotor stages into _____ substages

- a) 7
- b) 6**
- c) 9
- d) 4

7. Piaget introduced a term for infants innate thinking process as_____

- a) representational thought
- b) schemas**
- c) sensory perception
- d) memory

8. _____ is the application of previous concepts to new concepts.

- a) accommodation
- b) adaptation
- c) assimilation**
- d) accustiation

9. sensory memory lasts about _____

- a) **less than 1 sec** b) less than 10 sec
- c) less than 5 sec d) less than 15sec

10. What is the first level in Kohlberg's moral development theory?

- a) **preconventional stage** b) conventional stage
- c) postconventional stage d) premodal stage

UNIT III

1. What is the primary influence on a child's social development?

- a) Genetic factors b) **Peer interactions**
- c) Television programs d) Random chance

2. What is a common challenge faced by teenagers during identity formation?

- a) Having too much parental influence b) Lacking peer pressure
- c) **Struggling with a coherent sense of self** d) Avoiding all social interactions

3. According to Freud's psychoanalytic theory, which part of the mind operates on the pleasure principle?

- a) Ego b) Superego
- c) Conscience d) **Id**

4. Which psychological concept explains teenagers imitating behaviours they observe in their peers?

- a) **Social Learning Theory** b) Psychoanalytic Theory
- c) Cognitive Dissonance Theory d) Behaviourist Theory

5. What term describes a child's ability to understand and share another person's feelings?

- a) Sympathy b) Compassion
- c) **Empathy** d) Apathy

6. According to Erik Erikson's psychosocial theory, what is the primary conflict faced during adolescence?

- a) Trust vs. Mistrust b) Autonomy vs. Shame and Doubt
- c) **Identity vs. Role Confusion** d) Intimacy vs. Isolation

7. What refers to the period of inner conflict and exploration of identity that often occurs during adolescence?

- a) **Identity crisis** b) Identity resolution

b. **Commitment**

d. Love

UNIT V

1. Middle adulthood lasts from
 - a. **40-60**
 - b. 40-50
 - c. 30-50
 - d. 30-60
2. Isolation crisis is a characteristic feature of
 - a. childhood
 - b. oldage
 - c. adolescence
 - d. **adulthood**
3. Is the important status symbol of adulthood.
 - a. career
 - b. car
 - c. **home**
 - d. phone
4. Moving from one social group to another is called social
 - a. Movement
 - b. **Mobility**
 - c. transfer
 - d. adjustment
5. Longest period in total life span is
 - a. Infancy
 - b. **adulthood**
 - c. childhood
 - d. oldage
6. Moving from one social group to another on the same level is
 - a. diagonal
 - b. reverse
 - c. vertical
 - d. **horizontal**
8. Moving from one social group to another that is lower or higher is called
 - a. horizontal
 - b. **vertical**
 - c. diagonal
 - d. reverse
9. The most important quality of adult leader is
 - a. personality
 - b. **Social status**
 - c. career
 - d. beauty
10. Early adulthood is also called age.
 - a. **Settling down**
 - b. Gang
 - c. solitary
 - d. isolated
11. Oldage is the period of
 - a. growth
 - b. **decline**
 - c. maturity
 - d. productivity
12. The elderly have a group status.
 - a. **Minority**
 - b. Seniority
 - c. majority
 - d. juniority
13. is the sense that is most affected in oldage.
 - a. Audition
 - b. **vision**
 - c. touch
 - d. kinesthetic
14. Self interest among the oldage people is
 - a. decreasing
 - b. stable
 - c. **increasing**
 - d. neutral
15. The most common reason for change in recreation is
 - a. **Health**
 - b. Socio economic status
 - c. financial status
 - d. educational status

16. In oldage, religious tolerance
- | | |
|--------------------|---------------------|
| a. Loses hope | c. decreases |
| b. Develops hatred | d. increases |
17. The most common physical hazard of oldage is
- | | |
|-------------------|--------------|
| a. Carelessness | c. ignorance |
| b. Disease | d. accident |
18. is the most important psychological hazard for the elderly.
- | | |
|--------------------------------|--------------|
| a. Accepting stereotype | c. adjusting |
| b. Getting along | d. learning |

SECTION B

Answer in about 50 words:

(2 Marks)

UNIT I

- 1). Define Development psychology .
- 2). What are the characteristics of development psychology?
- 3) . What are the types of Experimental Method?
- 4). What is growth ?
- 5). Define life span development.
- 6). What is kinds of birth?
- 7). What is Reflexes in development?
- 8). Define Neonate development.
- 9). Discus the meaning and nature of development
- 10). What is multiple birth?

UNIT II

1. What about componential intelligence?
2. Define schema?
3. Define reflexes/
4. Write any two differences between gross and fine motor skills/
5. What are the stages of Piaget's theory?
6. Define lateralization of brain?
7. What is age clocks?
8. What is sensory perception?
9. Define Equilibrium?
10. What are the stages of Levinson theory in adulthood?

UNIT III

1. What is the concept of identity crisis in adolescence?

2. What is modelling?
3. What is sexual identity?
4. List the Freud's psychosexual stages.
5. What are the emotional problems in childhood?
6. How does social interaction contribute to the emergence of self-identity in teenagers?
7. List some important teenage problems.
8. Why is teenage considered a stormy age?
9. How does self-concept emerge during childhood?
10. What is the role of social learning in shaping adolescent behaviour?

UNIT IV

1. Name some of the social issues faced by Young Adults.
2. List the elements of Triangular Theory of love
3. What are the benefits of Marriage?
4. Name some of the Non Traditional Family Styles?
5. Why do people switch vocations?
6. List Erikson's stages of Psychosocial Development that comes under Young Adulthood.
7. What are the three types of intimacy?
8. State the ill effects of Divorce.
9. List the difficulties of Parenthood.
10. Define Psychosocial Development.

UNIT V

1. Define the term empty nest.
2. How does a middle aged cope with death of a spouse?
3. How can a middle aged person get ready for retirement?
4. List 4 characteristics of old age.
5. What are the developmental tasks of old age?
6. List 4 changes in motor abilities that the old have to cope up with.
7. List few mental changes occurring during old age.
8. What are the changes occurring in interests as a result of old age?
9. List few vocational adjustments in old age.
10. List few adjustments to retirement in old age.
11. List few changes in family life due to old age.
12. How do the old adjust to loss of a spouse in old age?
13. Define cohabitation in old age.

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

- 1). What are the types of Non experimental method.?
- 2). Explain the stages of Development.
- 3). What are the principle of development psychology?
- 4). Explain the Neonatal period , Important, Risk and Complications.
- 5). What are the types of Developmental psychology?

UNIT II

1. Write about the motor development in age 0-2?
2. Elaborate on what are the ways the child will be learning?
3. Establishing a career in adulthood – Analyse and introspect
4. What are the physical declines older people experiences?
5. Cognitive development according to Piaget –write briefly.

UNIT III

1. Explain the social learning perspective in personality development.
2. Write about teenage relationships with peers and parents.
3. Discuss about the identity crisis in adolescence.
4. Explain the cognitive perspective in personality development.
5. Write about the importance of sexual identity in teenagers.

UNIT IV

1. Explain the crisis of Young Adulthood.
2. Discuss the various relationships in Young Adulthood
3. Elaborately state the Personality Development
4. Briefly explain the Triangular Theory of Love
5. Write about the career planning of Young Adults.

UNIT V

1. Describe the characteristics of oldage.
2. Explain the adjustment to physical changes in oldage.
3. What are the personal interests of the old?
4. Describe the conditions responsible for changes in recreational activities during oldage.
5. Describe the conditions limiting employment opportunities to the old.
6. Write a note on retirement at oldage.
7. Differentiate the adjustment problems of men and women to loss of a spouse in oldage

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Explain the concept, nature and important of the developmental psychology.
2. Explain the life span period in Human Development.
3. Explain the Experimental Method and Non Experimental method.

UNIT II

1. Explain cognitive development in the age of 0-2.
2. Write briefly about the Intelligence and Moral development in adolescence.
3. Explain language development of children in brief.

UNIT III

1. Explain the psychoanalytic perspective in personality development.
2. Write about the emotional development and emergence of self.
3. Explain the psychosocial development in childhood and adolescence.

UNIT IV

1. Give an account of the Social issues faced in Young Adulthood.
2. Explain the Personal relationships in Young Adulthood.
3. Put Forth the new trends in relationship.
4. Elaborately explain the positives and negatives of Parenthood.

UNIT V

1. Elaborate on the marital hazards of middle age.
2. Explain the characteristics of oldage.
3. Explain the vocational adjustments during oldage.
4. Elaborate on the living arrangements for the elderly.

THEORIES OF PERSONALITY– 21PPSC13

SECTION –A

Choose the correct Answer

(1 Mark)

Unit I

1. When an assessment device measures what it intends to measure, it is called

- a. reliability
- b. **validity**
- c. consistency
- d. validation

2. Rorschach inkblot test is an example of test.

- a. self-report
- b. interview
- c. **projective**
- d. behavioural

3. Experimental method involves types of variables.

- a. 1
- b. **2**
- c. 3
- d. 4

4. McCrae & Costa proposed the factor model of personality.

- a. uni
- b. **five**
- c. six
- d. multi

5. The concept of birth order was proposed by

- a. Freud
- b. **Adler**
- c. Jung
- d. Watson

6. Erikson proposed stages of psycho-social development.

- a. 4
- b. 6
- c. **8**
- d. 10

7. set up the first lab for Psychology.

- a. **Wundt**
- b. Watson
- c. Wilson
- d. Williams

8. MMPI stands for

- a. **Minnesota Multiphasic Personality Inventory**

2. Ego and ego resiliency are the 2 components of ego.

- a. **control**
- b. mastery
- c. power
- d. superiority

3. Analytical Psychology was proposed by

- a. Freud
- b. **Jung**
- c. Adler
- d. Horney

4. Jung equated the term libido with the term

- a. **psyche**
- b. Thanatos
- c. life energy
- d. death energy

5. Adler proposed basic styles of life.

- a. 1
- b. 2
- c. 3
- d. **4**

6. According to Horney, is the foundation of neurosis.

- a. **anxiety**
- b. stress
- c. depression
- d. inferiority

7. Men envied women for their capacity for motherhood. This was called envy.

- a. penis
- b. vaginal
- c. **womb**
- d. uteral

8. The concept of fictional functionalism was given by

- a. Freud
- b. Jung
- c. **Adler**
- d. Horney

9. The concept of midlife crisis was given by

- a. Freud
- b. **Jung**
- c. Adler
- d. Horney

10. The concept of extraversion & introversion was given by

- a. Freud
- b. **Jung**
- c. Adler
- d. Horney

11. Ego psychology was a work of

- a. 0-1
c. **3-5**
- b. 1-3
d. 6-11
6. Identity crisis is found during
- a. **adolescence**
c. middle age
- b. adulthood
d. muscular anal
7. Presence of only the negative tendency in the ego is called
- a. maladaptive
c. munificent
- b. **malignant**
d. adaptive
8. Presence of only the positive tendency in the ego is called
- a. **maladaptive**
c. munificent
- b. malignant
d. adaptive
9. The study of biographies to know a person is called
- a. autobiography
c. **psycho historical analysis**
- b. case study
d. psycho analysis
10. There are stages in the development of gender preference.
- a. 1
c. 3
- b. 2
d. **4**

Unit IV

1. traits are specific to individuals.
- a. **unique**
c. surface
- b. common
d. source
2. traits are common to individuals.
- a. unique
c. surface
- b. **common**
d. source
3. Proprium is the other name for as stated by Allport.
- a. id
c. super ego
- b. **ego**
d. psyche
4. Allport proposed number of values.

a. 2

b. 4

c. **6**

d. 8

5. traits determine how efficiently we are able to work towards a goal.

a. **ability**

b. temperament

c. dynamic

d. common

6. Traits are the driving forces of behaviour.

a. ability

b. temperament

c. **dynamic**

d. common

7. Traits possessed by everyone to some degree is traits.

a. ability

b. temperament

c. dynamic

d. **common**

8. 16 PF was developed by

a. Freud

b. Adler

c. **Cattell**

d. Zultzer

9. Q data of Cattell relies upon

a. **questionnaires**

b. objective tests

c. observer's ratings

d. researcher's ratings

10. According to Eysenk, personality has dimensions.

a. 1

b. 2

c. **3**

d. 4

11. According to McCrae and Costa there are personality factors.

a. 1

b. 3

c. **5**

d. 7

12. In US, women high in, were found to blog more.

a. **neuroticism**

b. psychoticism

c. agreeableness

c. emotional stability.

13. Lower needs are also called

a. **deficit needs**

b. growth needs

c. safety needs

d. being needs

Unit V

1. Skinner identified respondent behaviour and behaviour.

a. **operant**

b. modelled

c. overt

d. covert

2. Schedule in which the reinforcements are given at specific time intervals is

a. **fixed interval schedule**

b. fixed ratio schedule

c. variable interval schedule

d. variable ratio schedule

3. Schedule in which the reinforcements are given at variable time intervals is

a. fixed interval schedule

b. fixed ratio schedule

c. **variable interval schedule**

d. variable ratio schedule

4. Punishment and negative reinforcement are

a. the same

b. **not the same**

c. unique

d. specific

5. Observing the behaviour of a person and repeating it is called

a. **modelling**

b. shaping

c. conditioning

d. reinforcing

6. Observational learning is governed by related mechanisms.

a. 1

b. 2

c. 3

d. **4**

7. According to Bandura, feelings of self sufficiency and adequacy is called

a. self efficiency

b. **self efficacy**

c. self confidence

d. all the above

8. Locus of control was proposed by

a. **Rotter**

b. Zuckerman

c. Seligman

d. None of the above.

9. Sensation seeking was proposed by

a. Rotter

b. **Zuckerman**

- c. Seligman
d. None of the above.
10. Learned helplessness was proposed by
- a. Rotter
b. Zuckerman
c. **Seligman**
d. None of the above.
11. Positive Psychology was proposed by
- a. Rotter
b. Zuckerman
c. **Seligman**
d. None of the above.

SECTION B

Answer in about 50 words each:

(2 Marks)

Unit I

1. Define personality.
2. Differentiate between conscious and unconscious.
3. Who proposed the concept of behaviourism.
4. Define reliability.
5. What is validity?
6. Describe projective tests.
7. Describe Buss and Plomin's three temperaments.
8. Write a note on Eysenk's dimensions of personality.
9. State the 5 factor model of personality.
10. Describe Cattell's trait theory.

Unit II

1. Describe id, ego and superego.
2. Illustrate the structure of the psyche according to Freud.
3. Describe projection.
4. What are defense mechanisms?
5. Explain reaction formation.
6. Differentiate between regression and repression.
7. What is Oedipus complex?

8. List Jung's psychological types.
9. What is the collective unconscious?
10. Explain MMPI.
11. Describe the characteristics of the second born child.

Unit III

1. List Horney's neurotic needs.
2. Describe a compliant personality.
3. Describe aggressive personality.
4. Describe detached personality.
5. What is womb envy?
6. List the psychosocial stages of development.
7. List the basic strengths developed in the various psychosocial stages of development.
8. Describe industriousness versus inferiority.
9. Describe Erikson's Play therapy.
10. Abbreviate: PEM & NEM.
11. Explain identity crisis.
12. What are the stages of development of gender preference.

Unit IV

1. Describe traits according to Allport.
2. What is functional autonomy of motives?
3. State the types of functional autonomies.
4. Differentiate common and unique traits.
5. State the importance of dynamic traits.
6. What are ergs and sentiments?
7. State Eysenk's dimensions of personality.
8. Describe psychoticism.
9. What are the 5 factors of personality according to McCrae and Costa?
10. Illustrate Maslow's hierarchy of needs.

11. State 4 characteristics of needs.
12. Describe meta motivation.
13. State 4 characteristics of self-actualizers.
14. State 4 characteristics of a fully functional person.
15. Describe client centered therapy.

Unit V

1. Define operant behaviour.
2. Define respondent behaviour.
3. State the schedules of reinforcement.
4. Describe superstitious behaviour.
5. Differentiate punishment and negative reinforcement.
6. Describe modelling.
7. What is disinhibition?
8. State the mechanisms that govern observational learning.
9. Define self efficacy.
10. What is reciprocal determinism?
11. Describe locus of control.
12. What is sensation seeking?
13. Differentiate optimism and pessimism.
14. What is learned helplessness?
15. Define positive psychology?

SECTION C

Answer in about 200 words:

(5 Marks)

Unit I

1. Describe the role of the unconscious.
2. Explain the evolution of personality.
3. Write a note on personality and the internet.
4. Describe the projective tests used to assess personality.

5. Explain clinical methods.
6. Explain personality in the perspective of genetic factors.
7. Explain personality in the perspective of developmental factors.
8. Explain personality in the Perspective of unconscious factors.
9. Describe a virtual research method.
10. List the limitations of experimental methods.

Unit II

1. Explain Freud's structure of the psyche
2. Describe the psychosexual stages of development.
3. Explain any 5 defense mechanisms of Freud.
4. State Anna Freud's extensions of Freud's theory.
5. Describe dream analysis.
6. Explain opposites, equivalence and entropy.
7. Write a note on extraversion and introversion.
8. Write a note on archetypes.
9. Describe the importance of ordinal position according to Adler.
10. Explain superiority and inferiority feelings.

Unit III

1. Describe basic anxiety as the foundation of neurosis according to Horney.
2. Describe the neurotic needs and trends according to Horney.
3. Explain complaint and aggressive personality types.
4. State the characteristics of detached personality.
5. Describe the conflicts found in various psychosocial stages of development according to Erikson.
6. How is assessment done in Erikson's theory?
7. Write a note on gender preference identity.
8. Write a note on virtual identity.

Unit IV

1. Explain functional autonomy.

2. Explain the types of traits according to Cattell.
3. Describe dynamic traits.
4. Differentiate extraversion and introversion.
5. Describe the five factor model of personality.
6. Write a note on Maslow's meta needs and meta pathologies.
7. Explain self actualization according to Maslow.
8. Write a note on the conditions of worth according to Rogers.
9. Describe the personal construct theory.
10. Describe fixed role therapy.

Unit V

1. Describe the schedules of reinforcement.
2. Differentiate operant and respondent behaviour.
3. Explain operant conditioning.
4. Explain the applications of operant conditioning.
5. Describe the assessment methods in operant conditioning.
6. What are the characteristics of modelling situations?
7. Differentiate self reinforcement and self efficacy.
8. Explain Julian Rotter's theory of personality.
9. Explain Zuckerman's sensation seeking.
10. Explain Seligman's positive psychology.

SECTION D

Answer in about 400 words:

(10 Marks)

Unit I

1. Elaborate on the place of personality in the history of psychology.
2. Explain the research methods used in psychology.
3. Elaborate the perspectives of psychology in genetic and environmental factors.
4. Explain in detail the personality perspectives in conscious and unconscious factors.
5. Explain in detail the personality perspectives in developmental and parental factors.

Unit II

1. Give a detailed account of Freud's psycho sexual stages of development.
2. Elaborate on defense mechanisms.
3. Explain Jung's concepts of psychic energy.
4. Critically analyze inferiority and superiority feelings.
5. Explain the importance of ordinal positions according to Adler.

Unit III

1. Discuss on Horney's Feminine Psychology.
2. Elaborate on neurotic needs and trends.
3. Explain in detail Erikson's stages of psychosocial development.
4. How is assessment done in Erikson's theory and what are its reflections?
5. Explain how basic anxiety forms the basis of all neurosis according to Horney.

Unit IV

1. Give a detailed account of Allport's trait theory.
2. Explain in detail traits as proposed by Cattell.
3. Elaborate on Eysenk's theory of personality.
4. Analyze the five factor theory of personality critically.

Unit V

1. Explain operant conditioning in detail.
2. Elaborate on Maslow's hierarchy of needs.
3. Give a detailed account of personal construct theory.
4. Explain how modelling forms the basis of observational learning.
5. Elaborate on the contemporary theories of personality.

PHYSIOLOGICAL PSYCHOLOGY – 21PPSC14

Section A

Choose the correct Answer

UNIT I

1. Charles Darwin published his book on the origins of species in the year.
a) **1859** b)1869 c)1857 d)1867
2. In which year CT scan was developed?
a) **1979** b)1978 c)1990 d)1991
3. Which one of the following was one among the people who discovered principles for drug treatment?
a) **Gertrude B. Elion** b)Erick c)Stanley d)Egas
4. CT scan stands for.
a) **Computerized Tomography**
b) Computerized Tomography
c) Computer Technology
d) All of these
5. Name the person who discovered the speed of the nerve impulse.
a) **Helmholtz** b)Charles Darwin c)Charles Bell d)Edward
6. Which is the most commonly used fixative.
a) Cresyl violet **b) formalin** c) xylene d)albumin
7. The most commonly used dye to stain cell bodies is called.
a) **Cresyl violet** b) formalin c) xylene d)albumin
8. Who referred to the "principle of selection" as survival of the fittest?
a) **Spencer** b)Roger c)Darwin d)all of these
9. The structure of DNA was first revealed by.
a) **Watson& Crick** b)Roger& Watson c)Darwin& Crick d)Crick &Roger

10. In which year the cell theory was started...

- a) **1830s** b)1840s c)1850s d)1870s

UNIT II

- Which is the primary function of the nervous system?
a) Thinking b)Movement **c) Behaviour** d) Transportation
- A neuron with one axon and one dendrite attached to its soma is called?
a) Bipolar b) **Unipolar** c) Multipolar d) Interneuron's
- Which is called the cell's marriage brokers and divorce judges?
a) Microtubules b) Cytoskeleton **c) Enzymes** d)Cytoplasm
- Which is known as the "black substance"?
a) **Substantia Nigra** b)Colliculi c)Red nucleus d)Reticular Formation
- Autonomic nervous system is divided into how many divisions?
a) **2** b) 1 c) 4 d) 5
- The Thalamus is a division of which part of the brain.
a) **Diencephalon** b)Telencephalon c)Mesencephalon d)noneof these
- Which is known as the little brain?
a) **Cerebellum** b)Cerebrum c)Diencephalon d)Telencephalon
- The peripheral nerve attached to the spinal cord is known as?
a) spinal nerve b)cranial nerve c)both a &b d)none of these
- Expand ANS
a) **Autonomic Nervous System**
b) Autonomic Nervous System
c) Autonomic Neuron System
d) Autonomic Nervous Sync
- A major groove in the surface of the brain, larger than a sulcus is known as?
a) **Fissure** b)Sulcus c)Gyrus d)All of these

UNIT III

- Which is known as the "glassy liquid"?
a) **CBF** b)Retina c)Vitreous humor d)Black bile

2. The deficits of visual perception in the absence of blindness caused by brain damage are known as?
a) **Visual agnosia** b) prosopagnosia c) apperceptive visual agnosia d) fusiform
3. The receptive cell of the auditory apparatus is known as?
a) Organ of Corti b) oval window c) Deiters's cell d) **hair cell**
4. Which is one of the vestibular sacs?
a) **utricle** b) Cupula c) Ampula d) none of these
5. The receptor cells sensitive to low light are known as?
a) **rods** b) fovea c) hue d) cones
6. A somato sense that includes sensitivity to stimuli that involves the skin is known as?
a) **Cutaneous senses** b) kinesthesia c) organic sense d) none of these
7. There are approximately how many taste buds in the tongue?
a) **10,000** b) 20,000 c) 5000 d) 30,000
8. The taste sensation produced by glutamate is known as?
a) **umami** b) sour c) sweet d) bitter
9. The olfactory bulbs are situated at the base of the ?
a) **brain** b) nose c) tongue d) none of these
10. Perception of the body's own movement is known as?
a) **kinesthesia** b) movement c) both a & b d) none of these

UNIT IV

1. What is the frequency of beta activity?
a) **13-30 Hz** b) 8-12Hz c) 3.5-7.5Hz d) less than 4Hz
2. Expand REM
a) **Rapid Eye Movement**
b) Rapid Eye Muscle
c) Retinal Eye Movement
d) Retinal Ear Movement
3. Which stage of sleep is known as slow-wave sleep?
a) 4th stage b) 3rd stage c) **both a & b** d) 1st stage

4. Termination of a pregnancy caused by the odor of a pheromone of the urine of male other than the one that impregnated the female.
 - a) **Bruce effect**
 - b)vandenbergh effect
 - c)lee-boot effect
 - d)Coolidge effect
5. The act of giving birth is known as?
 - a) **parturition**
 - b)pregnancy
 - c)insemination
 - d)none of these
6. The optimum value of the system variable in a regulatory mechanism is known as?
 - a) **set point**
 - b)system variable
 - c)detector
 - d)none of these
7. Thirst produced by hypovolemia is known as?
 - a) **volumetric thirst**
 - b)osmometric thirst
 - c)both a&b
 - d)none of these
8. Expand MP
 - a) **methyl palmoxirate**
 - b) methane palmoxirate
 - c) methyl Palmolive
 - d) methane palmolive
9. The first portion of the small intestine is known as?
 - a) **duodenum**
 - b)stomach
 - c)both a&b
 - d)none of these
10. Claude Bernard was a physiologist?
 - a) **French**
 - b)American
 - c)Indian
 - d)African

UNIT V

1. What is the Greek meaning for hormones?
 - a) **to excite**
 - b)to stay put
 - c)to work
 - d)to run
2. Hormones that target reproductive tissues are known as.....
 - a) **sex hormones**
 - b)anabolic hormones
 - c)tropic hormones
 - d)protein hormones
3. Non-steroid hormones are synthesized primarily from amino acids rather than from cholesterol are known as.
 - a) **Protein hormones**
 - b)peptide hormones
 - c)amino hormones
 - d)none of these
4. Adeno hypophysis means...
 - a) **anterior pituitary**
 - b)posterior pituitary
 - c)chromophobes
 - d)basophils
5. Pineal gland is located at the.....of the brain.
 - a) **center**
 - b)right
 - c)base
 - d)left
6. Growth hormone is also known as.

- a) **somatotropin hormone** b) prolactin c) anti diuretic hormone d) none of these
7. The important mineralocorticoid in humans is known as..
- a) **aldosterone** b) oxytocin c) prolactin d) epinephrine
8. Hypo secretion of mineralocorticoids and glucocorticoids may lead to which of the following.
- a) dehydration b) weight loss c) increase in potassium **d) all of these**
9. Extreme deficiency in vitamin D causes which condition?
- a) **rickets** b) goiter c) myxedema d) cystica
10. Thyroxine is the secretion of.....
- a) **thyroid gland** b) adrenal cortex c) gonads d) pineal gland

Section B (5 X 2 = 10)

Answer in about 50 words each:

UNIT I

1. What is the correlation approach?
2. Describe cerebral angiography.
3. Define Microiontophoresis.
4. Define PET.
5. State the interesting facts about males with extra Y chromosomes.
6. Define mitosis.
7. Define mitochondria.
8. Describe Hominids.
9. Describe natural selection.
10. Define DNA.

UNIT II

1. Define dendrite.
2. Define phagocytosis.
3. Define blood brain barrier.
4. Define cerebrospinal fluid.
5. List the layers of meninges.
6. Define apoptosis.
7. Define hippocampus.
8. Define the 2 important structures of diencephalon.
9. Define preganglionic neurons.

10. Define sympathetic ganglia.

UNIT III

1. Define sensory transduction.
2. Define parvocellular layer.
3. Define an oval window.
4. Define basilar membrane.
5. Define cupula.
6. Mention the 2 vestibular sacs.
7. Mention the 4 types of stimuli that cutaneous sense responds to.
8. Define phantom limb.
9. List the 5 qualities of taste.
10. Define an olfactory bulb.

UNIT IV

1. Define REM sleep.
2. Define narcolepsy.
3. Define rebound phenomenon.
4. Define menstrual cycle.
5. Describe Coolidge effect.
6. Describe the Bruce effect.
7. Define correction mechanism.
8. Describe isotonic.
9. List and describe the types of thirst.
10. Define ghrelin.

UNIT V

1. Define hormones.
2. Define tropic hormones.
3. Define synergism.
4. Describe oxytocin.
5. Define cushing's syndrome.
6. Define melatonin.
7. Define TypeI diabetes mellitus.
8. Define TypeII diabetes mellitus.
9. Describe vasopressin.
10. Define thyrotropin.

Section C (5 X 5 = 25)

Answer in about 200 words:

UNIT I

1. Provide a note on the philosophical roots of physiological psychology.
2. Produce a note on the historical developments of physiological psychology.
3. Produce a detailed note on Electroencephalography.
4. Produce a detailed note on recording of cardiovascular activity.
5. Explain Single-gene disorder.
6. Explain chromosomal abnormalities in detail.

UNIT II

1. Produce a note on supporting cells.
2. Analyse the blood brain barrier.
3. Produce a note on meninges and ventricular system.
4. Summarize the CNS.
5. Explain the anatomy of vertebrae with a diagram.
6. Produce a note on spinal and cranial nerves.
7. Analyse the midbrain.

UNIT III

1. Produce an account on photoreceptors.
2. Illustrate a note on the eye.
3. Explain the connection between the eye and brain.
4. Describe the perception of gustatory information.
5. Provide an account on perception of pain.
6. Bring out the anatomy of olfactory apparatus.

UNIT IV

1. Elucidate a note on disorders of sleep.
2. Explain the functions of slow wave sleep.
3. Explain the functions of REM sleep.
4. Explain the types of thirst.
5. Explain the neural mechanisms of thirst.
6. Explain the physiological hunger signals.
7. Provide a note on hormonal control of female reproductive cycles.
8. Explain pheromones.
9. Describe the activational effects of sex hormones in women.
10. Produce a note on neural control of sexual behavior in males.

UNIT V

1. Give a detailed account on classification of hormones.
2. Elucidate a note on working of hormones.
3. Provide a note on secretions of anterior pituitary gland.
4. Describe thyroid gland.
5. Illustrate a note on gonads and placenta.
6. Analyze stress syndrome.
7. Explain neurohypophysis.

Section D (2 X 10 = 20)

Answer in about 400 words:

UNIT I

1. Examine the genetic predisposition to psychotic disorders.
2. Categorize the methods of recording psycho physiological activity.
3. Analyse Brain imaging techniques

UNIT II

1. Analyse the basic and internal structure of neurons.
2. Illustrate the basic features of the nervous system.
3. Analyse the Autonomic Nervous System.
4. Provide a structure of neurons with diagram.

UNIT III

1. Explain the ear with a diagram.
2. Elucidate a note on the vestibular system.
3. Describe the anatomy of somatosenses and perception of cutaneous stimulation.

UNIT IV

1. Elaborate on the physiological and behavioral description of sleep.
2. Elaborate on the types of thirst and its neural mechanism.
3. Give a detailed description on brain mechanisms.

UNIT V

1. Explain in detail about your understanding about hormones.
2. Explain in detail about the pituitary gland.
3. Compile the hormones with its functions, locations and their glands in a table format.

SEMESTER II

COUNSELLING PSYCHOLOGY – 21PPSC21

Section – A

1 Mark

UNIT 1

Choose the correct answer:

- Which year was the Hughes Act was passed?
a) 1918 b) 1919 c) 1915 d) **1917**
- Who authored the book 'Revolution in Counselling?'
a) Freud b) Frank Parsons c) **John Krumboltz** d) Carl Rogers
- Who was the father of Guidance ?
a) Adler b) Freud c) Carl Rogers d) **Frank Parsons**
- In 1992, changed its name to ACA.
a) ACD b) ACAD c) **AACD** d) ACDA
- Pick the odd one out:
a) **Awareness** b) National development c) Self development d) Self realisation
- The ACA's code of ethics..... deals with confidentiality and privacy.
a) Section A b) **Section B** c) Section C d) Section D
- Counselling is a process.
a) **two way** b) one way c) interactive d) All of the above
- Who was the first to set up systematic guidance programme in public schools?
a) Rogers b) **Jesse B Davis** c) Smith d) Clifford
- Which is the era of great depression?
a) **1930s** b) 1940s c) 1950s d) 1920s
- In 1911, where did the educational courses were initiated?
a) Toronto University b) Yale University c) **Harvard University** d) Minnesota University

UNIT 2

- One of the pioneers of counselling.....
a) Sigmund Freud b) Carl Rogers c) Erickson d) **Clifford Beers**
- Father of Guidance.....
a) Jesse B Davis b) Clifford Beers c) **Frank Parsons** d) Skinner

3. A forerunner of mental health counselling.....
 - a) Frank Parsons
 - b) **Clifford Beers**
 - c) Carl Rogers
 - d) Jesse B Davis
4. Trait-Factor Theory was developed by.....
 - a) Carl Rogers
 - b) Skinner
 - c) Jesse B Davis
 - d) **Frank Parsons**
5. Counsellor centred approach was given by
 - a) **Williamson**
 - b) Jesse B Davis
 - c) Frank Parsons
 - d) Skinner
6. Directive approach in counselling was given by
 - a) **E.G. Williamson**
 - b) Frank Parsons
 - c) Jesse B Davis
 - d) Carl Rogers
7. Non Directive approach in counselling was given by
 - a) Frank Parsons
 - b) Jesse B Davis
 - c) Williamson
 - d) **Carl Rogers**
8. Community counsellor coined by.....
 - a) Rogers
 - b) Gilbert Wrenn
 - c) **Lewis**
 - d) Williamson
9. Ten strategies to resistance.....
 - a) **Newman**
 - b) Wrenn
 - c) Ginter
 - d) Bonny
10. Initial disclosure.....
 - a) Referral
 - b) **Relationship building**
 - c) Goal Setting
 - d) Problem assessment

UNIT 3

1. Who among the following used procedures where the client was asked to enact a role during a therapeutic situation?
 - a) Carl Jung
 - b) **Carl Rogers**
 - c) Sigmund Freud
 - d) George Kelly
2. Counselling involves _____
 - a) **consultation and interchange of opinions between counsellor and the individual**
 - b) advice from counsellor to the individual only
 - c) problem sharing by the individual with the counselor only
 - d) schools identifying issues with children with needs.
3. Which profession uses the aptitude tests most?
 - a) **Guidance Counsellor**
 - b) Doctors
 - c) Lawyers
 - d) Engineers
4. Which of the following sentence is TRUE in the context of guidance and counselling in school?

- a) Talking about my problems, in counselling or otherwise, isn't going to help.
 - b) Counselling takes only one sitting to be effective.
 - c) **Helps in working through personal problems that may affect academics or relationships.**
 - d) Students get counselling only because there is a counselor in school.
5. The approach to counselling in which the therapeutic process is directed along lines considered relevant by the counsellor is named as:
- a) Non-directive counselling
 - b) **Directive counselling**
 - c) Eclectic counselling
 - d) Vocational counselling
6. What is not a characteristics of counseling?
- a) Environment building
 - b) Opportunity for free expression
 - c) Counsellor's involvement
 - d) **Personal interview**
7. The number of types of counselling is
- a) **3** b) 2 c) 1 d) 5
8. According to the psychologist _____ counselling covers all types of personal situations in which one person is helped to adjust more effectively to himself and his environment.
- a) Carl Rogers
 - b) **Robinson**
 - c) Good
 - d) Erickson
9. Who among the following used procedures where the client was asked to enact a role during a therapeutic situation?
- a) Carl Jung
 - b) **Carl Rogers**
 - c) Sigmund Freud
 - d) George Kelly

UNIT 4

1. Some counseling techniques are appropriate for individual counseling, while others apply more to group counseling. Which of the following counselor skills applied to individual as well as group counseling?
- a) **summarizing**
 - b) consensus taking
 - c) moderating
 - d) linking
2. The counseling profession is based upon some general philosophical propositions. Which of these is not one of them?
- a) counseling aims to promote human growth and development
 - b) counseling considers physical as well as psychosocial environment.
 - c) counseling facilitates person-environment fit.
 - d) **counseling is a clearly defined helping relationship.**
3. Which counselor intervention most closely follows client verbalizations?
- a) reflection of feeling
 - b) confrontation
 - c) **restatement of content**

- d) positive regard
4. Which of these is not one of the core elements of the helping relationship?
 a) **psychodynamics** b) theory c) social influence d) human relations
5. Counselors who choose their approach and techniques according to the needs and capacity of each individual client are said to be.....
 a) humanistic b) affective c) cognitive d) **eclectic**
6. The “mediator” is an important dimension of which type of consultation?
 a) mental health b) **triadic** c) process d) behavioural
7. When a counselor’s response includes congruent ideas and feelings from another frame of reference to facilitate client exploration, Ivey would say the counselor is using
 a) basic empathy b) reflection of meaning c) **additive empathy** d) skill integration
8. Empty chair” is a group technique used by which type of group counselor?
 a) **gestalt** b) behavioural c) transactional analysis d) adlerian
9. Which type of group counselor views people as basically positive and moving toward actualization?
 a) behavioural b) **group centered** c) adlerian d) psychoanalytic

UNIT 5

1. Oral or written behavioural agreements in groups counseling are referred to as
 a) trust b) issue c) **contracts** d) conclusions
2. In rational-emotive and cognitive- behavioural therapy groups the focus is more on thoughts than on feelings. These techniques help people become aware of their
 a) self-denial b) defenses c) **self-talk** d) depression.
3. When a group member projects feelings deriving from past relationship onto the therapist, it is called.....
 a) counter transference b) **transference** c) reframing d) confrontation
4. Role playing is an effective technique used in group counselling. Which of the following is not a benefit of role playing?
 a) practicing new skills
 b) identifying effective and in effective behaviors
 c) **escaping from being oneself**
 d) preparing for real-life situations?
5. As a new counselor in a community mental health center, you have been assigned to a client whose diagnosis is “anorexia nervosa”. You would expect the client to be.....
 a) male rather than female
 b) middle-aged rather than adolescent
 c) extroverted rather than introverted
 d) **none of the above**

6. When working with clients, counselors need to be aware of defense mechanisms. Clients who refuse to take responsibility for their own actions or situations often attribute their unacceptable desires or impulses to others. This is an example of.....
- a) regression b) **projection** c) repression d) protection
7. A counselor whose methods are based on learning theory approaches treatment.....
- a) with an emphasis on rational thinking
 b) by focusing on emotional content
 c) **from a behavioural standpoint**
 d) in a holistic manner
8. _____ may be either basic, additive, or subtractive.
- a) positive regard b) attending c) consultation d) **empathy**
9. Counselors who consistently behave in accordance with their own values and perceptions are exhibiting the trait called _____.
- a) empathy b) transference c) intimacy d) **genuineness**
10. The _____ holds that individual are essentially good in nature, with a tendency toward growth and productivity.
- a) humanistic b) behavioristic c) **client-centered view** d) neo-freudian

Section B

Answer in about 50 words each

2 Marks

UNIT 1

1. Define the objectives of counselling.
2. Give a note on the need for ethical codes.
3. Write a short note on counselling efficiency.
4. Define Counselling.
5. List out some of the goals of counselling.

UNIT 2

1. Define commitment to action in counselling.
2. Write a brief note on transference and counter transference.
3. What does the termination mean in counselling?
4. Define structuring.
5. Define JPMR.
6. Describe Systematic desensitisation.

UNIT 3

1. Define active listening.
2. Give a brief note on attending.
3. Describe basic empathy formula.
4. List out the dimensions of responding skills.
5. Define summarising.
6. What are called micro skills in counselling.

UNIT 4

1. Define advanced empathy.
2. Define emotional catharsis.
3. Distinguish between transference and counter transference.
4. List out the stages of Egan's Skilled Helper Model.
5. List out some of the ways to enhance communication in counselling.
6. List out the stages of Patterson's Model.
7. Mention some ways to build counselling relationship.

UNIT 5

1. Define the term reliability
2. List out some of the types of validity.
3. Distinguish between metric and non-metric data.
4. Define face validity.
5. Define construct validity.
6. Distinguish between predictive and concurrent validity.
7. Explain content validity.
8. What are called random variables?

Section – C

Answer in about 200 words each:

5 Marks

UNIT 1

1. Demonstrate the essential assumptions for counsellors.
2. The most important area of ethical concern in counselling is 'Confidentiality' – Justify.
3. Explain the codes of professional ethics.
4. Explain some of goals of counselling.

UNIT 2

1. Describe the Person-Centered Theory.
2. Explain Gestalt Theory in counselling.
3. Provide a detailed note on Cognitive Theory.
4. Elucidate – Systematic Desensitization.
5. Explain the process of Goal setting in counselling.

UNIT 3

1. Describe some of the active listening skills in counselling.
2. Explain on the status of client's reluctance and resistance in counselling.
3. Provide a detailed note on counsellor's emotions towards the ambivalent, indifferent or oppositional clients.
4. Elucidate -three dimensions of responding skills?
5. Discuss the principles to guide the use of Empathy.

UNIT 4

1. Discuss the Patterson's three stages of counselling.
2. Explain some of the ways to enhance communication in counselling.
3. Provide a detailed account on advanced empathy, confrontation, role playing and emotional catharsis in counselling.
4. Provide a brief note on the evaluation of the helping process.
5. Discuss the action plan of Egan's Skilled Helper Model.

UNIT 5

1. Explain the client's reluctance and resistance in counselling.
2. Discuss the ways to understand hesitant clients.
3. Analyze some of the counsellor's difficulties while facing indifferent clients.
4. Elaborate the concept of reluctance and resistance in general.

Section – D

Answer in about 400 words each:

10 Marks

UNIT 1

1. Give an understanding about common ethical issues in counselling.
2. Explain the outcome and process of counselling.
3. Provide a detailed account on the emergence of counselling.

UNIT 2

1. Illustrate the Theories of Counselling.
2. Explain in detail on the process of goal setting, design and implementation in counselling.
3. Give an account on handling hesitant clients, resistance, transference and counter transference in counselling.

UNIT 3

1. Illustrate the active listening in detail.
2. Explain the counselling process of attending in detail.
3. Elucidate on the art of Probing and Summarizing in counselling.

UNIT 4

1. Elaborate the stages of Egan's Skilled Helper Model.
2. Discuss the Patterson's stages and skills in counselling process.
3. Elaborate the Patterson's process of goal setting, design and implementation of action plans.

UNIT 5

1. Elaborate the ways to deal with difficult clients.
2. Discuss the ways to work with ambivalent, indifferent and oppositional clients.
3. Compile the process involved in working with client's reluctance.

7. Ego psychology was developed by

- a. Jung
- b. Freud
- c. Anna Freud**
- d. Adler

8. Contemporary gestalt therapy is also called gestalt therapy

- c. relational**
- d. non relational

9. Classical psychoanalysis is grounded on psychology

- a. id**
- b. ego
- c. super ego
- d. psychotherapy

10. EFT was developed by

- a. Lassale Greenberg
- b. Leslie Greenwich
- c. Leslie Greenberg**
- d. Lessale Greenwich

Unit II

1. Therapy through meaning is called

- a. logo therapy**
- b. biblio therapy
- c. psycho therapy
- d. cogno therapy

2. PCT was propagated by

- a. Adler
- b. Jung
- c. Rogers**
- d. Freud

3. Congruence is the core therapeutic condition of

- a. PCT**
- b. RET
- C. CT
- d. CBT

4. Expressive art therapy was founded by

- a. Carl Rogers
- b. Natalie Rogers**
- c. Mandeli Rogers
- d. Xaverian Rogers

5. Bibliotherapy is used in

- a. PCT
- b. RET**
- C. CT
- d. CBT

6. The third school of Viennese Psychoanalysis was founded by

a. Adler b. Jung

c. **Victor Frankl** d. Freud

7. There are phases of existential counselling

a. 1 b. 2

c. **3** d. 4

8. Academy of cognitive therapy was founded by

a. Aaron Beck b. **Judith Beck** c. Albert

c. Ellis d. Meichenbaum

9 uses humor as a therapeutic technique.

a. PCT b. **REBT**

c. CT d. CBT

10. Automatic thoughts are

a. good b. **bad**

c. neutral d. none of the above

Unit III

1. CT was developed by

a. Ellis b. **Beck**

c. Meichenbaum d. Donald

2. Cognitive distortion of focusing on the extremes is called

- a. Labelling
- b. **dichotomous thinking**
- c. magnification
- d. personalization

3. Stress inoculation training occurs in phases.

- a. 1
- b. 2
- c. **3**
- c. 4

4. Relapse prevention is the final phase of

- a. **stress inoculation**
- b. RET
- c. CBT
- d. CT

5. CBM focuses on changing the clients

- a. cognitions
- b. behaviour
- c. **self-verbalization**
- d. self-intuitions

6. TA was developed by

- a. Ellis
- b. **Eric Berne**
- c. Meichenbaum
- d. Donald

7. There are Life positions.

- a. 1
- b. 2
- c. **3**
- d. 4

8. There are ego states in a person.

- a. 1
- b. 2
- c. **3**
- d. 4

9. There are types of transactions according to TA

- a. 1
- b. 2
- c. **3**
- d. 4

10. Crystallization is a type of used by TA therapists.

a. **interpositions** b.

c. transactions d. scripts

Unit IV

1..... therapy is effective for phobias.

A. **Group** b. family

c. individual d. cognitive

2.Uninhibited expression of emotion is called

a. cathexis b. **catharsis**

c. cathelix d. cathexin

3.Group therapy exclusively for alcoholics is called

a. **AA** b. BB

c. CC d. DD

4.When couple don't want to include other members in the therapy,Type is used.

a. structural b. **Bowenian**

c. systematic d. strategic

5 Is an important therapy of the east.

a. **yoga** b. Family

c. group d. TA

6.Pioneer in family therapy is

a. Ellis b. **Adler**

c. Meichenbaum d. Donald

7.Multi-generational family therapy was developed by

a. Adler b. **Murray Brown**

c. Virginia Satir d. Carl Whitakers

8. Symbolic family therapy was developed by

a. Adler b. Murray Brown

c. Virginia Satir d. **Carl Whitakers**

9. Structural family therapy was developed by

a. Adler b. Murray Brown

c. Virginia Satir d. **Salvador Minuchin**

10. Strategic family therapy was developed by

a. Adler b. Murray Brown

c. Virginia Satir d.
Jay Haley

Unit V

1. Ego psychology was developed by

a. Sigmund Freud b. **Anna Freud**

c. Anna Hasle d. None of
the above

2. Self psychology was developed by

Sigmund Freud b. Anna Freud

c. Anna Hasle d. **Heinz Kohurt**

3. The assumption that therapy is a relationship between therapist & client is called

a. **relational** b. non relational

c. conventional d. none of
the above

4. Symbiosis was a stage proposed by

.....

a. Adler b. Murray Brown

c. Virginia Satir d.

Mahler

5. BPT refers to

.....therap

Unit II

1. What are the phases of existential counselling?
2. List the principles of expressive arts therapy.
3. Record the phases of stress inoculation training.
4. List the basic concepts of existential therapy.
5. What are the objectives of existential therapy?
6. Define logo therapy.
7. Describe person centered therapy.
8. State the key concepts of person centered therapy.
9. List the interventions used in existential therapy.
10. What are the stages in person centered counseling?

Unit III

1. Describe ABC framework.
2. State the therapeutic goals in cognitive therapy.
3. What is the role of the therapist in cognitive therapy
4. What is bibliotherapy.
5. Describe REBT.
6. What is role playing?
7. What are the ego states according to TA?
8. Describe complementary transaction.
9. What are scripts?
10. What are life positions?

Unit IV

1. What is family therapy?

2. State the principles of group therapy.
3. List the disorders efficiently cured using group therapy.
4. Describe AA.
5. State the effectiveness of family therapy.
6. Define yoga therapy.
7. Produce the steps in meditation.
8. What is mindfulness training.
9. List the techniques used in yoga psychotherapy.

Unit V

1. Define child psycho analysis.
2. What is child psycho therapy?
3. List the current trends in psycho analysis.
4. What is object relational theory?
5. Describe self psychology.
6. Explain relational theory.
7. What is ego psychology?
8. List the interventions used in psycho analysis.
9. Describe the therapist-client relationship in psycho analysis.
10. Define catharsis.

SECTION –C

Answer in about 200 words each: (5 Marks)

Unit-I

1. Explain the methods of assessment in Psychoanalysis.
2. Analyze the basic principles of Gestalt therapy.
3. Describe the therapy techniques used in psycho analysis.

4. Explain the three states of mind according to Freud?
5. Differentiate Oedipus complex and electra complex.
6. Analyze dream analysis.
7. Explain free association.
8. Describe the stages of psycho sexual stages according to Freud.

Unit II

1. Explain the phases of existential counselling?
2. Analyze the principles of expressive arts therapy.
3. Explain the phases of stress inoculation training.
4. Describe the basic concepts of existential therapy.
5. Explain the objectives of existential therapy?
6. Explain the concept of logotherapy.
7. Explain the concepts of person centered therapy.
8. Describe the interventions used in existential therapy.
9. Explain are the stages in person centered counseling?

Unit III

1. Describe ABC framework.
2. Explain the therapeutic goals in cognitive therapy.
3. Describe the role of the therapist in cognitive therapy
4. Describe is bibliotherapy.
5. Analyze the concepts of REBT.
6. Describe role playing.
7. Explain the ego states according to TA?
8. Describe the types of transaction.

9. Describe the various life positions?

Unit IV

1. Describe group therapy.
2. Explain family therapy.
3. Analyze the principles of group therapy.
4. Describe AA.
5. Evaluate the effectiveness of family therapy.
6. Explain yoga therapy.
7. Explain the steps in meditation.
8. List the techniques used in yoga psychotherapy.

Unit V

1. Describe child psycho analysis.
2. Explain the techniques of child psycho therapy?
3. Describe the current trends in psycho analysis.
4. Describe object relational theory.
5. Describe self-psychology.
6. Explain relational theory.
7. Explain ego psychology.
8. Analyze the interventions used in psycho analysis.
9. Describe the therapist-client relationship in psycho analysis.

SECTION –D

Answer in about 400 words each :

(

10 Marks)Unit - I

1. Investigate the effectiveness of the therapeutic process of Psychoanalysis.
2. Evaluate critically the role and function of a therapist according to Gestalt theory.

3. Elaborate gestalt psychotherapy.

Unit II

1. Elaborate the concept of existential therapy.
2. Explain in detail logotherapy.
3. Give a detailed account of client centered therapy.
4. Elaborate on the techniques and outcomes of person-centered therapy.

Unit III

1. Give a detailed account of the contributors of cognitive therapy.
2. Elaborate on TA
3. Explain in detail the ego states and types of transactions in TA.
4. Critically evaluate the importance on scripts according to TA.

Unit IV

1. Compare and contrast group and family therapies.
2. Elaborate on the types of group therapy.
3. Elaborate on the techniques used in family therapy.
4. Elucidate on yoga therapy.
5. Elucidate on the eastern techniques of psychotherapies.

Unit V

1. Elaborate on psychoanalysis.
2. Explain in detail child psychoanalysis.
3. Elucidate on the current trends in psychoanalytic research.
4. Critically analyze psychodynamic and child psychoanalysis theories.

a) Gazing b) Staring **c) Handshake** D) Thumbs up

2. _____ are quick to form and hard to change.

a) Self-esteem **b) Stereotypes** c) Impression d) Self-efficacy

3. What are the nonverbal cues which are to be used carefully in different cultures?

a) Gazing b) Facial expression **c) Gestures and postures** d) All of the above

4. _____ refers to the attitude of a person towards oneself along a positive and negative dimension.

a) Self-efficacy B) Self-concept c) Self-criticism **d) Self-esteem**

5. _____ is not an example of actor-observer effect.

a) You fell; I was pushed b) I had a bad day; you are lazy

c) You are that kind of person; situation forced me to do so **d) I'm unskilled; you are talented**

6. The tendency to attribute positive outcomes to internal cause and negative outcomes to external cause is termed as _____.

a) Self-serving bias b) Fundamental attribution error c) Actor - observer effect d) Correspondence bias

7. We are more likely to attribute a person's behaviour to _____ cause under conditions in which consensus and distinctiveness are low but consistency is high.

a) External **b) Internal** c) Environmental d) Both a and b

8. _____ is the process through which we attempt to understand the reasons behind others' behavior.

a) Impression formation b) Attribution c) Attitude d) None of the above

UNIT III

1. Prejudice is the _____ towards the member of specific social group.

a) Positive attitude **b) Negative attitude**
c) Negative behaviour d) Positive behaviour

2. Thurston scale is also known as _____.

a) Semantic differentials b) Likert scale
c) Cumulative scaling **d) Method of equal appearing intervals**

3. People with authoritarian personality exhibit _____ which makes an individual predispose towards prejudice.

a) Rigid thinking b) Flexible thinking c) Openness d) Unruliness

4. Discrimination is the _____ towards the member of specific social group.

a) Positive attitude b) Negative attitude **c) Negative behaviour** d) Positive behaviour.

5. A stimulus that evokes a positive or negative response without substantial learning is termed as _____ stimulus.

- a) conditional **b) Unconditional** c) Neutral d) All of the above

6. _____ is the conditioning that occurs in the absence of conscious awareness of the stimuli involved.

- a) **Subliminal conditioning** b) classical conditioning
c) Operant conditioning d) instrumental conditioning

UNIT IV

1. _____ is known as the position within the group.

- a) Norms b) Role **c) Status** d) Rules

2. _____ are sometimes considered explicit feeling rules which are the expectations about the emotions that are appropriate to express.

- a) Rules b) Status **c) Norms** d) Role

3. In a group where there exists a strong bond is known as _____ group.

- a) Open b) Close c) Common **d) Cohesive**

4. _____ can range from, at low end, mere collection of individuals who have little or no connection with one another, to at the high end, where members share same name or identity.

- a) Cohesiveness **b) Entitativity** c) Status d) Norms

5. When we are a part of a large crowd, we are thought to be less aware of our personal self, this can be termed as _____.

- a) Alienation b) Individuation **c) Deindividuation** d) Hooliganism

6. Available resources are increased so that both sides can obtain their major goals, this tactic for reaching integrative agreements is called _____

- a) Broadening the pie** b) Logrolling c) Bridging d) Cost cutting

7. _____ often begins when individuals or groups perceive that others' interests are incompatible with their own interests

- a) Bargaining **b) Conflict** c) Aggression d) Conformity

8. Groupthink happens mostly in _____ group

- a) low cohesive **b) Highly cohesive** c) Common identity d) Distinctive

UNIT V

1. Example for prosocial act which are not altruistic is _____.

- a) Giving charity to get approval from friends** b) Pulling a victim from burning building
c) Taking bus ticket for a stranger who lost her purse d) Donating money without seeking recognition

2. General aggression model was based on _____ perspective.

- a) Situational b) Cultural c) **Social learning** d) Environmental

3. _____ by others would be interpreted as a very hostile action.

- a) **Exclusion** b) Inclusion c) Teasing d) None of the above

4. repeated exposure to media violence can create a strong expectation that others will behave aggressively; this tendency can be termed as _____ bias.

- a) Hostile aggression b) **Hostile expectation**
c) Social exclusion d) Both a & b

5. The proposal that prosocial behavior is motivated by the bystander's desire to reduce his or her own uncomfortable negative emotions or feelings is termed as _____.

- a) **Negative-state relief model** b) Empathic joy hypothesis
c) Empathy-altruism hypothesis d) None of the above

6. The suggestion that some prosocial acts are motivated solely by the desire to help someone in need is known as _____.

- a) Negative-state relief model b) Empathic joy hypothesis
c) **Empathy-altruism hypothesis** d) None of the above

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

- 1 Define social psychology?
2. What is sociolinguistics?
3. Give the definition of anthropology.
4. Describe the scope of sociology in social psychology.
5. What is correlation method?
6. State independent and dependent variable.
7. Give example for the role of intervening variable in experimentation.
8. Define hypothesis.
9. Describe survey method.
10. State the two key requirements for conducting a successful experiment.

UNIT II

1. What is nonverbal communication?
2. Describe stereotypes.
3. What is self-concept?

4. What is attribution?
5. What is correspondent inference theory?
6. Illustrate self-presentation.
7. List the types of non-verbal communication.
8. Write about self-serving bias.
9. What is Self-expression?

UNIT III

1. Define attitudes
2. What are prejudice, give example?
3. What is cognitive dissonance?
4. Explain discrimination.
5. List the types of prejudice.
6. What is pluralistic ignorance?
7. State instrumental conditioning.
8. What are projective techniques?

UNIT IV

1. Describe Entitativity.
2. Define conflict.
3. Illustrate group polarization?
4. What are common bond and common identity group?
5. State feeling rules.
6. Define cohesiveness.
7. State distraction conflict theory.
8. What are integrative agreements?
9. Describe superordinate goals.
10. Define decision making?
11. Illustrate groupthink.

UNIT V

1. State meaning of aggression.
2. What is hostile and instrumental aggression?
3. Describe bystander effect.
4. Define altruism.

5. state kinship selection theory.
6. What are prosocial behavior?
7. What are the three hypothesis that leads to the origin of prosocial behavior?

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Discuss the scope of social psychology.
2. Briefly explain the observation method in social psychology.
3. Write a short note on the nature of social psychology.
4. Explain the relationship between sociology and social psychology
5. Describe social psychology and its goals.

UNIT II

1. Write in detail about self-presentation and self-expression
2. Explain about stereotypes and central traits in impression formation.
3. Illustrate Jones and Davis's correspondent inference theory.
4. Write a brief note on fundamental attribution error and actor observer effect.
5. Relate primacy and recency effect in forming impression.
6. Explain in detail about the self-concept and self-esteem.

UNIT III

1. Explain briefly the theories of reasoned action and planned behaviour.
2. What are the functions of attitude?
3. Sketch the formation of attitude.
4. Evaluate the indirect measures of attitude.
5. Describe the nature of prejudice and discrimination.

UNIT IV

1. Explain the functions of the group.
2. Write a brief note on leadership in group.
3. Describe the decision-making process of the group.
4. Discuss the causes of conflict in group.
5. Illustrate the types of conflict.

UNIT V

1. Elaborate the social and personal determinants of aggression.
2. Explain any two theories of aggression.
3. Discuss the situational determinants of prosocial behavior.
4. Write about meaning of prosocial behavior and explain about cooperation and helping.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Describe the nature of social psychology with example.
2. Relate Social psychology with other social sciences.
3. Elaborate the research methods in social psychology.

UNIT II

1. Explain in detail about Kelly's covariation theory.
2. Write in detail on impression formation and the role of non-verbal cues in forming impression.
3. Write a detailed note on self-concept and self-esteem and explain primacy and recency effect in perceiving others with example.
4. Sketch the errors in attribution with example.
5. Discuss the role of impression formation with example.

UNIT III

1. Explain in detail about the attitude – behaviour link.
2. Write a detailed note on how prejudice is acquired and suggestions for reducing prejudice.
3. Discuss the direct methods of measuring attitude.

UNIT IV

1. Examine the causes of group conflict and recommend some techniques for reducing group conflict.
2. Explain the nature of group formation and the effect of the presence of others on individual performance.
3. Explain the decision-making process of a group and pit falls in its decision making.

UNIT V

1. Discuss the theories of prosocial behavior.
2. Analyse the theoretical perspectives of aggression.
3. Elaborate the determinants of prosocial behavior.

RESEARCH METHODOLOGY – 21PPSC24

Section – A

1 Mark

UNIT 1

Choose the correct answer:

- research is related to some abstract ideas or theory.
 - Conceptual**
 - Fundamental
 - Descriptive
 - Analytical
-research aims at finding a solution for an immediate problem facing a society.
 - Analytical
 - Applied**
 - Empirical
 - Fundamental
- In which type of research, the researcher is not free to carryout the research on his own inclination?
 - Decision oriented research**
 - Historical research
 - Conclusion oriented research
 - Diagnostic research
-research determines why people behave as they do.
 - Operation
 - Market
 - Motivational**
 - All of the above
- Inresearch, the ultimate size of the sample is not fixed in advance but is determined according to the researcher.
 - Sequential**
 - Systematic
 - Quota
 - Multistage
- When population elements are selected for inclusion in the sample based on easy access it is called as
 - Purposive sampling
 - Judgement sampling
 - Convenience sampling**
 - All of the above
- involves grouping the population and then selecting the groups or the clusters rather than individual elements.
 - Chain sampling
 - Convenience sampling
 - Cluster Sampling**
 - Quota sampling
- Which of the following are the qualities of a good research?
 - Replicable
 - Systematic
 - Logical
 - All of the above**

9. In which type of research, an artificial environment is created to measure the dynamics of human behaviour?

- a. Inferential
- b. Field setting
- c. Experimental
- d. **Simulation**

10. Case study is a method employed in method.

- a. Experimental
- b. **Clinical**
- c. interview
- d. observation

UNIT 2

1. What is the major attribute of Correlation Analysis?

- a) **Association among variables**
- b) Difference among variables
- c) Regression among variables
- d) Variations among variables

2. What is the name of the conceptual framework in which the research is carried out?

- a) Research hypothesis
- b) **Research paradigm**
- c. Synopsis of Research
- d. **Research design**

3. What is the main role of research in education?

- a) To upsurge one's social status.
- b) To increase one's job prospects.
- c) To augment one's personal growth.
- d) **To help an applicant in becoming a renowned educationalist.**

4. Which of the following features are considered as critical in qualitative research?

- a) Collecting data with the help of standardized research tools.
- b) Design sampling with probability sample techniques.
- c) **Collecting data with bottom-up empirical evidence.**
- d) Gathering data with top-down schematic evidence.

5. How is random sampling helpful?

- a) Reasonably accurate
- b) An economical method of data collection
- c) Free from personal biases
- d) **All of the above**

6. A research intends to explore the result of possible factors for the organization of effective mid-day meal interventions. Which research method will be most appropriate for this study?

- a) Descriptive survey method
- b) Historical method
- c) **Ex-post facto method**

- d) Experimental method
7. In order to pursue the research, which of the following is priorly required?
- a) Developing a research design
 - b) Formulating a research question**
 - c) Deciding about the data analysis procedure
 - d) Formulating a research hypothesis
8. Which one among the following statement is true in the context of the testing of hypotheses?
- a) It is only the alternative hypotheses that can be tested.
 - b) It is only the null hypotheses that can be tested.**
 - c) Both the alternative and the null hypotheses can be tested.
 - d) Both the alternative and the null hypotheses cannot be tested.
9. What does the longitudinal research approach actually deal with?
- a) **Long-term research**
 - b) Horizontal research
 - c. Short-term research
 - d. None of the above

UNIT 3

1. What are the conditions in which Type-I error occurs?
- a) The null hypotheses get accepted even if it is false
 - b) The null hypotheses get rejected even if it is true**
 - c) Both the null hypotheses as well as alternative hypotheses are rejected
 - d) None of the above
2. How to judge the depth of any research?
- a) By research title
 - b) By research duration
 - c) By research objectives**
 - d) By total expenditure on research
3. Which of the following is not the method of Research?
- a) Survey
 - b) Observation**
 - c. Historical
 - d. Philosophical**
4. Research is
- a) Researching again and again
 - b) Finding solution to any problem
 - c) Working in a scientific way to search for truth of any problem**
 - d) None of the above
5. In the process of conducting research ‘Formulation of Hypothesis’ is followed by
- a) Statement of Objectives
 - b) Analysis of Data

c) **Selection of Research Tools**

d) Collection of Data

6. The main objective of study's to acquire knowledge.

a) Exploratory

c. **Descriptive**

b) Diagnostic

d. Descriptive and Diagnostic

7..... is concerned with discovering and testing certain variables with respect to their association or disassociation.

a) Exploratory

c. Descriptive

b) **Diagnostic**

d. Descriptive and diagnostic

8. One of the terms given below is defined as a bundle of meanings or characteristics associated with certain events, objects, conditions, situations, and the like

a) Construct

c. Definition

b) **Concept**

d. Variable

9. Concepts are of Research

a) Guide

c. Methods

b) Variables

d. construct

UNIT 4

1. A statement of the quantitative research question should:

a) Extend the statement of purpose by specifying exactly the question.

b) Help the research in selecting appropriate participants, research methods, measures, and materials.

c) Specify the variables of interest.

d) All the above

2. Why do you need to review the existing literature?

a) To make sure you have a long list of references

b) Because without it, you could never reach the required word-count counseling aims to promote human growth and development.

c) To find out what is already known about your area of interest.

d) To help in your general studying

3. Survey is a Study

a) Descriptive

c. Fact finding

b) Analytical

d. Systematic

4. In a survey there is an enumerator and a

a) Guide

b. Respondent

b) Supervisor

d. Messenger

5. The first purpose of a survey is to

a) Description

c. Evaluation

b) Pration

d. Provide Information

6. Questions in which only two alternatives are possible is called

a) Multiple choice questions

c. Dichotomous questions

b) Open ended questions

d. Structured questions

7. What are the core elements of a Research Process?
- Introduction; Data Collection; Data Analysis; Conclusions and Recommendations
 - Executive Summary; Literature Review; Data Gathered; Conclusions; Bibliography
 - Research Plan; Research Data; Analysis; References
 - Introduction; Literature Review; Research Methodology; Results; Discussions and Conclusions**
8. Identifying causes of a problem and possible solution to a problem is.....
- Field Study
 - Action study
 - Diagnostic study**
 - Pilot study
9. Questionnaire is filled by
- Respondent**
 - Enumerator
 - Everybody
 - None of the above
10. The main problem in questionnaire is
- Accessible to Diverse Respondent
 - Greater Anonymity
 - Shows an inability of respondent to provide information**
 - None of these

UNIT 5

1. Which technique is generally followed when the population is finite?
- Systematic Sampling Technique**
 - Purposive Sampling Technique
 - Area Sampling Technique
 - None of the above
2. Which one is called non-probability sampling?
- Quota sampling**
 - Systematic sampling
 - Cluster sampling
 - Stratified random sampling
3. The ___ scale measurement has a natural zero.
- Ratio**
 - Ordinal
 - Nominal
 - Interval
4. Cluster sampling, stratified sampling and systematic sampling are types of
- Direct sampling
 - Random sampling**
 - Indirect sampling
 - Non random sampling
5. Final stage in the Research Process is
- Problem formulation
 - Data Analysis
 - Data collection
 - Report Writing**
6. A comprehensive full Report of the research process is called
- Thesis**
 - Abstract
 - Summary Report
 - Article
7. The first page of the research report is
- Appendix
 - Bibliography
 - Index
 - Title Page**
8. Which of the following is not one of the seven major parts to the research report?
- Results
 - Method
 - Abstract
 - Footnotes**
9. ANOVA is_____
- A government body which collects social statistics.

- b) The name of a statistical software package.
 - c) **A one-way analysis of variance.**
 - d) A two-way analysis of variance.
10. SPSS is an acronym of the following?
- a) Statistical Predictions for Social Sciences.
 - b) Sexual Preferences for the Sixties and Seventies.
 - c) **Statistical Package for the Social Sciences.**
 - d) Sexual Performance and SAD Syndrome.

Section B

Answer in about 50 words each

2 Marks

UNIT 1

1. Define extraneous variables.
2. List the limitations of experimental method.
3. Define the meaning of research.
4. Define descriptive vs. analytical research.
5. List out some of the significance of research.
6. What are the objectives of research.
7. Define research methodology.

UNIT 2

1. What are the factors involved in deciding the scale?
2. Distinguish between nominal and ordinal scales.
3. Distinguish between qualitative and quantitative data.
4. Distinguish between interval and ratio data.
5. Write a short note on: i) Mean ii) Median iii) Mode
6. Define dispersion.

UNIT 3

1. Define external validity.
2. List out the types of experimental methods.
3. Mention of the uses of survey method.
4. Explain the barriers of internal validity.
5. Define internal validity.
6. What do you mean by independent group design?
7. What is the purpose of repeated measures design?
8. List out the types of survey method.

UNIT 4

1. Define regression analysis?
2. Distinguish between parametric and non-parametric tests.
3. Define ANOVA.
4. List out some of the multivariate techniques.
5. List out the assumptions in ANOVA.
6. What is the purpose of regression analysis?

UNIT 5

1. Describe the purpose of report writing.
2. List out the significance of report writing.
3. What are the types of report writing?
4. Define oral presentation.
5. Mention some of the guidelines for effective writing.

Section – C

Answer in about 200 words each:

5 Marks

UNIT 1

1. What is research? How should a researcher think?
2. Differentiate between research method and research methodology.
3. Explain some of the criterias for a good research.
4. Write a note on various approaches of research.
5. Discuss the ethical issues in research.
6. Explain the significance of research.

UNIT 2

1. Explain the basic principles of experimental designs.
2. Compare the research design of exploratory research with descriptive research studies.
3. Discuss the types of measurement scales.
4. Explain some of the sources of error in measurement.
5. Explain the research design used in case of exploratory research studies.
6. Describe the test of validity and it's types.

UNIT 3

1. Analyze the ways to record behaviour in observance methods.
2. Discuss on cross-sectional and longitudinal research designs.
3. Explain why there is likely to be a serious threat to the interpretability of the results of a survey when a convenience sample is used.
4. Discuss the analysis and interpretation of experimental methods.
5. Examine the characteristics and uses of survey method.

UNIT 4

1. Determine the concept of regression analysis.
2. Explain the analysis of computer assisted data.
3. Explain ANOVA with its assumptions.
4. Explain some of the multivariate techniques.
5. Distinguish between parametric and non-parametric measures of analysis.

UNIT 5

1. Explain the significance of report writing.
2. Discuss the precautions of report writing.
3. Analyze the mechanics of writing a research report.
4. Elaborate - Oral presentation.

Section – D

Answer in about 400 words each:

10 Marks

UNIT 1

1. Describe the different types of research.
2. Elucidate on the steps involved in a research process.
3. "Empirical research in India creates so many problems for the researchers". State the problems encountered by researchers in India.
4. Illustrate the scientific approach to research.

UNIT 2

1. Analyze the different types of formal experimental designs.
2. Explain some of the types of research design.
3. Explain in detail on comparative scaling techniques.
4. Provide a detailed account on the techniques of developing measurement tools.
5. Explain the types of non-comparative scaling techniques.

UNIT 3

1. Examine the types of observational methods with a flow diagram.
2. You are interested in assessing the direction and extent of change over time in the opinions of individual respondents. Identify the survey-research design you would choose and explain why you would make this choice.
3. Illustrate the types of experimental methods.
4. Provide a detailed account on repeated measures design.

UNIT 4

1. Compile the concept of ANOVA with its procedures and assumptions.
2. Elaborate the analysis and interpretation of regression analysis.
3. Discuss some of the other multivariate techniques with its analysis and interpretation.

UNIT 5

1. Elaborate the steps, layout and types of report writing.
2. Describe the steps involved in report writing and its significances.
3. Discuss the guidelines for effective writing.
4. Compile the process report writing and communication in Psychology.

disorder, schizotypal personality disorder D. Antisocial personality disorder, narcissistic personality disorder, paranoid personality disorder

10. The DSM-5 defines _____ personality disorders.

- A) 5
- B) 8
- C) **10**
- D) 13

11. The most prevalent DSM-5 personality disorder in a community setting is

- A) **antisocial personality disorder.**
- B) borderline personality disorder.
- C) avoidant personality disorder.
- D) schizotypal personality disorder.

12. Antisocial personality disorder has previously been referred to as

- A) **psychopathy/sociopathy**
- B) evilness.
- C) anti empathic.
- D) None of the above.

13. F20-F29

- A) Schizophrenia
- B) Mood disorder
- C) Mental Retardation
- D) **Anxiety disorder**

14. Acute onset neuro psychiatric disorder

- A) Delirium
- B) Torpor
- C) Twilight
- D) **Organic Stupor**

15. Deposit of protein on brain region

- A) **Leavy bodies dementia**
- B) Dementia
- C) Delirium
- D) Torpor

UNIT II

1. The defect offound in delirium further reduces sensory acuity

- A) memory
- B) perception
- C) stimulus
- D) **attention**

2. In everything appears unreal and strange.

- A) **derealisation**
- B) micropsia
- C) macropsia
- D) megalopsia.

3. Jaspers believed that

- A) **Pseudo - hallucinations**
- B) Schizophrenia
- C) Delusion
- D) hallucination

4.are more common in acute organic states with clouding of consciousness.

- A) perception
- B) mental images
- C) **visual hallucinations**
- D) Psychosis

5. The colouring of green is called.....

- A) **Chloropsia**
- B) Xanthopsia
- C) Micropsia
- D) Macropsia

6. Irregular shapes are called

- A) Edema
- B) **Metamorphopsia**
- C) Micropsia
- D) Macropsia

7.is defined as an illusion

- A) **misinterpretation**
- B) Perception
- C) false belief
- D) false perception

8. Changes in intensity.....

- A) Hyper anesthesia
- B) Xanthopsia
- C) Micropsia
- D) **Macropsia**

9.is a loss of intelligence resulting from brain disease.

2. Define memory
3. What is Phobia
4. What is Parathymia
5. What is grandiose delusion
6. What are the types of memory
7. Define hebephrenic subtype
8. What is Moria
9. Explain Autobiographical memory
10. Define Amnesia

UNIT IV

1. Define self
2. Define consciousness
3. Give a short note on disorders of consciousness
4. Define dream like changes
5. Define Mentalization
6. What is personality
7. Define attention
8. What is institutionalization
9. What are the 4 aspects of self experience
10. Define Mentalisation

UNIT V

1. Define motor disorders
2. Define Ecstasy
3. What are the 3 types of perseverance
4. Define Echolalia
5. What is Stupor
6. Define Personality
7. What is paranoid
8. Explain Borderline personality disorder
9. What are the methods using assess the personality
10. Define Excitement

SECTION C

Answer in about 200 words each:

(5 marks)

UNIT I

1. Difference between symptoms and syndrome
2. Write a note on DSM IV
3. Classification of mental disorders
4. Explain personality disorder
5. Write a note on special disorder
6. Brief note on organic syndrome
7. Describe interview schedules
8. What is functional syndrome?
9. Explain Psychogenic reactions?
10. Write a short note about ICD 10

UNIT II

1. Describe sensory distortions
2. Give a brief note on illusions
3. Explain disorder of intelligence
4. What are the three types of disorders of thinking
5. Features of healthy thinking
6. Types of Aphasia
7. Explain hallucinatory syndrome
8. What are the differences between Hypnagogic and Hypnopompic hallucinations
9. Disorder of the stream of thought
10. Explain the disorders of the continuity of thinking?

UNIT III

1. What is Psychogenic Amnesia and explain the types
2. Types of Memory
3. Write a short note on Hyperamnesia
4. Explain distortions of recall
5. What is organic amnesia
6. Give a note on Normal emotional reactions
7. Explain abnormal emotional reactions
8. Discuss the meaning of Emotion
9. What is morbid expression of emotion
10. Give a short note on retrospective delusions

UNI IV

1. Discuss the restriction of consciousness
2. Explain the disturbance of the boundaries of the self
3. Give a brief note on disorders of consciousness
4. What are the ways consciousness can be changed
5. Explain disturbance of awareness of self activity
6. What is restriction of consciousness
7. Explain dream like change of consciousness
8. Discuss theory of mind , consciousness and Schizophrenia
9. Disturbance of the continuity of self
10. Write a brief note on lowering of consciousness

UNIT V

1. Explain the 2 types of motor disorder
2. Write a short note on Disorders of adaptive movements
3. Detail note about non adaptive movements
4. What are the 3 types of perseverance
5. Explain motor speech disturbances in mental disorders
6. Write a note on non goal directed abnormal patterns of behaviour
7. Give a note on movement Disorders
8. Explain cluster A in DSM IV
9. State assessing Personality
10. Explain anxious personality disorder

SECTION D

Answer in about 400 words each:

(10 marks)

UNIT I

- 1.Explain list of categories
- 2.Elucidate Psychological disorder
- 3.Classification of Psychiatric disorder
- 4.Comparison between DSM IV and ICD 10
- 5.Write a detailed note about Indian Classification
- 6.Explain personality disorders and Psychogenic reactions
- 7.Write a brief note on organic and functional syndrome

UNIT II

- 1.Give a brief note on Hallucinations of individual senses
- 2.Explain the hallucination,Types and causes of hallucinations
- 3.Explain sensory distortions
4. Give a brief note on disorders of thinking and intelligence
5. What is the disorder of content of thinking?
6. What are disorders of speech?
7. What are speech confusion and Schizophasia?

UNIT III

- 1.Illustrate the classification of memory
- 2.Elaborate Amnesia
- 3.Explain the distortions of memory
- 4.Give a brief note on morbid distortions of emotions
- 5.Explain normal and abnormal emotional reactions
- 6.Explain Psychogenic and organic amnesia
- 7.Brief on distortions of recognition and hyper Amnesia

UNI IV

- 1.Analyse the disorders of experience of self
- 2.Elucidate disorders of consciousness
- 3.Discuss the ways of consciousness can be changed
- 4.What are the disturbances of awareness of self activity

UNIT V

- 1 .What are the classification of motor disorder
- 2.Explain DSM IV personality disorder
- 3.Write a brief note on ICD 10 personality disorder
- 4.State assessing Personality
- 5.Detailed note about goal directed and non goal directed abnormal patterns of behaviour
- 6.Explain Disorders of non adaptive movements
- 7.Write a note on clinical description of categories.

INDIAN PSYCHOLOGY - 21PPSC32

SECTION –A

Choose the correct Answer

(1 Mark)

Unit I

1. What is the main goal of Indian Psychology?

- A. Self efficacy
B. Self realisation
C. Self propogation
D. Self appraisal

2. What is 'Jiva' in Indian Psychology?

- A. Witness
C. Experiential self

- B. Non-participant
D. Objective

3. Gita upholds the necessity of

- A. Rewards, Puruskar
B. Action, Karma
C. Self, Visada
D. Knowledge, Vidya

4. Who among the following psychologists found that Buddhist teachings have potential for transformation and healing?

- A. Leon Festinger
C. Eric Fromm
B. Alfred Adler
D Karen Horney

5. Who wrote the famous book 'Glimpses of Abhidhamma'?

- A. Eric Fromm
C. Chogyam Trungpa
B. Dalai Lama
D. Daniel GolemaN

6. The Indian notion of self encompasses the physical, social, mental as well as

- A. Experiential aspect
C. Spiritual aspect
B. Dependent aspect
D. Real aspect

7. Psychologists in India has started to realise that it is important to accept the philosophical traditions and native wisdom in our culture. This will help them to act as

- A. change makers
B. social catalysts
C. slow movers
D. dynamic and scientistS

8. Who worked as guide and councillor during ancient times?

- A. Kings
B. Common people
C. Lay people
D. Sages and saints

9. Consider the following statements

1. Durganand Sinha ask for integration of modern psychology with Indian thought.
2. Modern Psychology originate as an indigenous science.

Which among the following is/are correct?

- A. **Only 1**
B. Only 2
C. Both 1 and 2
D. None of these

10. Match the following:

List-I (Chapters of Bhagavad Gita)	List-II (Classification of the Chapter)
A. First 6 Chapters	1. Jnana Yoga
B. Middle six chapters	2. Bhakti Yoga
C. Last 6 chapters	3. Karma Yoga

- A. A-1, B-2, C-3
B. **A-3, B-2, C-1**
C. A-3, B-1, C-2
D. A-2, B-3, C-1

Unit II

1. Where was the first psychology department set up in India?

- A. Delhi University
B. Madras University
C. **Calcutta University**
D. Allahabad University

2. Arrange the following in chronology.

1. Department of Psychology started in Allahabad.
2. Girindra Shekhar Bose published journal 'Samiksha'.
3. Independent psychology department set up in DU.
4. Department of Applied Psychology established in University of Mumbai.

- A. 1, 2, 3, 4
B. 4, 3, 2, 1
C. **2, 1, 3, 4**
D. 4, 3, 1, 2

3. Which state of mind is related to cosmic consciousness?

A. Mind and behaviour stress relaxation
reduction

B. Mindfulness behavioural stress

C. Mindfulness based state reversal

D. Mindfulness based stress reduction

4. What is the name given to the inner battle between the 'self' and 'soul' in Sufism?

A. Nafs

C. Run

B. Ghalb

D. Jihaan

5. Name two important pioneers of 19th century who interpreted Indian thoughts in context of Western Philosophy?

A. R.C. Tripathi and Sri Aurobindo

B. Krishna Chandra Bhattacharya and R.C. Tripathi

C. Krishna Chandra Bhattacharya and S. Radhakrishnan

D. S. Radhakrishnan and Sri Aurobindo

6. Match the following:

List-I (Terms used in Sufism)	List-II (Physical Aspect)
A. Nafs	1. Heart
B. Ghalb	2. Soul
C. Ruh	3. Self
D. Jihad	4. Inner battle

A. A-1, B-2, C-4, D-3

C. A-1, B-2, C-3, D-4

B. A-4, B-3, C-1, D-2

D. A-2, B-1, C-3, D-4

7. Arrange the following in chronological order.

1. Nafs-al-Amanarah

2. Fana

3. Self surrender

4. Non-attachment

A. 1, 2, 3, 4

C. 4, 3, 2, 1

B. 1, 2, 4, 3

D. 3, 2, 1 4

8. Who has worked on Psycho-spiritual thought and mental health in mid 20th century?

A. Jadunath Sinha

C. Sri Aurobindo

B. Akhilanand

D. S. Radha Krishnan

9. What is 'Supra mentalisation' in integral Yoga ?

A. Realisation of enlightenment

C. Realisation of illumination

B. Realisation of the supermind

D. All of the above

10. What are the three types of being according to Sri Aurobindo?

A. Outer, Central, Inner

C. Outer, Inner, Jiva

B. Outer, Inner, Psychic

D. Outer, Inner, Atman

Unit III

1. A state of detached indifference towards life and world is

a. vairagya

c. nirvana

b. mayavadin

d. vedanta

2. Momentary worldly good is called

a. shreya

c. athma

b. preya

d. prakasha

3. The concept of golden mean was proposed by

a. Aristotle

c. Pluto

b. Socrates

d. Descartes

4. The soul evolves through levels.

a. 1

c. 3

b. 2

d. 4

5. Nafs is equivalent to English word

a. self

c. soul

b. life

d. bliss

1. Science and are the 2 avenues of human endeavors. (K1, Re)

a. religion

c. philosophy

b. spirituality

d. justice

2. Self-realization is a state of attaining (K1, Re)

a. **liberty**

c. peace

b. equality

d. spirituality

3. Yoga is a realization ofcognitive states. (K1, Re)

a. **meta**

c. para

B. Personal spiritual development

D. Cognitive enhancement

7. Which path in Buddhism are concerned with Meditation or Samadhi?

A. Right effort

C. Right livelihood

B. Right action

D. None of these

8. Consider the following statements

1. Jnana Yoga talks about the spiritual knowledge.

9. Sankhya Yoga talks about the role of action of 'Karma'.

Which among the above is/are correct?

A. Only 1

C. Both 1 and 2

B. Only 2

D. None of these

9. Who among the following has suggested a teacher pupil model in counselling?

A. Neki

C. J.B.P. Sinha

B. Janak Pandey

D. Udai Pareek

10. Who wrote the famous book 'Elements of Ancient Indian Psychology'?

A. Durganand Sinha

C. Misra and Mohanty

B. Kuppu Swami

D. J.B.P. Sinha

Section B

Answer in about 50 words each:.

(2 Marks)

Unit I

1. Define spiritual psychology.

2. List the 4 dangers of bifurcating religion and spirituality.

3. Record a note on intercessory prayer.

4. State the 4 factors that contributed to the change of attitude of Indian Psychology in the new millennium.

5. What are the 3 paradigms followed by researchers in understanding culture-emotion interface.

6. Define bhava and rasa.

7. Define psychotherapy in Indian context.

8. State the 4 factors that contributed to the change of attitude of Indian Psychology in the new millennium.

9. What are the 3 paradigms followed by researchers in understanding culture-emotion interface.
10. Define bhava and rasa.

Unit II

1. How did Psychology develop in India?
2. Describe the western implant of Psychology.
3. Describe the identity crisis of Psychology in India.
4. Define indigenous psychology.
5. Describe psychology in the new millennium.
6. What are the major impediments to research productivity?
7. Describe the word adoptology.
8. State few characteristics of psychology in new millennium.
9. What are veridical methods?

Unit III

1. Define emotion.
2. State the components of emotions.
3. What are the cultural variants in components of emotion.
4. Describe emotion in Indian context.
5. Typology of emotion. Explain.
6. Define bhava.
7. Define rasa.
8. What is emotion of bhakthi?
9. List the basic emotions according to Indian Psychology.
10. How are emotions expressed and understood?

Unit IV

1. State the 2 approaches to psycho therapy
2. Describe mayavadin solution
3. Describe vedantic solution.
4. What is inner purification?
5. Describe the harmony of mind and body.
6. State the integral thought of Gita.
7. Describe the path of thanthra.
8. Who is a counsellor?
9. State the goals of Indian psycho therapy.
10. What is the role of faith in psycho therapy?

Unit V

1. Describe sufism.
2. State the essentials of sufism.
3. Define self transformation.
4. Describe nafs.
5. Describe heart.
6. Describe soul.
7. List the states of heart.

8. Describe spiritual poverty.
9. Describe consciousness.
10. State the layers of islam.

Section – C

Answer in about 200 words:.

(5 Marks)

Unit I

1. Discuss the concepts of religion and spirituality.
2. Analyze how science and spirituality are 2 avenues of human endeavor.
3. Explain how Indian psychologists lived in 2 different worlds before independence.
4. Sketch the technique of understanding extra sensor human experience.
5. Explain distant intercessory prayer.

Unit II

1. Describe the 2 worlds of Indian psychologists.
2. Distinguish spirituality and religion.
3. Explain the 20th century psychology in India.
4. What is socially relevant research?
5. Consolidate the research that occurred in the west.

Unit III

1. Explain the lived reality of emotions.
2. Explain culture-emotion interface.
3. Describe the quest for basic emotions.
4. Give the typology of various emotions according to Indian Psychology.
5. Explain the concepts of bhava and rasa.

Unit IV

1. Explain the crisis of identity of Indian Psychology.
2. Brief on the concept of Indigenous Psychology.
3. Explain the mayavadin solution to suffering.
4. Explain the vedic solution to suffering.
5. Give a note on the integral concept of Gita.

Unit V

1. Brief on the concept of Indigenous Psychology.

2. Explain the mayavadin solution to suffering.
3. Explain the vedic solution to suffering.

Section – D

Answer in about 400 words:

(10 Marks)

Unit I

1. Elaborate on the implications and applications of Indian Psychology.
2. Evaluate twentieth century psychology in India.
3. Critically evaluate the theoretical basis of Indian Psychology.

Unit II

1. Elaborate on the development of Indian Psychology in the new millennium.
2. Give a detailed account on emotions in Indian thought.
3. Elucidate on the making of rasa.

Unit III

1. Elaborate on the psychology of emotions.
2. Criticize the cultural perspectives of emotions.
3. Explain the typology of emotions in detail.

Unit IV

1. Elucidate on psychotherapy and Indian thought.
2. Explain the two solutions to sufferings.
3. Critically analyze the contribution of Gita to Indian psychology

Unit V

1. Elaborate on the sufism in India.
2. Evaluate the essentials of sufi psychology.
3. Critically evaluate the development of Indian psychology.

STATISTICS FOR BEHAVIOURAL SCIENCES - 21PPSC33

SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

1. The most suitable method for studying individual behavior is
 - a. Informal observation
 - b. interview
 - c. **controlled observation**
 - d. introspection

2. Statistics is relevant in psychology because
 - a. Describes behaviour
 - b. **Controls behaviour**
 - c. predicts behaviour
 - d. **all the above**

3. is the most true statement in modern statistics.
 - a. **Science of drawing information about population**
 - b. Science of statecraft
 - c. Science of average
 - d. Science of counting

4. The role of statistics is least important in
 - a. Surveying literature
 - b. **formulating hypotheses**
 - c. identifying variables
 - d. testing hypotheses

5. The role of statistics is most important in
 - a. **Testing hypotheses**
 - b. Surveying literature
 - c. identifying variables
 - d. formulating hypotheses

6. The knowledge of statistics is not essential for psychologists to
 - a. **Administrating test**
 - b. Constructing test
 - c. reliability of test
 - d. validity of test

7. Statistics is used to generalize results of sample to population.
 - a. **Inferential**
 - b. correlational
 - c. descriptive
 - d. regression

8. Factor analysis helps in
 - a. Result interpretation
 - b. **test construction**
 - c. test norm preparation
 - d. test administration

9. Clinical psychologists work in
 - a. **hospitals**
 - b. schools
 - c. offices
 - d. homes

10. Aim of conducting basic research in psychology is
 - a. Solve problems
 - b. **Develop insight**
 - c. guide students
 - d. guide employees

11. The technique used to find out the dimensions of a psychological test is
 - a. Variance
 - b. Coefficient of variance
 - c. **factor analysis**
 - d. multi variance analysis

12. Which of the following about statistics is not correct?
 - a. **Used for selecting problem**
 - b. Used for making predictions
 - c. used for selecting sample
 - d. used for comparing groups

UNIT II

- The mean is often called
 - Average**
 - mode
 - median
 - range
- The median is called the Average.
 - Central
 - positional**
 - medial
 - ordinal
- The difference between maximum and minimum score is called
 - mode
 - range**
 - average
 - QD
- The value that can be found if the mean and median are known is
 - mode**
 - range
 - average
 - QD
- Variance is the square of
 - SD**
 - Range
 - QD
 - variance
- is not a measure of central tendency
 - Mean
 - Median
 - QD**
 - mode
- is the most stable measure of central tendency.
 - Mode
 - Mean**
 - median
 - QD
- The measure of central tendency sensitive for each score is.....
 - median
 - Mean**
 - mode
 - QD
- The median of the scores 3,7,4,10,5,11 is
 - 6**
 - 5
 - 8
 - 4
- Which measure of central tendency is used best to find the popular brand among students?
 - Mode**
 - Median
 - mean
 - QD
- Which measure is used to compare groups with unequal means?
 - SD
 - Co efficient of variation**
 - QD
 - MD
- Standard error of mean is
 - SD/ROOT n**
 - SD/ROOT2n
 - 2SD/ROOTn
 - 2SD/ROOT2n
- Choose the correct formula:
 - Mean>median>mode
 - Mean=median=mode
 - mean<median<mode
 - Mean=Median-mode**

UNIT III

- The reason for taking a sample rather than population is
 - Accuracy
 - Collecting data**
 - time
 - cost
- Sampling in survey research depends on

- c) Mode d) All of the above
4. Median can be used for scales.
- a) **Ordinal** b) Ratio
- c) Nominal d) Interval
5. One item on a questionnaire asks, “How many siblings (brothers and sisters) did you have when you were a child?” A researcher computes the mean, the median, and the mode for a set of $n = 50$ responses to this question. Which of the following statements accurately describes the measures of central tendency?
- a) Because the scores are all whole numbers, the mean will be a whole number
- b) Because the scores are all whole numbers, the median will be a whole number.**
- c) Because the scores are all whole numbers, the mode will be a whole number
- d) All of the other options are correct descriptions
6. What is the correct decision in a hypothesis if the data produce a z-score that is in the critical region?
- a. Reject H_0 **b. Fail to reject H_0** c. Reject H_1 d. Fail to reject H_1
7. Aerror occurs when a researcher rejects a null hypothesis that is actually true.
- a. **Type I** b. Type II c. Both type I & II d. Standard error
8. Which of the following tests is an example of a parametric test?
- a. Chi square
- b. z-test**
- c. Sign test
- d. Kruskal Wallis test**
9. The Kruskal Wallis test is the non parametric alternative to the
- a. Factorial design
- b. One way ANOVA**
- c. Two way ANOVA
- d. Correlation
10. Unlike the non-parametric tests, Parametric tests make certain assumptions about
- a. Sample size
- b. Population size
- c. Underlying distribution**
- d. None of the above
11. In conducting one-way ANOVA, which of the following test statistics would be used?
- a. Z
- b. t
- c. F**
- d. X
12. Analysis of variance is a statistical method of comparing several populations.....
- a. Means**

- b. Variances
- c. Standard Deviations
- d. None Of The Above

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

1. Define statistics.
2. Mention any 4 characteristics of statistics.
3. Mention any 4 limitations of statistics.
4. Define data.
5. What are the types of data?
6. List 4 methods of data collection
7. Describe any 4 applications of statistics.
8. Differentiate primary and secondary data.
9. Describe survey method.
10. Differentiate between primary and secondary data.

UNIT II

1. Define average.
2. Define median.
3. What is mode?
4. What are the differences between mean and median?
5. What are the demerits of mode?
6. Define dispersion.
7. What are the types of measures?
8. Name the merits of types of measures.
9. List 4 demerits of types of measures..
10. Name 4 demerits of mean.
11. Differentiate mean and mode.

UNIT III

1. Define hypothesis.
2. What are the types of error?
3. Define Type I error.
4. What is Type II error?
5. Define one tailed test.
6. What is two tailed test?
7. Differentiate type I and type II errors.
8. Define alpha level.
9. Describe the steps involved in hypothesis test.
10. Define critical region.

UNIT IV

1. Define Karl Pearson Correlation.

2. Define t-test.
3. Define one way ANOVA.
4. What is two way ANOVA?
5. Define z-test.
6. What is simple linear regression?
7. Differentiate sampling and non sampling errors.
8. List out the assumptions of correlation.
9. Describe the types of correlation.
10. What is skewness?

UNIT V

1. Define parametric tests.
2. Define non parametric tests.
3. What is chi square?
4. What is Mann Whitney U test?
5. List the types of parametric tests.
6. What are the types of non parametric tests.
7. Define regression.
8. What is correlation?
9. Differentiate regression and correlation.
10. Name any 4 assumptions about chi square.

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Write a note on the applications of statistics in psychology.
2. Write a note on the importance of statistics.
3. Describe the limitations of statistics.
4. Write a note on the various types of data.
5. Describe the various methods of data collection.

UNIT II

1. Provide a note on Central tendency.
2. Write a note on the measures of deviation.
3. Differentiate between central tendency and dispersion.
4. Describe the data types suitable for different types of variability.
5. Explain standard error.

UNIT III

1. Describe mean, median and mode.
2. Write a note the merits and demerits of central tendencies.
3. Write a note on dispersion.
4. Write a note on the types of measures.
5. Describe the types of dispersion.
6. Write a note on the merits and demerits of dispersion.

UNIT IV

1. Provide a note on hypothesis testing.
2. Write a note on the steps involved in hypothesis testing.
3. Produce a note on errors involved in hypothesis testing.
4. Distinguish between one tailed and two tailed tests.
5. Define and explain alpha level.

UNIT V

1. Write a note on parametric and non parametric tests.
2. Write a note on chi square.
3. Write a note on Mann Whitney U test.
4. Describe correlation.
5. Describe regression.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Define statistics. Describe its characteristics and applications in the field of psychology.
2. Define data. Describe its types and explain the methods of data collection.

UNIT II

1. Produce in detail about the measures of central tendency.
2. Illustrate in detail about the measures of dispersion.
3. Explain the data types suitable for different types of variability.
4. Compile the computation of quartile deviation and standard deviation.

UNIT III

1. Describe the concept of central tendency in detail.
2. Write in detail about the measures of variability.

UNIT IV

1. Define hypothesis testing. Explain its types.
2. Illustrate in detail about the errors involved in hypothesis testing.
3. Illustrate in detail about the directional hypothesis tests.
4. Evaluate the steps involved in hypothesis testing.

UNIT V

1. Distinguish between parametric and non parametric tests.
2. Summarize in detail about chi square and Sign test.
3. Explain in detail about correlation and regression.
4. Compile the computation and steps involved in Mann Whitney U test.

PSYCHOLOGICAL TESTING - 21PPSC34

SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

1. In which year was WAIS III published?
a). 1905 **b). 1991**
c). 1981 d). 1955
2. TAT is based on who's theory? K1(Re)
a). Freud b). Alfred
c). Anna Freud **d). Jung**
3. Which department developed the GATB?
a). Psychology b). Law
c). Labor d). HRM
4. Standardized test : SAT :: Self-report Test : ?
a). GRE **b). HPI**
c). WAIS d). PDS
5. Who developed TAT?
a). Murray b). Binet
c). Rorschach d). Terman
6. In which year did the APA published the first ethical standards for psychologists?
a). 1950 b). 1952
c). 1953 d). 1955
7. Which of the following is Principle D?
a). Integrity **b). Justice**
c). Respect d). Fidelity
8. In the year 1999, the updated standards for Educational and Psychological testing were prepared by?
a). AERA b). APA
c). NCME **d). All of these**
9. Expand ICT
a). International Test Commission b). International Testing Commission
c). International Test Community d). International Testing Community
10. Expand CAT
a). Computerized adaptive testing c). Computer adaptive testing
b). Computerized addition testing d). Computer addition testing

UNIT II

1. Which of the following is represented in whole numbers and decimal points?
a. Percentages **b. z scores**
c. standard scores d. percentiles
2. The MMSE was developed in the year...

- a. 1975 b. 1976
c. 1977 **d. 1978**
3. Which is the most basic level of measurement?
a. **Nominal scale** b. ordinal scale
b. Both a&b d. none
4. Choose the second level of measurement.
a. Nominal scale b. ratio scale
c. ordinal scale d. none
5. Which level of measurement comes after ordinal scales?
a. Nominal b. ordinal
c. ratio **d. equal interval**
6. Which is the most basic score calculated in?
a. raw score b. order score
c. standard score c. none
7. Which of the following determines the age level of and individual's performance?
a. age norms b. grade norms
c. both a & b d. none
8. Which of the following determines the grade level of an individual's performance?
a. age norms **b. grade norms**
c. both a & b d. none
9. "x" is the symbol of?
a. raw score b. mean
c. score d. standard deviation
10. "s" means... .
a. raw score b. mean
c. score **d. standard deviation**

UNIT III

1. Which of the following is represented in whole numbers and decimal points?
b. Percentages **b. z scores**
c. standard scores d. percentiles
2. The MMSE was developed in the year... .
c. 1975 b. 1976
c. 1977 **d. 1978**

3. What does it mean by the range 0.50?
 - d. Low correlation **b. moderate**
 - e. high d. none
4. Choose the correct answer: Same people and different time::?
 - b. Inter rater b. parallel forms
 - c. Internal consistency **d. Test retest**
5. Pick the right one: Validity:: ?
 - b. Consistency b. repetition
 - c. purity** d. solidity
6. Name the effect which occurs when test takes benefit from taking the test first time.
 - a. Practice effects** b. order effects
 - c. both a & b c. none
7. Measuring one trait or characteristic falls under which test?
 - a. Homogeneous tests** b. Heterogeneous tests
 - c. both a & b d. none
8. Measuring more than one trait or characteristic falls under which test?
 - a. Homogeneous tests **b. Heterogeneous tests**
 - c. both a & b d. none
9. "People with low self-control seek immediate gratification".
 - a. Impulsiveness** b. simple task
 - c. Temper d. risk taking
10. "People with low self-control are drawn to excitement and adventure".
 - a. Impulsiveness b. simple task
 - c. Temper **d. risk taking**

UNIT IV

1. Which are instruments used for gathering information?
 - a. survey** b. scores
 - c. reliability c. validity
2. Which is the process that scientists use to generate knowledge?
 - a. Scientific method** b. knowledge acquisition
 - c. survey d. none
3. Which of the following research technique help us to describe a situation?

8. Mention four places where psychological testing can be used.
9. Define Ethics.
10. Explain E-learning.

UNIT II

1. Define Standard scores.
2. Define Transformed scores.
3. Define z-scores.
4. Explain the nominal scale.
5. Explain ordinal scale.
6. Explain frequency distribution.
7. Explain the normal curve.
8. Define correlation.
9. Define transformed scores.
10. Describe percentile.

UNIT III

1. Define Practice effects.
2. Define order effects.
3. Define validity.
4. Define Reliability.
5. Explain test-retest reliability.
6. Explain face validity.
7. Define factor analysis.
8. Explain confirmatory factor analysis.
9. Explain Exploratory factor analysis.
10. Describe test length.

UNIT IV

1. Define survey.
2. Explain scientific method.
3. Describe mail surveys.
4. Describe structured observations.
5. Describe projective techniques.
6. Explain random responding.

7. Explain item discrimination.
8. Explain item bias.
9. Define cross-validation.
10. Define differential validity.

UNIT V

1. Define formative assessment.
2. Define Diagnostic assessment.
3. Define Summative assessment.
4. Describe clinical interview.
5. Describe semi-structured interview.
6. Explain self-fulfilling prophecy.
7. Explain biochemical assessment.
8. Explain traditional interview.
9. Describe work samples.
10. Define polygraph.

SECTION C

Answer in about 200 words:.

(5 Marks)

UNIT I

1. Provide an account of Psychological Tests.
2. Provide an account of test classification methods.
3. Provide an account of the importance of using psychological tests.
4. Elaborate on “Who uses psychological tests and for what reasons?”.
5. Provide an account of the issues of primary concern.
6. Explain the advantages and disadvantages of computerized testing.

UNIT II

1. Provide an account of standard scores.
2. Provide a note on levels of measurement.
3. Provide a note on frequency distribution.
4. Elaborate on descriptive statistics.
5. Provide a note on the role of norms.
6. Analyse the normal curve.

UNIT III

1. Provide an account of factors that influence reliability.
2. Provide a note on test-retest reliability.
3. Provide a note on the types of validity.
4. elaborate on the types of reliability.
5. Provide a note on factor analysis.
6. Provide a note on Exploratory factor analysis with an example.

UNIT IV

1. Provide a note on the scientific method of survey design.
2. Provide a note on survey reliability and validity.
3. Provide a note on composing the test items.
4. Provide a note on writing effective items.
5. Provide a note on how to conduct a pilot test.
6. Provide a note on revising the test.

UNIT V

1. Provide a note on the psychological test used in educational setting.
2. Explain Authentic Assessment.
3. Explain the models of psychological assessment.
4. Provide an account on clinical interview.
5. Provide a note on pre-employment testing.
6. Provide a note on polygraph testing.

SECTION D

Answer in about 400 words:.

(10 Marks)

UNIT I

1. Summarize Psychological Testing.
2. Critically analyze the importance of using psychological tests.
3. Summarize the ethical principles of the APA.
4. Summarize Computerized testing.

UNIT II

1. Summarize Standard scores.
2. Give a detailed account of the levels of measurements.

3. summarize the procedures for interpreting test scores.

UNIT III

1. Summarize reliability.

2. Summarize validity.

3. Analyse Sources of evidence for validity.

4. summarize factor analysis.

UNIT IV

1. Summarize survey.

2. Elaborate on developing a test plan.

3. Summarize qualitative item analysis.

4. Summarize quantitative item analysis.

UNIT V

1. Summarize about the tests used in educational setting.

2. Summarize the tests used in clinical setting.

3. Summarize the tests used in organizational setting.

4. Elaborate on performance appraisal.

SEMESTER IV

HUMAN RESOURCE MANAGEMENT – 21PPSC41

SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

1. Which of the following best defines Human Resource Management (HRM)?
 - a) Maximizing profits through employee exploitation
 - b) **Managing human resources to achieve organizational goals**
 - c) Maintaining employee satisfaction at any cost
 - d) Ignoring employees' needs for organizational benefits
2. What is one of the primary functions of HRM?
 - a) Marketing
 - b) Production
 - c) Finance
 - d) Staffing and Recruitment
3. Which approach emphasizes viewing HRM as a system comprising interrelated parts?
 - a) Functional approach
 - b) Behavioral approach
 - c) **Systems approach**
 - d) Traditional approach
4. What is the significance of HRM in organizations?
 - a) Minimizing employee turnover
 - b) Maximizing employee exploitation
 - c) **Achieving organizational goals through effective management of human resources**
 - d) Ignoring employee development
5. What is needed for an efficient HR?
 - a) Technical skills only
 - b) Soft skills only
 - c) **Both technical and soft skills**
 - d) No specific qualifications required
6. Which of the following best describes the evolution of HRM?

- a) HRM has remained unchanged over time
 - b) **HRM has evolved from a personnel function to a strategic business function**
 - c) HRM has become less important in modern organizations
 - d) HRM has become more bureaucratic over time
7. What are some of the challenges faced by HRM today?
- a) Declining workforce diversity
 - b) **Increasing globalization and technological advancements**
 - c) Decreasing legal regulations
 - d) Lack of importance placed on employee well-being
8. What does "E HRM" refer to?
- a) **Electronic Human Resource Management**
 - b) Efficient Human Resource Management
 - c) External Human Resource Management
 - d) Enhanced Human Resource Management
9. Which aspect of HRM emphasizes the ethical treatment of employees?
- a) Exploitation
 - b) Discrimination
 - c) **Ethical HRM**
 - d) Expatriation
10. What is the scope of HRM?
- a) Limited to hiring and firing employees
 - b) Limited to payroll management
 - c) **Encompasses all activities related to managing human resources in an organization**
 - d) Limited to performance appraisal and training

UNIT II

1. What is the primary importance of effective recruitment and selection processes in organizations?
- a) Maximizing employee turnover
 - b) Minimizing employee satisfaction
 - c) **Attracting and retaining qualified candidates**
 - d) Ignoring applicant qualifications
2. Why is fairness in recruitment essential for organizations?
- a) It ensures that only internal candidates are considered for job openings.

- b) **It helps in maintaining a positive employer brand.**
 - c) It allows organizations to discriminate against certain applicant groups.
 - d) It decreases the number of applicants for a job.
3. What are recruitment requirements typically based on?
- a) Personal preferences of hiring managers
 - b) **Job analysis and job description**
 - c) Industry gossip
 - d) Previous recruitment outcomes
4. How can organizations attract the right applicants for job openings?
- a) By offering uncompetitive salaries and benefits
 - b) By providing vague job descriptions
 - c) **By highlighting the company's culture and values**
 - d) By conducting biased interviews
5. What is the purpose of assessing and selecting candidates during the recruitment process?
- a) To eliminate all candidates except one
 - b) To discriminate against certain applicant groups
 - c) To ensure a diverse workforce
 - d) **To identify the most suitable candidate for the job**
6. What is the scope of employee relations in organizations?
- a) Limited to management's control over employees
 - b) Limited to individual employee issues
 - c) **Encompasses all interactions between employers and employees**
7. What is the role of trade unions in employee relations?
- a) To eliminate employee rights
 - b) **To advocate for employees' interests and rights**
 - c) To restrict employees' freedom of speech
 - d) To promote favoritism within the organization
8. What is collective bargaining?
- a) A negotiation process between employees and customers
 - b) **A negotiation process between employers and employees' representatives**
 - c) A negotiation process between managers and executives
 - d) A negotiation process between HR managers and candidates
9. What are the consequences of poor disciplinary decisions in organizations?
- a) Improved employee morale
 - b) Increased trust in management

c) **Decreased productivity and morale**

d) Enhanced organizational culture

10. What are disciplinary procedures designed to achieve?

a) To punish employees for minor infractions

b) To provide opportunities for retaliation

c) **To correct unacceptable behavior and performance**

d) To discourage employees from reporting grievances

UNIT III

1. What is the primary aim of approaches to fair employment?

a) To promote discrimination in the workplace

b) To ensure unequal opportunities for all employees

c) **To achieve equality and prevent unlawful discrimination**

d) To favor certain groups over others in hiring decisions

2. Which of the following is considered unlawful discrimination in the workplace?

a) Providing equal opportunities to all employees

b) **Treating employees differently based on their race or gender**

c) Offering training programs to enhance employee skills

3. What does the legal framework for equality in employment encompass?

a) Policies that encourage discrimination

b) **Laws and regulations that prohibit discrimination**

Guidelines for promoting harassment in the workplace

c) Practices that favor certain employee groups over others

4. Which type of discrimination involves treating an individual less favorably due to their disability or age?

a) Gender discrimination

b) Equal pay discrimination

c) **Disability/age discrimination**

d) Harassment and bullying

5. What does equal pay refer to in the context of employment?

a) Paying all employees the same regardless of their job roles

b) Paying employees based on their qualifications and experience

c) Providing additional compensation for employees with disabilities

d) **Ensuring that employees receive equal pay for equal work**

6. What is the role of the Health and Safety Executive (HSE)?

- a) Enforcing discrimination laws in the workplace
 - b) Promoting fair employment practices
 - c) Ensuring compliance with health and safety regulations**
 - d) Providing occupational health services to employees
7. What is the primary focus of the behavioral approach to managing health and safety?
- a) Identifying and mitigating workplace hazards
 - b) Enforcing strict disciplinary measures for safety violations
 - c) Promoting employee well-being and positive safety behaviors**
 - d) Assigning blame to individuals for accidents and injuries
8. What is the role of the International HR Manager?
- a) Managing human resources within a single country
 - b) Overseeing HR activities across multiple countries**
 - c) Fostering a hostile work environment for international workers
9. Which of the following best describes globalization in the context of International HRM?
- a) Restricting business operations to a single country
 - b) Expanding business operations across national borders**
 - c) Promoting discrimination in the global marketplace
 - d) Limiting workforce diversity within multinational corporations
10. What are international management competences focused on?
- a) Promoting ethnocentrism in the workplace
 - b) Enhancing managers' ability to navigate cultural differences**
 - c) Excluding international workers from managerial positions
 - d) Fostering a homogeneous organizational culture globally

UNIT IV

1. What is a characteristic of e-learning?
- a) Requires physical attendance
 - b) Instructor-led sessions
 - c) Self-paced learning**
 - d) Limited accessibility
2. Which of the following is a type of training that emphasizes hands-on experience and simulations?
- a) Classroom training
 - b) On-the-job training**
 - c) E-learning

d) Lecture-based training

3. In the performance management cycle, what comes after setting objectives?

a) Evaluation

b) Planning

c) **Feedback**

d) Training

4. Role of a HR is

a) Solely evaluate employee performance

b) Provide feedback only during annual reviews

c) **Set objectives and give ongoing feedback**

d) Delegate all performance-related tasks to HR

5. Which reward practice is based on an individual's performance evaluation?

a) Seniority-based pay

b) Equal pay

c) **Performance-related pay**

d) Skill-based pay

6. What is a category of rewards often linked to the status of an employee within the organization?

a) Intrinsic rewards

b) Extrinsic rewards

c) Performance rewards

d) **Status rewards**

7. What issue in rewarding employees focuses on ensuring fair compensation for employees performing similar roles?

a) Performance-related pay

b) **Equal pay**

c) Skill-based pay

d) Seniority-based pay

8. Which of the following refers to a shift in payment systems that ties compensation directly to an individual's performance?

a) Equal pay

b) Skill-based pay

c) **Performance-related pay**

d) Seniority-based pay

9. What is a characteristic of accelerated learning?

- a) Long-duration training programs
- b) Fixed learning
- c) **Emphasizes passive learning**
- d) Rigid structure and curriculum

10. What comes after giving feedback in the performance management cycle?

- a) Evaluation
- b) Planning
- c) Training
- d) **Rewards**

UNIT V

1. What does competency mapping primarily focus on?

- a) Employee referrals
- b) Attitudes & emotions
- c) **Identifying and assessing key skills and competencies**
- d) Business process outsourcing

2. Which of the following is NOT a component of HR Matrix?

- a) Recruitment
- b) Performance management
- c) **Business process outsourcing**
- d) Employee referrals

3. What is the main purpose of a virtual organization in HRM?

- a) Reducing employee referrals
- b) Enhancing competency mapping
- c) **Maximizing flexibility and agility in operations**
- d) Implementing business process outsourcing

4. Flexitime primarily refers to:

- a) Fixed working hours for all employees
- b) **Flexible working hours allowing employees to vary their start and end times**
- c) Outsourcing business processes to external vendors
- d) Mapping competencies for employees

5. E-HRM stands for:

- a) Enhanced Human Resource Management

- b) Electronic Human Resource Management
 - c) Effective Human Resource Management
 - d) Entrepreneurial Human Resource Management
6. What is the main focus of E-Recruitment?
- a) Managing employee attitudes and emotions
 - b) **Utilizing neural networks for decision making**
 - c) Recruiting candidates through online platforms
 - d) Outsourcing business processes to external vendors
7. Which aspect of E-HRM involves the use of technology to analyze and design jobs?
- a) E-Performance management
 - b) **E-Job design & analysis**
 - c) E-HR Planning
 - d) E-Recruitment
8. E-Selection primarily involves:
- a) Using electronic devices for employee referrals
 - b) **Selecting candidates through online assessments and tools**
 - c) Mapping competencies for existing employees
 - d) Implementing flexitime policies
9. What does E-Training focus on?
- a) Conducting training sessions in virtual organizations
 - b) Outsourcing business processes related to training
 - c) **Using technology for training delivery and assessment**
 - d) Managing employee attitudes and emotions
10. E-HR Records primarily involve:
- a) Managing physical records of employee data
 - b) **Using electronic systems for storing and managing HR-related information**
 - c) Implementing flexitime policies
 - d) Mapping competencies for existing employees

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

1. Define Human Resource Management (HRM).
2. Explain the significance of HRM in modern organizations.
3. List out the functions of HRM.
4. What is the systems approach to studying HRM?
5. Mention the role and responsibilities of an HR Manager in an organization.
6. What are some essential qualities and qualifications required for individuals pursuing a career in HRM?
7. Identify three major challenges faced by HRM in today's business environment.
8. Define E-HRM.
9. How does ethics play a role in HRM?
10. Mention the scope of HRM.

UNIT II

1. Define the importance of effective recruitment and selection processes in organizations.
2. Discuss the significance of fairness in recruitment practices.
3. Explain the concept of recruitment requirements.
4. What strategies can organizations use to attract the right applicants for job openings?
5. Mention the purpose of assessing and selecting candidates during the recruitment process.
6. What is the scope of employee relations within organizations?
7. Explain the role of trade unions in advocating for employees' interests and rights.
8. Define collective bargaining.
9. What are the consequences of poor decisions in organizations?
10. Define recruitment.

UNIT III

1. Define unlawful discrimination in the context of employment.
2. What are the main approaches to achieving fair employment practices?
3. Explain the significance of the legal framework for ensuring equality in employment.
4. Discuss the concept of disability/age discrimination in the workplace.

5. What is the principle of equal pay, and how does it relate to employment practices?
6. Describe the role of the Health and Safety Executive (HSE) in the workplace.
7. Describe the behavioral approach to managing health and safety?
8. Mention the process of conducting a risk assessment in the context of managing health and safety.
9. What are the consequences of accidents in the workplace?
10. Mention the role of occupational health in promoting employee well-being and safety.

UNIT IV

1. Discuss the advantages and disadvantages of e-learning as a training method.
2. Explain the role of feedback in the performance management cycle.
3. Describe the key components of a development plan.
4. List out the impacts of performance-related pay on employee motivation and organizational performance.
5. Compare and contrast intrinsic and extrinsic rewards.
6. List out the importance of reward practices.
7. List out the types of training methods.
8. Define on the job training
9. Mention the role of managers in managing employee performance.
10. List out the issues in rewarding employees.

UNIT V

1. Mention some of the importance of competency mapping in modern HR practices.
2. Explain the concept of a learning organization.
3. Describe the role of e-recruitment in modern HRM.
4. What are the key components of e-HRM?
5. Explain the concept of flexitime.
6. Define employee referral?
7. Define virtual organization in the context of HRM.
8. Describe the concept of knowledge management in HRM.
9. Mention the significance of HR metrics and analytics in HRM.
10. Define e-performance management.

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Explain the concept of the systems approach to studying HRM.
2. Discuss the role of HRM in addressing the challenges posed by globalization and technological advancements.
3. Analyze the ethical considerations in HRM practices.
4. Trace the evolution of HRM from its origins and explain the implications for HRM practices in contemporary organizations.
5. Evaluate the significance of E-HRM (Electronic Human Resource Management) in modern organizations.

UNIT II

1. Discuss the importance of fairness in recruitment processes.
2. Evaluate the role of trade unions in contemporary employee relations.
3. Compare and contrast disciplinary procedures and grievance procedures in organizations.
4. Evaluate and discuss some strategies for improving poor employee relations within organizations.
5. Analyze the ethical considerations that organizations should take into account during the recruitment and selection process.
6. Discuss the importance of managing employee relationships in organizations.

UNIT III

1. Discuss the key components of the legal framework aimed at promoting equality in employment.
2. Analyze the challenges and implications of disability and age discrimination in the workplace.
3. Evaluate the role and functions of the Health and Safety Executive (HSE) in ensuring workplace safety and health.
4. Explain the process of conducting a risk assessment in the workplace.
5. Explore the role of occupational health services in promoting employee well-being and safety in the workplace.

UNIT IV

1. Discuss the types of training in HRM.

2. Evaluate the effectiveness of different performance management techniques in driving employee engagement and productivity.
3. Analyze the impact of reward practices on employee motivation and job satisfaction.
4. Critically assess the challenges associated with managing performance in a diverse workforce.
5. Explore the evolution of reward systems in organizations.

UNIT V

1. Discuss the concept of employer branding and its significance.
2. Explain the concept of competency mapping in detail.
3. Analyze the impact of e-HRM on traditional HR practices.
4. Compare and contrast traditional recruitment methods with e-recruitment strategies.
5. Evaluate the role of HR metrics and analytics in driving strategic decision-making in organizations.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Explain the role of HR managers in strategic decision-making processes within organizations.
2. Evaluate and discuss some ethical challenges that HRM leaders may face in their roles.
3. Explore the evolution, origin and development of HRM.
4. Discuss the concept of "deconstructing HRM" in the context of modern organizational practices.

UNIT II

1. Summarize the recruitment and selection processes in HRM.
2. Give a detailed note on managing discipline and grievance.
3. Summarize the ways to manage employee relations.

UNIT III

1. Summarize the evolution of the legal framework aimed at ensuring equality in employment.
2. Explain the concept of an integrated approach to managing health and safety in the workplace.
3. Summarize on International HRM.

UNIT IV

1. Discuss the role of learning and development in achieving organizational goals.
2. Examine the role of rewards in managing employee performance and promoting organizational effectiveness.
3. Summarize Performance Management Cycle.

UNIT V

1. "Employer branding is crucial for attracting and retaining top talent" - Justify.
2. Discuss the concept of competency mapping, its significance and processes in talent management.
3. Summarize E HRM.
4. Evaluate the aspects of E HRM on candidate recruitment, selection, and employee training.

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SECTION –A

Choose the correct Answer

(1 Mark)

UNIT I

1. What is the best definition of career success?
a) money
b) recognition
c) **work life balance**
d) autonomy
2. What is the best predictor of employee productivity?
a) ability
b) **tenure**
c) religion
d) job satisfaction
3. Managers who are weak at managing conflicts have low _____ skills?
a) Technical
b) conceptual
c) **human**
d) decision making
4. which management function moves a manager from lower level to mid- level management?
a) **planning**
b) organizing
c) leading
d) controlling
5. _____ is an unpleasant psychological process that occurs in response to environmental pressure.
a) **stress**
b) distress
c) Eustress
d) depression
6. An mental ability to analyze and diagnose complex situation are called _____ skill
a) technical
b) **conceptual**
c) human
d) communication
7. The manager performs a _____ role when they represent the organization to outsiders.
a) Leader
b) disseminator
c) **Spokesperson**
d) figurehead
8. Manager act as a conduit to transmit information to organizational members is _____ role
a) Monitor
b) **Disseminator**
c) Spokesperson
d) liaison
9. Organizations are no longer constrained by national borders, it because of _____
a) **Globalization**
b) diversity

- c) customer service d) networked organization
10. Research which is try to study good about employees is called _____
- a) ethical behaviour b) workplace diversity
- c) Employee well- being **d) positive organizational scholarship**

UNIT II

1. Which dimension of intellectual ability required for plant manager?
- a) Inductive reasoning b) deductive reasoning
- c) number aptitude **d) verbal comprehension**
2. Which leader is most effective in managing diverse team?
- a) transformational** b) transactional
- c) democratic d) authoritative
3. Which country ranked third in International happiness?
- a) Canada b) Netherland
- c) India** d) U.S
4. What is the response of the dissatisfied employee in the dimension “ Active- Destruction”?
- a) Voice **b) Exit**
- c) Loyalty d) neglect
5. How many dimensions are there in intellectual abilities?
- a) 6 **b) 7**
- c) 8 d) 9
6. The ability to move the trunk and back muscle is called _____
- a) extent flexibility** b) dynamic flexibility
- c) dynamic strength d) trunk strength
7. _____ refers to the biological heritage people use to identify themselves.
- a) Family **b) race**
- c) culture d) religion
8. _____ is the additional set of cultural characteristics that often overlaps with race
- a) religion **b) ethnicity**
- c) culture d) region
9. The ability to exert muscular strength using the trunk muscles is called _____
- a) static **b) trunk**
- c) dynamic d) explosive
10. _____ is the ability to use logic and assess the implications of an argument?

- a) Inductive reasoning b) **deductive reasoning**
- c) spatial visualization d) memory

UNIT III

1. The most common means of measuring personality is _____
 - a) Experimental method b) survey method
 - c) **self report surveys** d) interview method
2. Who rely on unconscious processes and look at the “big Picture”?
 - a) Extraverted b) introverted
 - c) sensing d) **intuitive**
3. Which personality identifies opportunities to show initiative until meaningful changes occurs?
 - a) Depended personality b) pro social personality
 - c) **Pro- active personality** d) neurotic personality
4. which set of values refers to prepared modes of behaviour?
 - a) **instrumental values** b) terminal values
 - c) generational values d) value system
5. The _____ dimension captures our comfort level with relationship
 - a) agreeableness b) conscientiousness
 - c) **Extraversion** d) openness to experience
6. _____ types of personality prefer order and structure
 - a) **Judging** b) thinking
 - c) sensing d) extraverted
7. _____ is an enduring characteristics that describes an individual’s behaviour
 - a) MBTI b) Big Five Model
 - c) **personality traits** d) personality determinants
8. People who are sociable, gregarious and assertive are _____
 - a) **Extraversion** b) agreeableness
 - c) Conscientiousness d) emotional stability
9. People who lack in concern for others and lack of guilt when causing harm to others are _____
 - a) Narcissism b) Machiavellianism
 - c) **Psychopathy** d) histrionic
10. Which personality trait is associated with better leaders?

- a) Machiavellianism **b) narcissism**
c) psychopathy d) agreeableness

UNIT IV

1. Increasing the group status and perceived difficulty of attaining membership is the property of _____
a) diversity **b) cohesiveness**
c) norms d) roles
2. The joy of experienced when other teams lose is called _____
a) in group favouritism b) status
c) schadenfreude d) Social identity
3. In which stage intra group conflict occurs?
a) forming **b) storming**
c) norming d) performing
4. Zimbardo's prison experiment is an example for _____
a) role b) norms
c) status d) size
5. Our view of how we are supposed to act in a given situation is called _____
a) role expectation b) role
c) role perception d) norms
6. In group others are not carrying their fare share is the cause of _____
a) faultline b) diversity
c) social loafing d) polarisation
7. Punctuated equilibrium model is for _____ group formation
a) Formal b) informal
c) temporary **d) temporary group with deadlines**
8. The Hawthorne study examines the relationship between _____ and productivity.
a) job satisfaction b) family roles
c) tenure **d) physical environment**
9. Conformity experiment was done by _____
a) Philip Zimbardo b) Tuckman
c) James Stoner **d) Solomon Asch**
10. Conformity to social norms is higher in _____

- a) **Collectivistic culture** b) individualistic culture
c) formal group d) informal group

UNIT V

1. Influence based on special skill or knowledge is called _____ power.
- a) **Expert** b) legitimate
c) referent d) reward
2. Among the following powers which one is most effective?
- a) Coercive b) reward
c) legitimate **d) referent**
3. B's relationship to A when A possesses something that B requires is an example of _____
- a) personal Power b) formal power
c) **dependence** d) Politics
4. Leaders use power as a mean of attaining _____
- a) group cohesiveness b) group performance
c) **group goal** d) group norms
5. In which power tactics employee use friendly behavior prior to making request?
- a) **Ingratiation** b) Personal appeals
c) Exchange d) Coalitions
6. The ability to influence others to enhance one's objective is called _____
- a) Power **b) Political skill**
c) power tactics d) political behaviour
7. Presenting a logical arguments to demonstrate a request is reasonable is called _____
- a) Legitimacy **b) Rational Persuasion**
c) Inspirational appeals d) Consultation
8. In which year government of India passed The Sexual Harassment of women at work place act?
- a) 2011 b) 2012
c) **2013** d) 2014
9. When employees see politics as a threat, they often respond with _____
- a) Power tactics b) decreased turnover
c) **Defensive behaviour** d) Increased job satisfaction
10. Which is NOT a determinant of sexual harassment?

- a) Showing pornography b) Welcomed verbal communication
c) request for sexual favor d) unwelcomed non-verbal conduct

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

1. List out the skills of manager to achieve organizational goals.
2. Explain micro level concepts in organizational behavior.
3. Mention the management functions.
4. Explain the decisional role of management.
5. Explain the term manager and organization.
6. Explain the human skill of management.
7. List out the disciplines that contribute to organizational behavior.
8. How organization respond to globalization
9. Explain employee well-being at work.
10. Describe positive organizational scholarship.

UNIT II

1. Differentiate between surface and deep level diversity.
2. Write the components of attitude.
3. Define job satisfaction.
4. Mention the cause of job satisfaction.
5. List the dimensions of intellectual abilities.
6. Describe the role of disabilities.
7. Define attitude.
8. Describe Surface level diversity.
9. Describe deep level diversity.
10. Describe age related diversity.

UNIT III

1. Define Personality
2. Explain the determinants of personality
3. Write a note on approach- avoidance framework.
4. Define Values.
5. Differentiate between terminal and instrumental values.

6. Mention the measures of personality.
7. Describe MBTI personality framework.
8. How conscientiousness personality trait influences Organizational behavior?
9. Describe Machiavellianism.
10. Describe Narcissism.

UNIT IV

1. Define groups
2. Distinguish between different types of groups.
3. Describe social identity theory.
4. Describe ingroup favoritism
5. Explain punctuated- equilibrium model.
6. Differentiate role perception and role expectation
7. Define conformity
8. Describe deviant workplace behavior.
9. Describe cohesiveness.
10. What are the by- products of group decision making?

UNIT V

1. Define power.
2. Describe the term dependence related to OB.
3. Describe coercive power.
4. Describe reward power.
5. Describe legitimate power.
6. Describe referent power.
7. Explain sexual harassment.
8. Define Political behavior.
9. Describe defensive behaviours.
10. Describe expert power.

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Examine the functions of management with example.
2. Discuss the management roles.

3. Discuss the management skills.
4. Demonstrate Fred Luthans study on managerial activities.
5. Discuss the disciplines that contribute to organizational behavior.

UNIT II

1. Discuss the other biological characteristics of diversity.
2. Discuss Intellectual ability in organizational behavior.
3. Discuss sex related diversity in organization.
4. Discuss employee engagement in job satisfaction.
5. Discuss the levels of diversity with example.

UNIT III

1. Compare generational differences in values.
2. Discuss Dark Triad with example.
3. Discuss MBTI strength and weaknesses.
4. Identify the key traits in the Big Five Personality model.
5. Discuss approach- avoidance framework of personality.

UNIT IV

1. Demonstrate social identity theory with their characteristics.
2. Identify stages of group development.
3. Discuss group decision making techniques.
4. Show how group size affects group performance.
5. Discuss the pros and cons of cohesive group

UNIT V

1. Discuss about leadership and power.
2. Discuss sexual harassment in organization.
3. Discuss the reality of politics.
4. Identify the factors that contribute to political behavior.
5. Discuss the ethics of behaving politically

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Evaluate the view of challenges in organizational behavior with example.
2. Elaborate Mintzberg's managerial roles with example.

3. "Globalization is a challenge to an organization"- justify.
4. Analyse the enhancement of employee well-being at work place.

UNIT II

1. Prove that biographical characteristics make diversity in work place.
2. Interpret the major job attitudes.
3. Outline the abilities in organizational behavior.
4. Show the practical implementation of diversity management strategies.

UNIT III

1. Show that Myers- Briggs and Big Five Personality model predict behaviour at work
2. Examine the undesirable traits in organizational behavior.
3. Analyse the importance of value in organization.
4. Elaborate some of the specific personality attributes relevant to OB.

UNIT IV

1. Contrast the strengths and weakness of group decision making.
2. Evaluate the implications of diversity for group effectiveness.
3. Analyse the role change in different situation with example.
4. Outline the norms of the group effect on individuals.
5. Elaborate the alternative model for temporary group with deadlines.

UNIT V

1. Examine the bases of power.
2. "Dependence is a key to power" – Justify.
3. Outline power tactics.
4. Analyse the cause and consequences of political behavior.
5. Show the connection between sexual harassment and the abuse of power

14. Natural selection theory was proposed in the year

- a. 1852
- b. 1854
- c. 1856
- d. **1858**

15. Dualism was a concept of

- a. **Plato**
- b. Aristotle
- c. Descartes
- d. Darwin

UNIT II

1. part of neuron is responsible for receiving information.

- a. axon
- b. terminal fibre
- c. **dendrites**
- d. soma

2. The information processing element of the nervous system is

- a. axon
- b. nucleus
- c. **neuron**
- d. soma

3. number of neurons are found in the nervous system.

- a. 12 million
- b. 12 trillion
- c. **12 billion**
- d. 12 lakh

4. converts electrical fluctuation into visible signals.

- a. microscope
- b. multimeter
- c. **oscilloscope**
- d. signaliser

5. The connection between dendrites and cell body of next neuron is called

- a. axon
- b. **synapse**
- c. junction buttons
- d. dendrites

6. cells are found only in the peripheral nervous system.

- a. cell body
- b. cell membrane
- c. **schwann cells**
- d. golgi

7. facilitates communications between neurons.

- a. synaptic input
- b. synapse
- c. dendric input
- d. **action potential**

8. The phosphate groups bind to form the

- a. fat
- b. acid
- c. **water**
- d. phospholipid

9. leaves the nucleus and comes in contact with ribosomes in endoplasmic reticulum.

- a. RNA
- b. **M RNA**
- c. T RNA
- d. DNA

10. A trans genetic technique used in Neuropsychology is called

- a. **optogenetics**
- b. optomogenetics
- c. spatial summation
- d. backpropocation

11. In action potential, leaves the neurons.

- a. **potassium**
- b. sodium
- c. calcium
- d. chlorine

12. In action potential, chemical enters the neuron

- a. potassium
- b. **sodium**
- c. calcium
- d. chlorine

UNIT III

1. The visual regions are often called cortex.

- a. **inferotemporal**
- b. exterotemporal
- c. protemporal
- d. pretemporal

2. The process of matching visual & auditory information is called modal matching.

- a. top
- b. bottom
- c. **cross**
- d. ventro

3. Social cognition helps us know about other people's

- a. cognitions
- b. **intentions**
- c. beliefs
- d. values

4. Which lobe of the brain is primarily responsible for executive functions such as decision-making and impulse control?

- a. **Frontal lobe**
- b. Temporal lobe
- c. Parietal lobe
- d. Occipital lobe

5. In which area of the frontal lobe is Broca's area located, responsible for language production?

- a. Superior frontal gyrus
- b. **Inferior frontal gyrus**
- c. Precentral gyrus
- d. Postcentral gyrus

6. The primary motor cortex, responsible for voluntary movement, is located in which lobe?

- a. **Frontal lobe**
- b. Temporal lobe
- c. Parietal lobe
- d. Occipital lobe

7. Which of the following functions is primarily associated with the temporal lobe?
- a. **Auditory processing**
 - b. Visual processing
 - c. Motor control
 - d. Tactile sensation
8. Which important structure, involved in memory formation, is located within the temporal lobe?
- a. Hypothalamus
 - b. Amygdala
 - c. **Hippocampus**
 - d. Thalamus
9. Damage to which part of the temporal lobe can result in deficits in language comprehension?
- a. Inferior temporal gyrus
 - b. Superior temporal gyrus
 - c. Fusiform gyrus
 - d. **Wernicke's area**
10. Which disorder is associated with abnormalities in the function of the frontal lobe, resulting in difficulties with attention and hyperactivity?
- a. Alzheimer's disease
 - b. Parkinson's disease
 - c. **ADHD**
 - d. Schizophrenia
11. The prefrontal cortex, a region of the frontal lobe, is involved in which of the following functions?
- a. **Emotional regulation**
 - b. Motor coordination
 - c. Visual processing
 - d. Pain perception
12. Which part of the temporal lobe is responsible for the recognition of faces?
- a. Inferior temporal gyrus
 - b. **Fusiform gyrus**
 - c. Superior temporal gyrus
 - d. Middle temporal gyrus
13. Which of the following conditions is associated with abnormalities in the temporal lobe, leading to seizures and altered consciousness?
- a. Migraine
 - b. **Epilepsy**
 - c. Multiple sclerosis
 - d. Bell's palsy
14. Damage to the frontal lobe can result in deficits in which cognitive function?
- a. Memory
 - b. Language comprehension
 - c. **Problem-solving**
 - d. Visual perception
15. The lateral prefrontal cortex is involved in which aspect of executive function?
- a. **Working memory**
 - b. Emotional processing
 - c. Language production
 - d. Auditory processing
16. Which condition is associated with damage to the temporal lobe and is characterized by difficulties in recognizing and identifying objects?
- a. **Agnosia**
 - b. Aphasia

c. Apraxia

d. Dysarthria

UNIT IV

1. Which lobe of the brain is primarily responsible for processing sensory information such as touch, temperature, and pain?

a. Frontal lobe

b. **Parietal lobe**

c. Temporal lobe

d. Occipital lobe

2. Damage to the parietal lobe can result in:

a. Loss of vision

b. Impaired motor function

c. Difficulty understanding language **d. Sensory deficits such as numbness or tingling**

3. The primary somatosensory cortex, responsible for processing tactile information, is located in which lobe of the brain?

a. Frontal lobe

b. **Parietal lobe**

c. Temporal lobe

d. Occipital lobe

4. The parietal lobe plays a crucial role in:

a. Memory formation

b. Emotion regulation

c. **Spatial awareness and perception** d. Hearing and auditory processing

5. Visual processing primarily occurs in which lobe of the brain?

a. Frontal lobe

b. Parietal lobe

c. Temporal lobe

d. **Occipital lobe**

6. The primary visual cortex, responsible for initial processing of visual information, is located in the:

a. Frontal lobe

b. Parietal lobe

c. Temporal lobe

d. **Occipital lobe**

7. Damage to the occipital lobe can result in:

a. Loss of hearing

b. Impaired balance and coordination

c. **Visual deficits**

d. Difficulty speaking and understanding language

8. The parieto-occipital sulcus separates which two lobes of the brain?

a. Frontal and parietal lobes

b. Parietal and temporal lobes

c. **Parietal and occipital lobes**

d. Occipital and temporal lobes

9. The integration of visual and spatial information, such as hand-eye coordination, occurs in the:

a. Frontal lobe

b. **Parietal lobe**

c. Temporal lobe

d. Occipital lobe

10. Which lobe of the brain is associated with functions such as attention, awareness, and language comprehension?

a. **Frontal lobe**

b. Parietal lobe

c. Temporal lobe

d. Occipital lobe

11. The parietal-occipital sulcus is found on the medial surface of the hemisphere and separates the parietal lobe from which lobe?

a. Frontal lobe

b. Parietal lobe

c. Temporal lobe

d. **Occipital lobe**

12. Damage to the parietal lobe may lead to difficulties in:

a. Forming long-term memories

b. Controlling voluntary movements

c. Processing visual information

d. **Perceiving touch and spatial relationships**

13. The occipital lobe is primarily responsible for:

a. Hearing

b. **Vision**

c. Speech production

d. Memory formation

14. Which area of the parietal lobe is responsible for processing information about body sensations and awareness of body parts in space?

a. Broca's area

b. Wernicke's area

c. Angular gyrus

d. **Somatosensory cortex**

15. Lesions in the occipital lobe can result in a condition known as:

a. Aphasia

b. Agnosia

c. Anosognosia

d. **Hemianopia**

UNIT V

1. What is brain plasticity?

a. The inability of the brain to change

b. **The brain's ability to reorganize and adapt**

c. The rigidity of neural connections

d. The fixed nature of cognitive processes

2. Which of the following factors can influence brain plasticity?

a. Genetics

b. Environmental experiences

c. Age

d. **All of the above**

3. Which type of brain cells are primarily involved in brain plasticity?

a. **Neurons**

b. Glial cells

14. Which of the following factors can negatively impact brain plasticity?

- a. Chronic stress
- b. Lack of sleep
- c. Poor nutrition
- d. **All of the above**

15. Which term describes the process of generating new neurons in the brain?

- a. **Neurogenesis**
- b. Synaptic pruning
- c. Myelination
- d. Neurotransmission

SECTION B

Answer in about 50 words:

(2 Marks)

UNIT I

1. Define Neuropsychology.
2. State the branches of neuropsychology.
3. What is dualism?
4. State the functions of spina cord.
5. Differentiate gyri & sulci.
6. Define anopsia.
7. What is natural selection theory?
8. Define epigenetics.
9. List the functions of basal ganglia.
10. Describe mentalism.

UNIT II

1. Describe synapse.
2. Define optogenetics.
3. List the functions of neuron.
4. What is graded potential?
5. Illustrate a neuron.
6. What is action potential?
7. What is localization of function in brain?
8. List the functions of Golgi bodies.
9. What is versatile neuron?
10. Differentiate post synaptic potential and action potential.

UNIT III

1. List the subdivisions of temporal cortex.
2. State the aspects in which music sounds differ from one another.
3. What is music memory?
4. Differentiate default network & salience network.
5. List the connections of temporal cortex.
6. State the 3 basic sensory functions of temporal cortex.
7. Define pitch, rhythm and loudness.
8. List the disorders of auditory and speech perceptions.
9. Describe internal cues.
10. What are external cues?
11. Describe context cues.

UNIT IV

1. State the connections of visual cortex.
2. Define visual space.
3. Differentiate visual recognition & visual attention.
4. List the disorders of visual pathways.
5. What is visual space?
6. What is ischemia?
7. What is spatial navigation?
8. What is somatosensory agnosia?
9. Describe Balint's syndrome.
10. What is Gerstmann syndrome?

UNIT V

1. Define plasticity.
2. What is functional restitution.
3. Define aphasia.
4. Define rehabilitation.
5. Explain movement therapy.
6. What is tactile stimulation?
7. Define cognitive rehabilitation.
8. What are pharmacological therapies used to cure brain damage.
9. What is electrical stimulation.
10. What is stem cell induction?

SECTION C

Answer in about 200 words each:

(5 Marks)

UNIT I

1. Give a note on comparative neuro psychology.
2. Illustrate a human brain.
3. Describe brain anatomy.
4. Explain the perspectives on the brain and behaviour.
5. Explain materialism.
6. Explain neuro plasticity.
7. Describe brain imaging.

UNIT II

1. Explain neuro plasticity.
2. Discuss the electric activity in the neuron.
3. Illustrate neuron.
4. Explain the cell membrane.
5. Discuss the functions of the nucleus of neuron.
6. Explain protein synthesis.
7. Discuss neuron's electrical activity.
8. Explain resting potential.
9. Write a note of optogenetics.

UNIT III

1. Illustrate the frontal lobe anatomy.
2. Discuss the studies done on temporal memory in humans.
3. State the temporal cortex connections.
4. Explain speech perception in temporal lobe.
5. Explain music perception in temporal lobe.
6. Discuss the disorders of auditory and speech perceptions.
7. Discuss the disorders of music perception.
8. Explain the clinical neuropsychological assessment of temporal lobe damage.
9. Explain cues.
10. Write a note on loss of divergent thinking.

UNIT IV

1. Explain the disorders of visual pathways in occipital lobe.
2. What is Balint's syndrome?
3. Describe visual agnosia.
4. Explain the subdivision & connections of parietal cortex.
5. Explain the behavioural uses of spatial information.
6. What is somatosensory agnosia.
7. Describe the Gerstmann syndrome.
8. Describe apraxia and parietal lobe.

UNIT V

1. Describe brain plasticity.
2. Discuss any one therapeutic approach used for brain damage.
3. How is testing for brain damage done?
4. Discuss the assessment methods for specific brain functions.
5. Discuss the assessments for brain functioning done?
6. Explain rehabilitation in neuropsychological practice.
7. State the principles of brain plasticity.
8. Give examples of functional restitution.
9. Describe brain tissue transplants & stem cell induction.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Analyze and elaborate on CNS.
2. Elaborate on Brain stem.
3. Give a detailed account on spinal cord: structure, anatomy and functions.
4. Define neuro psychology and elaborate on the research done on comparative neuro psychology.
5. Write an essay on the divisions of the brain.

UNIT II

1. Elaborate on structure of neuron.
2. Analyze the action potential found in a neuron.
3. Discuss: Neuron is a factory
4. How does protein synthesis happen in the neuron?

UNIT III

1. Analyze and elaborate on the auditory processing in the temporal lobe.
2. Analyze the symptoms of the frontal lobe lesions.
3. Elaborate on the frontal lobe anatomy
4. Elaborate on the temporal lobe anatomy.
5. Analyze the symptoms of the temporal lobe lesions.
6. Give an essay on the visual processing of the temporal lobe.

UNIT IV

1. Elaborate on the categories of visual processing in occipital lobe.
2. Elaborate on clinical neuropsychological assessment of parietal lobe.
3. Give a detailed account of the somatosensory symptoms of parietal lesions.
4. Write an essay on the disorders of visual pathways.
5. Critically analyze the theory of occipital lobe function.

UNIT V

1. Elaborate of functional recovery after injury.
2. Write an essay on the therapeutic approaches to recovery after brain damage.
3. Critically evaluate the neuropsychological practices.

8. Major problem of disability is _____
a) **Health** b) Finance

c) Education d) Gender

9. World`s AIDS day celebrated on _____

a) **December 1** b) June 6

c) May 2 d) April 1

10. HIV consists of _____ stages

a) **3** b) 6

c) 7 d) 5

UNIT IV

1. Which of the following is a type of eating disorder _____

a) **Anorexia Nervosa** b) Alzheimer

c) Amnesia d) Autism

2. In ADL, A represent _____ of daily living

a) **Activities** b) Arousal

c) Attention d) Affective

3. Unpaid family is also called as _____

a) Formal b) Demographic

c) **Informal** d) Authoritative

4. Delayed verbal recall is also called as _____

a) long term memory b) Sensory memory

c) Immediate Memory d) **short term memory**

5. _____ evaluation will identify the signs and symptoms associated with a condition

a) Functioning b) Standardized

c) **Diagnostic** d) non-diagnostic

6. Jean Piaget developed _____ stages

a) 3 b) **4**

c) 6 d) 5

7. _____ is the 2nd stage in psychodiagnosics assessment

a) data collection b) Situation Variable

c) **Development of inference** d) Predictor of behaviour

8. Human rights act established _____

- a) 2000
- b) 2010
- c) 2004**
- d) 2009

9. Disability Discrimination Act in _____

- a) 1919
- b) 1992**
- c) 1996
- d) 1987

10. _____ helps caregiver`s burden to reduce

- a) Delegate**
- b) Self esteem
- c) Coordinate
- d) Encouragement

UNIT V

1. Once the patient has recovered, he can choose to go home given amount of _____ rehabilitation

- a) Outpatient**
- b) Institution
- c) In patient
- d) Community

2. Psycho diagnostics focus on understanding the individual _____ process

- a) Informal thought
- b) Formal thought**
- c) Cognitive thought
- d) Emotional thought

3. _____ represent reacting to facial exposure

- a) 2 years
- b) 1 months
- c) 6 months**
- d) 5 months

4. _____ sounds into words

- a) Phonology**
- b) Syntax
- c) Semantic
- d) Morphology

5. Meaning of the sentence _____

- a) Phonology
- b) Syntax
- c) Morphology
- d) Semantic**

6. _____ is a process of recognizing any disability

- a) Evaluation
- b) early identification**
- c) Diagnostic
- d) Data collection

7. Adaptive Behavior Assessment consists of _____ subscales

- a) 8
- b) 10**

c) 7

d) 9

8. _____ assessment is a growth and development of children and promote and optimum

a) **Development**

b) Physical

c) Adaptive

d) Intellectual

9. _____ skills are needed for personal care

a) **Self-care**

b) Work

c) home

d) Social

10. Interaction with others is an example of _____

a) Self direction

b) Communication

c) social

d) Leisure

SECTION B

Answer in about 50 words each:

(2 Marks)

UNIT I

1. Define disability.
2. Define rehabilitation.
3. Define psychology.
4. Define biological perspective.
5. Define psychosocial perspective.
6. Define disease.
7. List any four functions of rehabilitation psychology.
8. List any four nature of disability.
9. Describe the methods of rehabilitation.
10. Describe need of disability.

UNIT II

1. Describe mental illness.
2. Describe the types of mental illness.
3. Define MR.
4. Define learning disabilities.
5. Define visual disabilities.

6. Describe orthopedic disability.
7. List the types of disability.
8. Explain AIDS.
9. Explain autism.
10. List any four types of cerebral palsy

UNIT III

1. Define psychological need.
2. Define designing training.
3. List five role of psychologist in disability.
4. Define caregiver
5. Define disability.
6. List any four psychological need of caregivers.
7. Describe rehabilitation
8. Differentiate between disability and rehabilitation
9. Describe RCI.
10. Explain work setting in psychology.

UNIT IV

1. Define assessment.
2. Define screening.
3. List the assessments of rehabilitation.
4. Describe psychodiagnostics.
5. Explain early identification
6. Describe development assessment.
7. Describe adaptive behavior.
8. Describe psychological assessment.
9. Explain intellectual assessment
10. Differentiate between assessment and scale.

UNIT V

1. Define act.
2. Define mental health.
3. Describe disability.

4. Describe mental health act
5. Explain RCI.
6. Explain scales of disability.
7. Define national trust act.
8. Define Hanson's disease.
9. Define neuromuscular disability
10. Explain multiple disabilities

SECTION C

Answer in about 200 words:

(5 Marks)

UNIT I

1. Provide a short note on needs of person with disabilities.
2. Provide a note on psychosocial perspective of disability.
3. Explain the functions of rehabilitation psychology.
4. Provide a short note on methods of rehabilitation psychology.

UNIT II

1. Provide an overview of mental illness.
2. Provide a note on person with disability.
3. Provide a note on various types of disability.
4. Provide a note on mental retardation.

UNIT III

1. Provide a note on role of psychologist in disability.
2. Provide a note on work setting of rehabilitation psychologist.
3. Provide a note on designing training programs for rehabilitation.
4. Analyze the psychological needs of caregivers.

UNIT IV

1. Provide a note on developmental assessment.
2. Provide a note on Intellectual assessment.
3. Provide a note on psychodiagnostics assessment.
4. Provide a note on adaptive behavior.

UNIT V

1. Explain the types of acts.
2. Provide a note on national trust act.
3. Provide a note on the PWD act.
4. Provide a note on RCI.
5. Explain mental health act.

SECTION D

Answer in about 400 words:

(10 Marks)

UNIT I

1. Give a detailed note on nature and needs of persons with disabilities.
2. Give a detailed difference between disability and rehabilitation.
3. Give a detailed note on history of rehabilitation psychology.
4. Elaborate on functions of rehabilitation psychology.
5. Summarize methods of rehabilitation.

UNIT II

1. Summarize the mental illness.
2. Give a detailed note on PWD.
3. Summarize learning disabilities.
4. Summarize the visual disabilities.

UNIT III

1. Summarize on understanding psychological needs of caregivers.
2. Summarize on working with families of person with disabilities.
3. Give a detailed note on designing training program for rehabilitation psychology.
4. Summarize on role of psychologist in disability rehabilitation.

UNIT IV

1. Give a detailed note on psychodiagnostics assessment.
2. Give a detailed note on developmental assessment.
3. Summarize on intellectual assessment.
4. Elaborate on assessment of adaptive behavior.

UNIT V

1. Summarize mental health act.
2. Give a detailed account on person with disability act.
3. Summarize RCI act
4. Elaborate national trust act.

11. What is the source of energy in active transport?
 - a. Sunlight
 - b. Hydrolysis of ATP**
 - c. Electric current
 - d. Osmosis
12. Which type of movement occurs when Na/K pump is used?
 - a. Na ion moves out of the cell and K⁺ moves in**
 - b. K⁺ ion moves out of cell and Na ion moves in
 - c. both Na and K⁺ ions move inside the cell
 - d. both Na and K⁺ ions move out of the cell
13. In anchoring junctions, cadherins are linked to _____
 - a. actin filaments in the cell's cytoskeleton**
 - b. cell walls of adjacent cells in plants
 - c. extracellular matrices of adjacent cells
 - d. intracellular integrins of most cells
14. Cell junctions that prevent small molecules from passing in between two cells are called _____
 - a. gap junctions
 - b. tight junctions**
 - c. plasmodesmata
 - d. adhesions
15. Desmosomes are associated with _____ junctions
 - a. adherens
 - b. anchoring**
 - c. communicating
 - d. tight
16. Which one of the following protein is present in the tight junction?
 - a. Occludins and claudins**
 - b. Placoglobins
 - c. Cadherins
 - d. Connexins

Unit II

1. The process of converting extracellular signals into cellular responses is called _____
 - a. signal transformation
 - b. signal transduction**
 - c. signal interference
 - d. signal amplification
2. Synaptic signaling involves _____
 - a. endocrine signals
 - b. paracrine signals
 - c. autocrine signals
 - d. neurotransmitters**
3. Cell signals with short-lived local effects are known as _____
 - a. paracrine**
 - b. endocrine
 - c. apocrine
 - d. autocrine
4. Which of the following signaling is involved in paracrine signaling?
 - a. Chemical signaling**
 - b. Synaptic transmission
 - c. Hormonal communication
 - d. Autostimulation of cell
5. Which of the following signal molecule is not used for extracellular signaling?
 - a. Autocrine
 - b. Endocrine
 - c. Paracrine
 - d. Cyclic AMP**
6. How many transmembrane alpha-helices are present in the G-protein coupled receptors?
 - a. Two
 - b. Four
 - c. Five
 - d. Seven**
7. Which G-protein components has GTPase activity?
 - a. Alpha subunit**
 - b. Beta subunit
 - c. Gamma subunit
 - d. Alpha/beta complex

8. In the cAMP pathway, the G protein stimulates _____
 a. phospholipase C **b. adenylyl cyclase** c. pheromones d. calmodulin
9. _____ is a common second messenger
 a. **cAMP** b. cATP c. cGTP d. cMHC
10. Cell surface receptors may be any of the following except _____
 a. G protein linked
b. single-pass transmembrane proteins for neurotransmitters
 c. enzymic receptors
 d. chemically-gated ion channels
11. Binding of epinephrine to a G –protein linked receptor causes adenylyl cyclase to produce large amounts of _____
 a. G-protein b. phospholipase C c. inositol triphosphate **d. cAMP**
12. The strength of binding between a ligand and a receptor is usually expressed as _____
 a. K_m b. endocrine constant **c. affinity constant** d. paracrine constant
13. Simple nerve reflexes use signaling molecules called _____
 a. **neurotransmitters** b. nitric oxides c. G proteins d. proteases

Unit III

1. Chromosome having centromere in the middle is called _____
 a. acrocentric b. telocentric **c. metacentric** d. submetacentric
2. A normal metaphase chromosome with a middle centromere is called _____
 a. acrocentric b. telocentric **c. metacentric** d. submetacentric
3. Process in which introns are removed from messenger RNA precursor and exons are re-joined is referred to as _____
 a. **splicing** b. capping c. polyadenylation d. replication
4. Identify the coding sequence found in split genes
 a. operons b. introns **c. exons** d. cistrons
5. Pick up the non-coding sequence in mRNA
 a. template b. non template **c. intron** d. exon
6. The term gene refers to
 a. sequence of amino acids in protein b. a linkage group
 c. a part of RNA **d. a part of DNA**
7. In prokaryotes, the promotor region consists of a homology of TATA box called _____
 a. HD sequence **b. pribnow box** c. hagness box d. SD sequence

3. In 70S ribosomes 'S' stands for _____
- a. SI unit b. solubility factor c. **Svedberg unit** d. seconds
4. The larger and smaller subunits of 70S ribosome are _____
- a. **50S and 30S** b. 30S and 40S c. 40S and 20S d. 20S and 50S
5. Which of the following ions are required for binding of ribosomal subunits?
- a. Na⁺ b. **Mg⁺⁺** c. Mn⁺⁺ d. Fe⁺⁺
6. Which of the following organelles has a continuous connection with nuclear membrane?
- a. Golgi apparatus b. Lysosome
- c. **Rough endoplasmic reticulum** d. Smooth endoplasmic reticulum
7. Identify the function of RER
- a. Protein synthesis and detoxification
- b. **Protein synthesis and post translational modification**
- c. Protein synthesis and phospholipid biosynthesis
- d. Protein synthesis
8. The removal of mismatched base pairs in DNA replication is called _____
- a. legation b. transcription c. **proof reading** d. capping
9. SER in the retinal cells are called as _____
- a. sarcoplasmic reticulum b. retinal reticulum c. **myeloid bodies** d. amyloid bodies
10. Where dose protein glycosylation occur?
- a. Lumen of mitochondria
- b. **Lumen of rough endoplasmic reticulum**
- c. Lumen of smooth endoplasmic reticulum
- d. Lumen of lysosomes
11. The enzyme required for transcription is _____
- a. restriction enzymes b. DNA polymerase c. **RNA polymerase** d. RNAase
12. Which of the following is considered as a start codon?
- a. **AUG** b. GUG c. UAG d. AGG
13. Mark the one which is not a stop codon
- a. UAA b. UAG c. UGA d. **GGA**
14. Krebs cycle starts with the production of _____
- a. **acetyl CoA** b. oxaloacetic acid c. malic acid d. citric acid
15. The chemical products of the cell are shipped and distributed by _____
- a. ER lumen b. **Golgi apparatus** c. lysosome d. endosome

16. Zone of exclusion is associated with _____
 a.nucleus b.ribosome c.cytoplasm d.**Golgi complex**
17. Which face do proteins enter the Golgi apparatus?
 a.trans b.**cis** c.median d. ER
18. Endoplasmic reticular proteins which bind to carbohydrates attached to newly made proteins is _____
 a. **calnexin** b.protein disulphide isomerase
 c.chaperone Hsc70 d.peptidyl-prolyl isomerase
- 19.The carrier for the oligosaccharide in endoplasmic reticulum membrane is _____
 a. peptidyl-prolyl isomerase b. **dolichol**
 c. glycosyl transferase d. galactosyl transferase

Unit V

1. In mitotic division nucleolar dispersal occurs during _____
 a. **prophase** b. metaphase c. anaphase d. telophase
2. Spindle fibers extending from pole to pole are _____.
 a. asters b. chromosomal fibers c. **continuous fibers** d. chromatin fibers
3. The longest stage of meiotic division is _____.
 a. **prophase I** b. telophase I c. prophase II d. telophase II
4. In meiotic division actual reduction of chromosome occurs during _____.
 a. metaphase I b. **anaphase I** c. prophase II d. anaphase II
5. In which stage of meiosis does crossing over occur?
 a. zygotene b. **pachytene** c. diplotene d. diakinesis
6. The time taken for S phase in a rapidly replicating human cell is _____.
 a. 30 minutes b. 4.5 hours c. 9 hours d. **10 hours**
7. Inhibitor of kinase protein which acts as tumour suppressor is _____.
 a. P⁵⁷ b. P²⁷ c. P²¹ d. **P¹⁶**
8. Copying of damaged bases is prevented in _____.
 a. **G₁ arrest** b. G₂ arrest c. S arrest d. M arrest
9. Cyclin D is expressed during _____.
 a. **G₁ phase** b. S phase c. G₂ phase d. M phase
10. _____ is a naturally occurring process by which a cell is programmed to cell death.
 a. **Apoptosis** b. Cell division c. Cancer d. Proliferation
- 11.Activation of apoptosis via mitochondria is an _____ pathway.
 a. **intrinsic** b. extrinsic c. cytoplasmic d. external

Section B (2 marks)

Answer in about 50 words

Unit I

1. How will you isolate red cell ghost from plasma membrane?
2. Differentiate extrinsic proteins from intrinsic proteins
3. Discuss membrane electric potential
4. Distinguish between active and passive transport
5. Define passive diffusion
6. What is uniport transporters?
7. Explain co-transport system
8. Differentiate symporters from antiporters
9. What are channel proteins?
10. Comment on ABC transporter
11. Write a short note on cell junction
12. Distinguish between tight junction and septate junction
13. Write about desmosomes
14. Explain hemi desmosomes
15. Distinguish between spot desmosomes and belt desmosomes

Unit II

1. Discuss contact dependent signaling
2. Explain RTK
3. Differentiate endocrine signaling from paracrine signaling
4. Enlist the different types of cell surface receptors
5. Write about ion channels
6. Define first messengers
7. What are second messengers?
8. List out the types of second messengers

9. Explain effector molecule
10. What is meant by amplification of signals?
11. Distinguish between signal molecules and signal receptors

Unit III

1. Distinguish autosome and allosome
2. Differentiate prokaryotic chromosome and eukaryotic chromosome
3. Classify chromosome on the basis of the position of centromere.
4. In what way are simple, compound and complex genes different?
5. Differentiate between intron and exon.
6. Define A form DNA.
7. Comment on B form DNA.
8. Write short notes Z form DNA.
9. List out the major forms of DNA. Differentiate them in terms of helix sense and base pairs per turn.
10. Distinguish transition from transversion.
11. Define frame shift mutation.

Unit IV

1. Write short note on polyribosomes
2. What are split proteins?
3. Differentiate 70S ribosome from 80S ribosomes
4. Compare first critical with second critical level
5. Distinguish between rough and smooth endoplasmic reticulum
6. Define cisternae
7. What are tubules?
8. Discuss translational proof reading
9. Name different components of Golgi components.
10. Write short notes on importance of O-linked glycoproteins.

11. Write short notes on synthesis of N-linked glycoproteins.

Unit V

1. Define cytokinesis.
2. What is synaptonemal complex?
3. Define G₀ phase.
4. What are cyclins?
5. What are cyclin dependent kinases?
6. Enlist cyclin – kinase inhibitors.
7. Define cell cycle check points.
8. List out the types of cancer.
9. Define Apoptosis.
10. Define anaplasia.

Section C (5 maks)

Answer in about 200 words

Unit - I

1. Describe the asymmetrical organization of lipid and protein of plasma membrane
2. Illustrate the fluid mosaic model of plasma membrane
3. Discuss the different types of intercellular junctions
4. Comment on membrane proteins
5. “GLUT 1 – transports glucose into mammalian cells” – Substantiate
6. Explain uniporter catalyzed transport
7. What are ion channels? Discuss their types
8. Differentiate muscle calcium pump from plasma calcium pump
9. Describe MDR transport proteins in Mammalian cells
10. “H⁺ ATPases pump protons across lysosomal and vacuolar membranes” - Substantiate

Unit II

1. Analyze the mechanism of cell signaling
2. Compare and contrast between endocrine and autocrine signaling
3. Explain the different types of cell signaling
4. Write an account of receptors with intrinsic enzyme activity
5. Outline the structure and mechanism of action of G-protein coupled receptors

6. Prove with examples where cGMP acts as second messenger
7. Give examples where IP₃ and DAG act as second messenger
8. “cAMP activates specific protein kinases” - Justify
9. How does Ca⁺⁺ act as second messenger in neurons?
10. What is ryanodine receptor? What is its function?

Unit III

1. Describe the morphological structure of chromosome
2. Classify chromosome by the position of centromere
3. Describe components of prokaryotic gene
4. Analyze the components of eukaryotic gene.
5. Give an account on split gene
6. Describe the structure of complex gene
7. Discuss different types of frame shift mutation
8. Differentiate A-DNA and B-DNA from Z-DNA.
9. Explain chemical induced mutation.
10. Analyse the causes of physical induced mutation

Unit IV

1. Illustrate the structure of prokaryotic ribosome
2. Explain the protein factors that initiate protein synthesis
3. Describe the role of elongation factors in the formation of polypeptide chain.
4. Outline the role of termination factors in protein synthesis
5. Discuss the quasi symmetrical model of ribosome
6. Describe the ultra structure, and chemical organization of mitochondria.
7. Analyze the various functions of mitochondria in the cells
8. Describe the morphological structure of Golgi complex.
9. Describe the process of post translational modifications undergone by protein.
10. Highlight the events of N-linked glycolysation
11. Give the principal types of linkages of carbohydrates with protein.

Unit V

1. Discuss the process of mitosis.
2. List out the significance of mitosis.
3. Differentiate mitosis from meiosis.

4. Explain prophase I of meiosis I.
5. Enumerate the role of crossing over in meiosis.
6. Distinguish cyclin from cyclin -dependent kinases.
7. Differentiate cancer cells from normal cells.
8. Compare apoptosis from necrosis.
9. Explain the Extrinsic pathway of apoptosis.
10. Explain the Mitochondrial or Intrinsic pathway of apoptosis.
11. Write the properties of cancer cells.
12. Explain the different types of cancer.

Section D (10 marks)

Answer in about 400 words

Unit I

1. Describe different models of plasma membrane structure
2. Present the general architecture of bio membranes
3. Explain the different modes of transport across cell membrane
4. Analyze the different classes of ATP powered ion pumps
5. Describe different type of transport ATPases
6. Define and distinguish uniport, symport and antiport proteins. Explain their properties
7. “ABC superfamily transports a wide variety of substrates” - Justify
8. Outline the co-transport of Na^+ and K^+ by Na^+K^+ ATPase
9. Evaluate Cl^- and HCO_3^- co- transport through RBC membrane

Unit II

1. Categorize the different types of cell surface receptors
2. Describe the role of cGMP and cAMP as the second messenger in signal transduction
3. Examine the role Ca^{2+} as second messengers
4. Write an account of second messengers
5. Explain the signaling mechanism from plasma membrane to nucleus

Unit III

1. Explain the signaling mechanism from plasma membrane to nucleus

2. Discuss the different forms of DNA in detail
3. Describe molecular basis of mutation.
4. Discuss mutagenesis and make a list of chemical mutagens and the types of mutations caused by them.
5. Elaborate molecular basis of spontaneous mutation.
6. Describe the various methods of DNA repair

Unit IV

1. Illustrate the structure of ribosome with two models
2. Differentiate prokaryotic ribosome from Eukaryotic ribosomes
3. Describe the process of protein synthesis
4. Explain translational proof reading in protein synthesis
5. Describe the structure of endoplasmic reticulum
6. Outline the role of mitochondria in the process of cellular respiration
7. Clarify the role of addressing tags for the trafficking of vesicles through Golgi.
8. Highlight the events of protein glycosylation in endoplasmic reticulum.
9. Illustrate the role of protein in post translational modifications.

Unit V

1. Describe the process of mitosis and its significance.
2. Describe the major features of meiosis and discuss the need of meiosis for the production of gametes.
3. Narrate the phase of meiosis I and add notes on its significance.
4. Write in detail cyclins and cyclin -dependent kinases.
5. Describe the role of cyclin -dependent kinase complexes in eukaryotic cell cycle regulation.
6. Explain cell- cycle control in mammalian cells.
7. Describe the mechanisms of Apoptosis
8. 'A cell's progress through the cell cycle is monitored at check points'- Explain

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc Zoology Semester I

Core II: Genetics and Evolution Course Code: 21PZOC12

(for those who joined in July 2021 and after)

Question Bank

Section A (1 mark)

Choose the correct answer

Unit I

1. A tetrad type containing two different genotypes is _____
 - a. **non parental ditype**
 - b. parental ditype
 - c. tetra type
 - d. parental and non parental type
2. _____ are used as a marker in the chromosomes
 - a. primary constrictions
 - b. **secondary constrictions**
 - c. centromeres
 - d. chromomeres
3. Who classified the human chromosomes into seven groups?
 - a. **Patau**
 - b. Carl Correns
 - c. Ephrussi
 - d. T.H. Morgan
4. Where does this evidence come from? – crossing over takes place at a four-stranded stage and not at two stranded stages of chromosomes.
 - a. studies on linkage maps of chromosomes in *Drosophila*
 - b. studies of meiosis in maize
 - c. 4:4 organization of ascospores in *Neurospora*
 - d. **2:2:2:2 organization of ascospores in *Neurospora***
5. Who proposed the sex linkage hypothesis for the white gene in *Drosophila*?
 - a. Bridges
 - b. **T. H. Morgan**
 - c. Jacob
 - d. Mendel
6. Crossing over that results in genetic recombination in higher organisms occurs between _____
 - a. two different bivalents
 - b. sister chromatids of a bivalent
 - c. **non sister chromatids of a bivalent**
 - d. two daughter nuclei
7. The modified version of Belling's hypothesis is _____
 - a. Break and Exchange theory
 - b. **Copy Choice theory**
 - c. Classical theory
 - d. Duplication theory
8. Tetrad analysis was carried out in _____
 - a. ***Neurospora***
 - b. *Drosophila*
 - c. *Chironomous*
 - d. *E. coli*

9. Who proposed the classical theory of crossing over?
 a. Belling b. **Karl Sax** c. Darwin d. Lader berg
10. _____ technique is used to quickly detecting of cancer cells
 a. **Chromosome painting** b. Chromosome banding
 c. Chromosome mapping d. Q banding

Unit II

1. Who discovered transduction?
 a. Friedrich Miescher b. Harshey and Chase
 c. **Zinder and Lederberg** d. Griffith
2. When genetic material is transferred between two prokaryotes via specialized intercellular connection, it is called _____
 a. transformation b. **conjugation** c. transduction d. restricted transduction
3. Transduction is mediated by _____
 a. coliphage b. prophage c. **bacteriophage** d. integrated phage
4. A type of recombination is mediated by F' factors. How is it called?
 a. Conjugation b. Transduction c. **Sex duction** d. Transformation
5. Plasmids are _____
 a. chromosomes b. **minichromosomes** c. sex factor d. F factor
6. DNA elements which can switch their positions are called _____
 a. cistrons b. exons c. introns d. **transposons**
7. Who is credited with the discovery of transposons?
 a. Albert Kelner b. Kim c. Benzer d. **McClintock**
8. Retrotransposons replicate themselves during _____
 a. **transposition** b. translocation c. transversion d. transition
9. Where do you find copia elements?
 a. Maize b. **Drosophila** c. Human d. Yeast
10. The central block of the composite transposable element consists of gene for _____.
 a) transposase b. **antibiotic resistance** c. integrase d. lactamase
11. Hybrid dysgenesis occurs in which of the following cases?
 a. Crossing between P-female and P-male
 b. Crossing between M-female and M-male
 c. Crossing between P-female and M-male
 d. **Crossing between M-female and P-male**

Unit III

- Which of the following formula lets you predict the genotypic frequency of the next generation?
a. $p + q = 1$
c. $x^2 = \text{sum}[O - E]^2 / E$
b. $p^2 + 2pq + q^2 = 1$
d. $0.5\lambda/n \cdot \sin\theta$
- At a single locus with two alleles (S and s), if the frequency of the S allele is 0.72 in a population, then the frequency of s allele is _____
a. 0.64
b. 0.36
c. **0.28**
d. 0.80
- Which of the following is an assumption for Hardy – Weinberg equilibrium?
a. no dominance
b. no crossing over
c. no epistasis
d. **no mutation**
- _____ develop in the brain of an Alzheimer's patient and may be a cause of the disease.
a. Tumours
b. Cholesterol clots
c. Ruptured blood vessels
d. **Plaques and tangles**
- Which is the major clinical manifestation of Alzheimer's disease?
a. Epilepsy
b. **Dementia**
c. Depression
d. Split personality disorder
- Which is the trinucleotide (CAG) repeat disorder in man?
a. **Huntington's chorea**
b. Epilepsy
c. Schizophrenia
d. Parkinson's disease
- Dermatoglyphics is a term which refers to the study of _____.
a. skin histology
b. **configuration of ridged skin**
c. lines of cleavage
d. distribution pattern of skin diseases
- The most common pattern of fingerprint is _____.
a. arch
b. **loop**
c. whorl
d. composite
- In a family pedigree half darkened circle represents _____.
a. a heterozygous male
b. **a heterozygous female**
c. an affected female
d. a carrier female
- Which of the following enzymes exhibits genetic polymorphism?
a. Glucokinase
b. Phosphokinase
c. **N-acetyl transferase**
d. Adenyl cyclase
- Amniocentesis can be used to determine whether or not an unborn child will _____.
a. have diabetes
b. **have Down syndrome**
c. have chickenpox
d. be obese
- Which of the following diagnostic techniques is useful for the diagnosis of neural tube defects?
a. Amniocentesis
b. Chorionic villus sampling
c. Ultrasonogram
d. **Maternal serum level of alpha-fetoprotein**

Unit IV

- The phenomenon of industrial melanism demonstrates _____
 - natural selection**
 - mutation
 - reproductive isolation
 - geographical isolation
- The ultimate source of variation is _____
 - mitosis
 - mutation**
 - selection
 - meiosis
- The science that deals with the origin of life and diversity among living organisms is known as _____
 - heredity
 - Genetics
 - Evolution**
 - Applied Biology
- The sum of all genes present in a sexually reproducing population during a given period is _____
 - genetic drift
 - gene pool**
 - genetic load
 - gene flow
- Which of the following is an example of genetic variation?
 - Two children have different eye colours**
 - One person is older than another
 - One person has a scar but her friend does not
 - Tod eats meat but his brother Rod is a vegetarian
- In the case of peppered moth (*Biston betularia*) the black coloured form became dominant over the light coloured form in England during Industrial revolution. This is an example of _____
 - Inheritance of darker colour character acquired due to the darker environment
 - Natural selection whereby the darker forms were selected**
 - Appearance of the darker coloured individuals due to very poor sunlight
 - Protective mimicry
- Phenotype of an organism is the result of _____
 - environmental changes and sexual dimorphism
 - cytoplasmic effects and nutrition
 - mutation and linkages
 - genotype and environmental interactions**
- Which of the following statement is correct?
 - There is no evidence of existence of gills during embryogenesis of mammals
 - Stem cells are specialized cells
 - Ontogeny repeats phylogeny**
 - All plants and animal cells are totipotent

9. Select the correct statement from the following
- Fitness is the end result of the ability to adopt and gets selected by nature**
 - Darwinian variations are small and directionless
 - Mutations are random and directional
 - All animals except whales and camels have seven cervical vertebrae
10. Variation in gene frequencies within populations can occur by chance rather than by natural selection. This is referred to as _____
- gene flow
 - genetic drift**
 - genetic load
 - random mating

Unit V

- A species inhabiting different geographical areas is known as _____
 - sympatric
 - allopatric**
 - sibling
 - subspecies
- Which model of evolution suggests that one species transforms to another species in time?
 - divergent speciation
 - convergent speciation
 - sexual selection
 - phyletic speciation**
- Sewall Wright's name is associated with random walk of genes called _____
 - gene flow
 - genetic drift**
 - genetic load
 - random mating
- Quick changes in phenotypes in a small band of colonisers is called _____
 - genetic bottleneck
 - geneflow
 - founder effect**
 - Gauss effect
- Which one of the following is incorrect about genetic drift?
 - Random change in allele frequency in a population
 - A mechanism for the evolution of new species
 - Founder effect is a special case
 - Significant only in large populations.**
- One of the important consequences of geographical isolation is _____
 - random creation of new species
 - no change in the isolated fauna
 - prevention of speciation
 - speciation through reproductive isolation**
- Prezygotic isolating mechanisms ensure that _____
 - hybrids are never conceived or born**
 - hybrids are not fertile
 - hybrids are more likely to survive
 - genes do not mutate and affect the entire population

Section B (2 marks)

Answer in about 50 words

Unit I

1. Define karyotype with example
2. What is linkage?
3. What is incomplete linkage? Give an example
4. State duplication theory of crossing over
5. Write down classical theory of crossing over
6. What is interference?
7. Define coefficient of coincidence
8. What is tetrad analysis?
9. Define tetratype?
10. Differentiate chromosome painting from chromosome banding technique

Unit II

1. What is sexduction?
2. What is Hfr strain? How is it formed?
3. What is prophage?
4. Define lysogeny
5. Distinguish between F^+ and F^- cells
6. Define transposons. Give two examples
7. What are IS elements?
8. Give the genetic organization of P element.
9. What are the mobile genetic elements found in *Drosophila*?
10. Write down the evolutionary significance of transposons.

Unit-III

1. Write down the gene pool concept
2. Distinguish between gene and genotype frequencies
3. Expand $(p+q+r)^2 = 1$
4. List down the factors which upset Hardy – Weinberg equilibrium
5. What are the prime clinical manifestations of Alzheimer's disease?
6. Comment on the neurobiology of Huntington's chorea
7. Mention basic patterns in finger print

8. Define pedigree analysis
9. What is pharmacogenetics? Who coined this term?
10. Outline the sequence of events involved in drug metabolism
11. What is genetic counselling?
12. Distinguish between prospective and retrospective genetic counselling

Unit IV

1. State germ plasm theory
2. Define gene flow
3. Mention a few Neo- Darwinians
4. Define hybridization
5. What are the elemental forces of evolution?
6. What is genetic variation?
7. What are eco phenotypes?
8. What is genetic burden?
9. Define disruptive selection
10. What is frequency dependent selection?

Unit V

1. State the differences between species and subspecies
2. What are sibling species? Give an example
3. Distinguish between phyletic and parapatric speciation
4. What is Sewall Wright's effect?
5. Write short notes on geographical isolation
6. Highlight the significance of isolating mechanisms in the origin of species
7. What is meant by Simpson's adaptive grid?
8. List down the elemental evolutionary forces causing microevolution
9. Write down the formula to calculate the evolution rate.
10. State the similarities and differences between *Homo erectus* and *Homo sapiens*
11. Mention the phases of cultural evolution of man
12. Predict the future evolution of man.

Section C (5 marks)

Answer in about 200 words

Unit I

1. Give an account on morphological variability of human chromosomes
2. Distinguish between complete and incomplete linkages
3. Describe complete linkage in *Drosophila*
4. Highlight the contribution of T. H. Morgan
5. Differentiate interference from coincidence
6. State the Break and Exchange theory about crossing over
7. Discuss the first division segregation pattern in *Neurospora*
8. Explain incomplete linkage in *Drosophila*
9. Write the significance of chromosome painting technique
10. Classify chromosome banding techniques

Unit II

1. Distinguish between transformation and transduction
2. Describe the lytic cycle of T- phage
3. Explain generalized transduction
4. Give an account on specialized transduction
5. Compare and list the similarities and differences between conjugation, transformation and transduction
6. Present an account on the families of transposons found in bacteria.
7. What is transposition? Distinguish between cut-paste and copy-paste mechanism of transposition.
8. Analyse the genetic organisation and transposition of yeast Ty element.
9. Discuss the medical significance of transposons.
10. Describe the genetic significance of transposons.
11. Explain the evolutionary significance of transposons.

Unit-III

1. Demonstrate the relationship between gene and genotype frequencies
2. State the central theme of Hardy –Weinberg law. Derive its algebraic proof.
3. Discuss the dominance and codominance in a natural population in the light of Hardy – Weinberg law.

4. How do you estimate the frequency of multiple alleles using Hardy – Weinberg law?
5. Write down the genetic causes and clinical consequences of Huntington's chorea.
6. What is meant by Alzheimer's disease? Explain its neuropathological features.
7. Illustrate the diagnostic features of dermatoglyphics.
8. Enumerate the symbols commonly used in the construction of pedigree chart.
9. Describe the pharmacogenetics of β - agonists through β_2 adrenergic pathway.
10. Examine the prenatal diagnostic methods for genetic disorders that aid in genetic Counselling

Unit IV

1. Bring out the modern concept of recapitulation theory
2. What is variation? Explain the types of variations with suitable example
3. Bring out the evolutionary significance of recombination
4. What is introgressive hybridization? Write its evolutionary significance
5. What are chromosomal aberrations? Write its types
6. List the salient features of hybridization
7. Explain how the migration affects the gene pool of a population
8. Describe why peppered moth changed from white to black over several generation
9. State Founder's principle
10. Bring out the role of isolation in evolution

Unit V

1. Give the biological definition of species. What are the salient features?
2. Compare and contrast sympatric and allopatric speciation
3. Compare and contrast parapatric and quantum speciation
4. Illustrate the bottleneck phenomenon with an example.
5. Citing suitable examples explain the ecological and ethological isolating mechanisms.
6. Present an account on the mechanism and evolutionary significance of megaevolution.
7. Describe the evolutionary significance of microevolution
8. What is evolutionary rate? What are its types?
9. Assess the milestones of cultural evolution of man.
10. Discuss the future evolution of man

Section D (10 marks)

Answer in about 400 words

Unit I

1. How do you construct a genetic map using three point test cross?
2. Describe the phenomenon of linkage with suitable example
3. How are tetrads formed in *Neurospora*?
4. State the theories of crossing over
5. Compare complete and incomplete linkage with suitable examples
6. Describe the mechanism of crossing over

Unit II

1. Describe the process of conjugation in bacteria
2. Highlight the recombination in bacterial conjugation and transduction in detail
3. Write an account of transformation and transduction
4. Write short notes on: a) sex duction b) virulent phage c) temperate phage d) conjugation tube
5. Distinguish among the three modes of recombination in bacteria
6. What are retrotransposons? Describe the categories of retrotransposons occurring in eukaryotes.
7. Critically evaluate the genetic and clinical significance of transposons.

Unit III

1. Enumerate the applications of Hardy –Weinberg law in the estimation of equilibrium gene frequencies in natural populations.
2. Evaluate the mode of inheritance of genes using pedigree analysis
3. Discuss the types of drug metabolizing enzymes and their genetic variants.
4. Illustrate the relationship between dermatoglyphics and human aneuploidy.
5. Elucidate the basic steps in genetic counselling process

Unit IV

1. Explain the modern version of Lamarckism
2. Present an account on Neo Darwinism
3. “Variation is the raw material for evolution” – Discuss
4. What are the different kinds of natural selection? Describe each kind with suitable example
5. Appraise recombination and hybridization with examples

Unit V

1. Analyse the modes of speciation with supportive examples
2. “Random genetic drift is effective in small populations” – Justify
3. Discuss the role of isolating mechanisms in speciation
4. Present a critical account on the mechanism of micro and macroevolution.
5. Trace the evolution of man as seen in the fossil record.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI

I M.Sc Zoology Semester I

Core - III Biochemistry Course Code : 21PZOC13

(for those who joined in July 2021 and after)

Question Bank

Section-A (1 mark)

Choose the correct answer

Unit I

1. What does the nucleus of an atom contain?
a. electron b. proton c. proton and electron **d . proton and neutron**
2. How many electrons are present in the outermost shell of a carbon atom ?
a.2 b. 6 c. 8 d. 4
3. If K,L,M,N shells of an atom are full the total number of electrons in the atom are _____
a. **60** b. 26 c. 42 d. 36
4. Name the atoms that have the same number of protons but differ in the number of neutrons
a. **isotopes** b. molecules c. compounds d. salts
5. Atomic mass of an element is equal to the sum of _____
a. electron and proton **b. proton and neutron**
c. electron and neutron d. proton and deuteron
6. A covalent bond consists of _____ .
a. a shared electrons **b. a shared electron pair**
c. two different ions d. an octet of electrons
7. The H- O - H bond angle in water molecule is _____ .
a. 104.0° b.104.5 ° c. 105.0° **d. 105.5 °**
8. At which p^H will the concentration of H^+ ions be equal to the concentration of OH^- ions?
a. p^H 5 **b. p^H 7** c. p^H 9 d. p^H 14
9. If the H ion is 1×10^{-6} the pH is _____
a. one b.10 c. 4 **d. 6**
10. Which of the following is the most important buffer of the plasma ?
a. HCO_3^- / H_2CO_3 b. $HPO_4^{2-} / H_2PO_4^-$ c. protein d. haemoglobin

11. The normal p^H of plasma is maintained by all of the following except _____ .
 a. plasma buffer b. lung's buffer c. **heat mechanism** d. renal mechanism
12. The p^H of the extracellular fluid must be maintained between _____
 a. 6 to 7.4 b. **7.35- 7.45** c. 7-7.2 d. 8-8.52
13. Normal p^H of blood is _____
 a. 7.0 b. 7.2 c. **7.4** d. 7.6
14. At blood p^H 7.4, the ratio of $NaHCO_3^- / H_2 CO_3$ will be _____
 a. 5:1 b. 10:1 c. **20:1** d. 14:1
15. At blood p^H 7.4 , the ratio of $HPO_4^- / H_2 PO_4^-$ will be _____ .
 a. **4:1** b. 5:1 c. 20:1 d. 1:20

Unit II

1. The ratio of hydrogen and oxygen in a carbohydrate is _____ .
 a. 5:1 b. 4:3 c. 3:1 d. **2:1.**
2. Monosaccharides have _____ carbons
 a. 20 b. 10-15 c. 2-10 d. **3-10**
3. A non-reducing sugar is _____ .
 a. glucose b. **sucrose** c. fructose d. maltose
4. The number of isomers of glucose is _____ .
 a. 4 b. 8 c. 12 d. **16**
5. Inulin is a polymer of _____ .
 a. glucose b. galactose c. **fructose** d. arabinose
6. The carrier of citric acid cycle is _____
 a. succinate b. fumarate c. malate d. **oxaloacetate**
7. The intermediate in hexose monophosphate shunt is _____
 a. **D.ribulose** b. D.arabinose c. D. xylose d. D. lyxose
8. Glucose 6-phosphatase is absent in _____
 a. **adipose tissue** b. intestine c. kidney d. heart.
9. In the liver glyceraldehyde 3-phosphate is converted into _____ .
 a. glycol b. formaldehyde c. formic acid d. **glycerol.**
10. The greatest contributor of electrons to the electron transport system is _____
 a. glycolysis b. oxygen c. **Kreb's cycle** d. transition reaction

11. Gluconeogenesis occurs in _____ .
a. heart b. erythrocytes **c. liver** d. lungs
12. Cori cycle involves the conversion of _____ .
a. liver glucose to lactose b. pyruvate to lactate in muscle
c. muscle lactate to glucose in liver d. pyruvate to glucose in the liver

Unit III

1. All amino acids are optically active except _____ .
a. glycine b. serine c. threonine d. tryptophan.
2. The reaction given by two or more peptide linkages is _____ .
a. biuret test b. ninhydrin test c. xanthoprotein test d. Pauley's test
3. Amino acids are insoluble in _____ .
a. acetic acid b. chloroform c. ethanol **d. benzene.**
4. The amino acid containing hydroxyl group is _____ .
a. alanine b. isoleucine c. arginine **d. threonine.**
5. The basic amino acid is _____ .
a. glycine **b. serine** c. threonine d. tryptophan.
6. The amino acid synthesized by the body is _____ .
a. essential amino acids **b. non essential amino acids**
c. semi essential amino acids d. ketogenic amino acids
7. _____ is a functional protein
a. collagen b. vitamin c. zwitterions **d. enzyme**
8. Primary structure of proteins is due to _____ .
a. hydrogen bonds b. covalent bonds c. S-S bonds **d. peptide bonds**
9. Proteins are denatured by _____ .
a. Carbon-monoxide b. carbon di-oxide **c. heat** d. oxygen.
10. Proteins are detected with the help of _____ .
a. Fehling's test b. Biuret test **c. Anthrone test** d. Benedict's test
11. Transamination of oxaloacetate results in the formation of _____ .
a. **aspartic acid** b. valine c. alanine d. serine
12. The substance accumulated abnormally in the urine in alkaptonuria is _____ .
a. phenylalanine b. acetoacetate **c. homogentisate** d. fumarate

12. The sterol present in the faecal matter is _____
 a. ergosterol b. dehydroxy cholesterol **c. coprosterol** d. cholesterol
13. The glycolipid present in the white matter of the brain is _____
 a. gangliosides **b. sulpholipid** c. keratin d. lipoprotein

Unit V

1. Enzymes are polymers of _____
 a. fattyacids **b. aminoacids** c. inorganic phosphate d. hexose sugar
2. The non-protein compound which help in accelerating the enzyme action is called _____
 a. prosthetic group b. apoenzyme **c. co-enzyme** d. holoenzyme
3. The enzymes help for transfer of electrons are _____
 a. **cytochromes** b. transferases c. oxidoreductases d. lyases
4. Enzymes catalyzing the reactions of intramolecular transfer of various groups are included in the class of _____
 a. oxidoreductases **b. transferases** c. isomerases d. hydrolases
5. The Michaelis –Menton constant K_m is a measurement of _____
 a. rate of reaction **b. affinity of enzyme for substrate**
 c. co-efficient of ES d. substrate
6. The functional unit of the enzyme is called _____
a. holoenzyme b. apoenzyme c. co-enzyme d. prosthetic group
7. At boiling temperature an enzyme is _____
 a. un-affected b. inactivated **c. denatured** d. both (b) & (c)
8. Feedback mechanism is induced by _____
 a. enzymes b. catalyst **c. end product** d. substrate
9. The back bone of nucleic acid structure is constructed by _____
 a. peptide bonds b. glycosidic bonds
c. phosphodiester bridges d. hydrogen bonds
10. In tRNA molecule there is a loop which contains a minor base _____
 a. Thymine b. Uracil c. Cytosine **d. Dihydrouracil**
11. Which site of tRNA molecule hydrogen bonds to a mRNA molecule ?
 a. codon b. 5' end of tRNA molecule c. 3' end of tRNA molecule **d. anti codon**

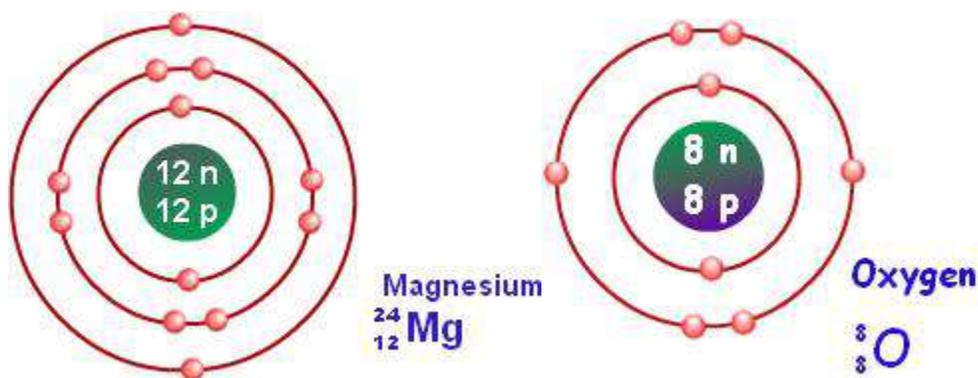
12. Ribozymes are _____
- a. enzymes with catalytic activity b. **RNAs with catalytic activity** .
 c. proteins with catalytic activity d. nucleic acids with catalytic activity
13. Which of the following is a nucleotide coenzyme?
- a. **FAD** b. NADPH+ c. CoASH d. NADH+
14. The salvage pathways for purine involves enzyme _____
- a. PRPP amidotransferase b. PRPP synthetase c. **HGPRTase** d. xanthine oxidase
15. The end product of purine metabolism in human is _____
- a. xanthine b. **uric acid** c. urea d. allantoin
16. Lesch- Nyhan syndrome is due to the lack of enzyme _____
- a. PRPP amidotransferase b. PRPP synthetase c. **HGPRTase** d. adenosine deaminase
17. An enzyme of purine metabolism associated with immune deficiency disease is _____
- a. **adenosine deaminase** b. xanthine oxidase c. PRPP synthetase d. HGPRT

Section B (2 marks)

Answer in about 50 words

Unit I

1. Illustrate the structure of an atom
2. What are the postulates of Dalton's atomic theory ?
3. What is a covalent / ionic /hydrogen bond / Vanderwaals bond ?
4. The diagram below shows the electron arrangements of Magnesium and Oxygen



- a) Draw a diagram showing how a bond is made between Magnesium and Oxygen .

- b) What name is given to this type of chemical bond ?
5. Distinguish between stable and unstable atoms
 6. Define atomic number and atomic weight
 7. State the difference between an ionic bond and a covalent bond
 8. Is water a polar or non-polar molecule? What is the consequence of this characteristic for the functions of water as solvent ?
 9. Write short notes on weak acids and strong acids
 10. Define the term pH and pH scale
 11. State the Henderson – Hassellbalch's equation

Unit II

1. Define optical isomerism.
2. Mention the significance of maltose.
3. Distinguish between pyranoses and furanoses.
4. What is osazone?
5. Describe D and L form of sugars.
6. What is a glycan?
7. Write the differences between amylase and amylopectin.
8. What is MPS? Give example.
9. State the importance of glucosides.
10. Enlist any two biological significance of carbohydrates.

Unit III

1. Define N and C terminals
2. Write a note on iso- electric pH.
3. What is Zwitterion?
4. Write a short note on peptide bond.
5. What is an essential amino acid?
6. Enlist the two differences between fibrous and globular proteins.
7. What is protein denaturation?
8. Mention the salient features of alpha helix.
9. What are conjugated proteins? Give examples.
10. What is albinism?

11. Give some examples of inherited metabolic disorders
12. What are the symptoms of Hartnup disease?
13. What is meant by Phenylketonuria ?

Unit IV

1. Give the general structure of cholesterol
2. What is ketogenesis?
3. What are steroids?
4. Define lipoprotein
5. Comment on iodine value
6. Write notes on rancidity
7. What is sterol?
8. Define saponification
9. Define emulsification
10. What are waxes?

Unit -V

1. What are bio-catalysts?
2. Give any two examples for oxidoreductases
3. Comment on E.C number
4. Write short notes on isoenzymes
5. Define allosteric inhibition
6. Define Chargoff's rule
7. Distinguish between nucleosides and nucleotides
8. Differentiate between DNA and RNA
9. What are the different forms of DNA ?
10. What is meant by denaturation and renaturation of DNA?
11. Write short notes on ribozymes
12. Give the sources of carbon and nitrogen of purine / pyrimidine nucleotide
13. Comment on HGPRT
14. What is the mechanism of allopurinol?
15. What is the biochemical basis of Lesch- Nyhan syndrome / gout ?

Section - C (5 marks)

Answer in about 200 words

Unit I

1. Describe the configuration of an atom
2. What is an ionic bond ? With two suitable examples explain the difference between an ionic bond and a covalent bond
3. Write an elaborate account on hydrogen bond and its significance in biological molecules
4. What is Van der Waals interaction? Give its importance
5. Differentiate between respiratory and metabolic acidosis
6. State the difference between respiratory and metabolic alkalosis
7. Describe haemoglobin as a buffering agent
8. Highlight the importance of phosphate and bicarbonate buffers in maintenance of acid-Base balance
9. Discuss the metabolic conditions due to defects in acid- base balance .
10. Differentiate between acidosis and alkalosis

Unit II

1. Classify carbohydrates with suitable examples.
2. Enumerate the structure and functions of three biologically important carbohydrates.
3. Define polysaccharides and describe the structure of starch and glycogen.
4. Mention the properties of carbohydrates with examples.
5. Define and describe glycogenolysis.
6. Narrate the reactions of HMP shunt.
7. Explain the chemistry and structure of disaccharides. Add a note on their biological significance.
8. Compare the structures of starch and cellulose.
9. Explain glycogenolysis and its controlling mechanism.
10. Discuss the synthesis of glucose from non-carbohydrate sources

Unit III

1. Mention the various types of neutral amino acids with suitable examples.
2. State the physical properties of amino acids.
3. Distinguish between acidic and basic amino acids.

4. Explain the general structure of amino acids and their classification.
5. Compare α -helix and β -pleated sheet structures of proteins.
6. Analyze the properties of amino acids.
7. What is denaturation? Explain its significance.
8. Classify proteins giving examples.
9. Explain metabolic fate and metabolic rate of tryptophan.
10. Comment on a. deamination b. transamination
11. Discuss briefly the symptoms, causes, diagnosis and treatment of Phenylketonuria.
12. How does a person inherit Hartnup disease? Explain its symptoms and treatment with suitable example.

Unit IV

1. Explain the structure of phospholipids
2. Narrate the role of liver in fat metabolism
3. Explain the synthesis of triglycerides
4. Classify lipids with suitable examples
5. State the functions and reactions of fatty acids
6. Write notes on synthesis of phospholipids
7. Differentiate between saturated and unsaturated fatty acids with suitable examples
8. Explain the biosynthesis of choline
9. Explain compound lipids with examples
10. Enumerate the salient features of fatty acids

Unit V

1. How are enzymes named and how have they been classified recently?
2. Enumerate the general properties of enzymes
3. Write short notes on iso enzymes and their importance
4. List down the functions of nucleotide
5. Describe the structure of nitrogenous bases present in nucleic acids
6. What are nucleotides? Illustrate with suitable structures
7. Summarise the different forms of DNA
8. Illustrate the structure of transfer RNA. Add a note on its function
9. Explain the salvage pathway of purine synthesis

10. Describe any two diseases caused by abnormal nucleotide metabolism and explain their biochemical basis

Section D (10 marks)

Answer in about 400 words

Unit I

1. Illustrate the various chemical bonds
2. “ Water is truly incredible molecule for life” – Substantiate
3. Derive Henderson – Hasselbalch’s equation . Mention its significance
4. What is meant by acid – base balance in the body? Describe the role of blood buffers and the kidney in maintaining the same
5. What is the normal pH of blood ? Discuss the various mechanisms involved in its regulation
6. Write an elaborate account on biological buffer

Unit II

1. Define and classify carbohydrates with suitable examples.
2. Give an account of structural configuration of monosaccharides with special reference to glucose.
3. Discuss the structure and functions of three biochemically important disaccharides.
4. Write the different sequential reactions leading to the synthesis of glycogen.
5. State briefly the steps of Kreb’s cycle.
6. Analyze the glycolysis and its energy budget.
7. “ Citric acid cycle is the final common metabolic pathway for the oxidation of food stuffs”- Justify.
8. Give an account of glycogen metabolism.
9. Describe hexose monophosphate shunt and its biological significance
10. What is gluconeogenesis? Describe the various reactions of gluconeogenesis

Unit III

1. Describe the classification of amino acids with structures.
2. What are proteins? Classify them and give important tests for it.
3. Narrate the levels of structural organization of proteins.
4. "Primary structure of proteins guides the formation of secondary and tertiary structures" - Explain.

5. Analyze the different levels of structural organization of proteins.
6. What are the molecular shapes and kinds of chemical bonds that characterize the structure of proteins?
7. Define, describe and differentiate deamination and transmission of amino acids with example.
8. Enumerate the properties of proteins.
9. Discuss in brief the classification and biological importance of proteins.
10. Describe the metabolism and inherited disorders of phenylalanine and tyrosine.
11. Explain the metabolism of amino acid tryptophan and associated disorders

Unit IV

1. Describe the steps of β – oxidation
2. Explain the structure and types of fatty acids
3. Enumerate the role of liver in fat metabolism
4. Classify lipids by giving one example each
5. Give an account of biosynthesis of fatty acids
6. Explain the biosynthesis of ketone bodies and their utilization
7. Write notes on rancidity, saponification and emulsification

Unit V

1. Describe the different classes of enzymes with suitable examples
2. Present the IUB nomenclature of enzymes in detail with examples
3. Narrate the mechanism of enzyme action
4. Discuss the factors that regulate enzyme catalysed reactions
5. Elucidate the various theories of enzyme action
6. Describe the salient features of Watson and Crick model of B- DNA . Draw appropriate figures to explain the structure .
7. Give a detailed account on different types of RNA
8. Explain the biosynthesis of inosine monophosphate
9. Describe the catabolism of purine nucleotides and the associated metabolic disorders
10. Discuss the synthesis and degradation of pyrimidines
12. Describe the role of PRPP in purine and pyrimidine synthesis
13. Describe the metabolic disorders associated with degradation pathways of purines and pyrimidines

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

I M.Sc. Zoology

Core IV: Applied Entomology

Sub. Code: 21PZOC14

QUESTION BANK

Section A (20 x 1 =20)

Choose the correct answer

Unit-I

- Immortal contribution to the scientific names of insects was made by _____.
a. Fabricius b. Simpson c. **Linnaeus** d. Ross
- According to Imm's classification dragonflies belong to the order _____.
a. Hemiptera b. **Odonata** c. Diptera d. Thysanura
- Order Hymenoptera includes
a. **honey bees** b. beetles c. grasshoppers d. aphids
- Lepisma saccharina* is commonly called as
a. spring tail b. **silver fish** c. scale insect d. stick insect
- The term pooter refers to
a. suction bottle b. **suction tube** c. relaxing jar d. setting board
- Crawling and burrowing insects are captured by _____ trap.
a. **pitfall** b. light c. sticky d. bait
- Butterflies are killed by injecting _____ into thorax with a hypodermic needle.
a. phenol b. ethyl acetate c. **oxalic acid** d. carbontetrachloride
- Smallest and softest insects are pinned by _____ pins.
a. English b. continental c. **point** d. anvil
- For the permanent preservation of insects effective and widely used liquid preservative is
a. **75-80% ethyl alcohol** b. formalin c. glycerin d. heparin
- Mountant used in the preparation of permanent slide of insects is
a. clove oil b. varnish c. **canada balsam** d. acetic acid
- A tool entomologists use to suck small insects into a vial is called _____.
a. an aerial net b. a sifter c. **an aspirator** d. a berlese funnel
- What entomologist's tool is used to drive insects from leaf litter or soil samples?
a. dip net b. aspirator c. **sifter** d. pitfall trap

13. Pest insects that feed on dry, pinned, insect specimens can be repelled using
a. ethyl acetate b. acetone c. plaster of paris d. **naphthalene**

Unit- II

1. Which of the following insects are efficient pollinators?
a. **Bees** b. Beetles c. Wasps d. Moths
2. Which of the following silk worm variety is used in commercial production of silk?
a. Tasar b. Erie c. **Mulberry** d. Muga
3. Silk is a _____ .
a. **Fibrous protein** b. Glycoprotein c. Mucoprotein d. Polysaccharide
4. Select the insect which is reared for the production of honey and wax
a. *Bombyx mori* b. *Laccifer lacca* c. ***Apis indica*** d. *Apis dorsata*
5. Pick out the true lac secreting insect from the following
a. ***Kerria lacca*** b. *Bombyx mori* c. *Antheraea mylitta* d. *Philosamiaricin*
6. In India 40% of the total lac production comes from the state
a. **Bihar** b. Tamil Nadu c. Orissa d. Assam
7. The food plant of *Bombyx mori* is _____ .
a. **mulberry** b. castor c. oak d. ber
8. The caterpillars of Eri silkworm feeds on _____ .
a. mulberry leaves b. **castor leaves** c. palm leaves d. neem leaves
9. The cocoon of _____ silkworm is as large as hen's egg with a hard case.
a. Mulberry b. **Tasar** c. Eri d. Muga
10. _____ is a circular basket to facilitate the worms to attach their cocoons.
a. Tray b. Basket c. **Chandrika** d. Rearing stand
11. Which of the following are scavengers who are important recyclers of carrion, dung and decomposing vegetation?
a. **Chaffer beetles** b. Ladybird beetles c. Rhinoceros beetles d. Reduviid bugs
12. Bee venom is used in the treatment of _____ .
a. **arthritis and inflammation** b. anaemia c. asthma d. sore throat
13. Wax is secreted by the wax glands of the _____ .
a. queen b. **worker** c. drone d. female

14. Which of the following insect's cuticle is the source of the immune stimulant for livestock feeds?
- a. Propolis **b. Chitosan** c. Glucon d. Lavamisole
15. What can Forensic Entomology be used to determine?
- a. Time of death b. Neglect of the elderly c. Location of death **d. All of these**
16. Name the flies that may arrive and begin laying eggs within minutes of death.
- a. House flies b. Soldier flies c. Coffin flies **d. Blow flies**
17. What insect is often used to determine the time of death since it has a very predictable life cycle at 70°F ?
- a. Carrier beetle **b. Black blowfly** c. Carpet beetle d. Wasp

Unit- III

1. *Oryctes rhinoceros* is the pest of _____.
- a. **coconut** b. rice c. sugarcane d. pulses
2. Which of the following causes “dead heart” disease in rice?
- a. *Orseolia oryzae* b. *Spodoptera mauritia*
- c. *Chilo sacchariphagus* d. *Scirpophaga incertulas*
3. Which of the following pest is commonly called ‘rice ear head bug’?
- a. *Chilo sacchariphagus* b. *Scirpophaga incertulas*
- c. ***Leptocorisa acuta*** d. *Spodoptera mauritia*
4. Select the pest which attacks the seedlings of paddy from the following
- a. ***Spodoptera mauritia*** b. *Scirpophaga incertulas*
- c. *Leptocorisa acuta* d. *Brevennia rehi*
5. *Pyrilla perpusilla* which attacks sugarcane is a _____.
- a. termite b. mealy bug c. **leaf hopper** d. shoot borer
6. Burnt up appearance of coconut is due to the attack of the pest _____.
- a. *Oryctes rhinoceros* b. ***Opisina arenosella***
- c. *Rhyncophorus ferrugineus* d. *Odonto termesobesus*

UNIT IV

1. Which of these is a competent vector for the transmission of dengue fever?
a. **Aedes** b. Culex c. Anopheles d. Housefly
2. Which among the following is associated with the spread of cholera?
a. Sand fly b. Mosquito c. **House fly** d. Bees
3. Infestation of head louse to human being is called _____.
a. ascariasis b. **pediculosis** c. filariasis d. malaria
4. Which of these disease is not transferred through mosquitoes?
a. Chikungunya b. Malaria c. Elephantiasis d. **Measles**
5. Name the vector/s of chikungunya virus (CHIKV).
a. *Aedes aegypti* b. *Aedes albopictus* c. *Anopheles minimus* d. **both a & b**
6. What is the vector for filariasis?
a. *Anopheles fluviatilis* b. *Aedes aegypti*
c. *Anopheles minimus* d. ***Culex fatigans***
7. The most important vectors (transmission agents) of human disease would probably be
a. moths b. ants c. **flies** d. cockroaches
8. *Gambusia affinis* is the predator of _____.
a. caterpillars b. sandfly c. **mosquito larvae** d. fish
10. In which of the following insects do only the females suck blood?
a. bed bug b. **mosquito** c. fleas d. louse
11. Persistent polyarthralgia is associated with _____.
a. malaria b. dengue c. **chikungunya** d. filariasis
12. The mode of transmission of exogenous infectious agents carried with the help of feed and body of the insect vector is called as _____.
a. **indirect mechanical transmission** b. direct mechanical transmission
c. biological transmission d. myiasis

13. The mode of transmission of the conjunctivitis from man to man by insect vectors is _____.
- a. indirect mechanical transmission **b. direct mechanical transmission**
- c. biological transmission d. myiasis
14. When the pathogen just multiplies in the host vector, it is called as _____.
- a. cyclopropagative transmission** **b. propagative transmission**
- c. cyclodevelopmental transmission d. myiasis
15. The infection by lodging the living dipterous larvae in the open body cavities of an and domestic animals is called _____ .
- a. cyclopropagative transmission b. propagative transmission
- c. cyclodevelopmental transmission **d. myiasis**

UNIT V

1. The control of pests by adopting ordinary farm practices in appropriate time is called _____ control.
- a. biological b. natural **c. cultural** d. legal
2. Hand picking and shaking of branches of plants comes under the following method of pest control
- a. cultural **b. mechanical** c. physical d. environmental
3. Flooding of rice nurseries will eliminate the attack of _____.
- a. **army worm** b. root weevil c. stem borer d. scale insect
4. Which of the following is manipulating the date of sowing in pest management ?
- a. **cultural** b. mechanical c. environmental d. physical
5. Cultural controls of insects include which of the following ?
- a. **Crop rotation** b. Hand picking c. Fumigation d. Light trap
6. Which route of insecticide exposure is the most common?
- a. Oral b. Inhalation c. Ocular **d. Dermal**
7. Which of the following pest control methods generally works the fastest?
- a. **Pesticides** b. Biocontrol through parasitoids
- c. Pheromone lures d. Crop rotation

8. A chemical that kills insects when they breathe _____.
- a. contact insecticide b. a stomach poison c. **a fumigant** d. a desiccant
9. *Bacillus thuringiensis* is a _____ poison.
- a. contact b. **stomach** c. respiratory d. nerve
10. Fumigant is the toxicant which in it's _____ state kills the pest.
- a. solid b. liquid c. **gaseous** d. crystalline
11. The chemical which blocks acetyl choline esterase in insects is called as _____.
- a. protoplasmic poison b. **nerve poison** c. physical poison d. fumigant
12. Spray oil causes death in insects due to _____.
- a. **asphyxiation** b. haemorrhage
- c. muscular paralysis d. precipitation of protoplasm
13. Insecticidal property of kernels of neem tree is due to the active principle
- a. **Azadirachtin** b. nicotin c. pyrethrin d. rotenone
14. Insecticides that break down almost immediately after being applied have a mode of action is called _____.
- a. repellent b. persistent c. stomach poison d. **systemic**
15. Which choice would be an example of a biological method of pest control?
- a. Applying a pre emergence herbicide b. Cultivating between rows
- c. Crop rotation d. **Increasing the population of the pest's natural enemy.**
16. Control that uses insects and disease- causing agents to attack pest populations is called _____.
- a. **biological control** b. life cycle control c. cultural control d. population control
17. Which egg parasitoid is employed to control the shoot borer of sugarcane?
- a. *Goniozus nephantidis* b. *Telenomous remus*
- c. *Aphelinus mali* d. ***Trichogramma chilonis***
18. A systemic pesticide _____
- a. kills anything it touches b. is only a post emergence herbicide
- c. **is absorbed by the roots of the plant** d. is absorbed by the leaves of the plant

19. Pesticides that leave residues which stay in the environment without breaking down for long periods of time are called _____ .
- a. systemic b. **persistent** c. short lived d. translocated
20. The ability of insects to survive pesticide applications after exposure over generations is called
- a. repellency b. tolerance c. **resistance** d. acclimation
21. A chemical messenger produced and emitted by an insect to communicate with other members of the same species is called _____ .
- a. hormone b. **pheromone** c. rhabdome d. toxin

Section B (7x2=14)

Unit – I

1. State the significance of binomial system of nomenclature in insect systematics.
2. Mention the salient features of the order Thysanura.
3. Mention the salient features of the order Odonata
4. Mention the salient features of the order Orthoptera
5. Mention the salient features of the order Phasmida
6. Mention the salient features of the order Mallophaga.
7. Mention the salient features of the order Hemiptera.
8. Mention the salient features of the order Diptera
9. Mention the salient features of the order Lepidoptera.
10. Enumerate the salient features of the order Coleoptera.
11. Mention the salient features of the order Hymenoptera.
12. Comment on the light trap.
13. Distinguish between aspirator and pooter.
14. What are killing bottles?
15. How do you relax insects before pinning?
16. Enlist the types of entomological pins.
17. Define liquid preservatives. Give two examples.

Unit – II

1. Enlist the medicinal uses of bee venom.
2. Enumerate the uses of silk.
3. Enumerate the uses of bee-wax.
4. Enlist the different types of silk.
5. Name the five species of honeybees found in India
6. Why are bees called as efficient pollinators?
7. Mention the advantages of pollination by nectar feeders.
8. What are the two types of lac cultivated in India?
9. What are the uses of Shellac?
10. Define lac encrustation.
11. Write down the food plants of lac insect.
12. Why is silk called 'queen of fibre'.
13. What are scavenger insects? Give two examples
14. Name three types of insects of forensic interest.
15. What does PMI stand for?
16. Give examples of how insects are used in medicine.
17. Give examples of insects used as food for humans.
18. What is Entomotherapy?
19. How can insects be used for toxicology analysis?

Unit -III

1. Why is *Pyrilla perpusilla* considered as a potential pest of sugarcane?
2. Mention any four pests of stored products
3. How does *Oryctes rhinoceros* attack coconut?
4. How will you prevent termites from damaging coconut seedlings?
5. What are external feeders?
6. What are internal feeders?
7. Comment on biological control of leaf caterpillar.
8. Write the classification of Rhinoceros beetle.

9. How will you control red palm weevil chemically?
10. Enumerate the symptoms of rice swarming caterpillar
11. Write the difference between internal and external feeders. Give examples.
12. Why is rice gall midge infection called as 'silver shoot'?
13. Write the symptoms of *Opisania arenosella* infestation in cocconut.
14. Comment on rice meal moth.

UNIT IV

1. Differentiate propagative and cyclopropagative transmission.
2. Write short notes on direct mechanical transmission.
3. Write the difference between direct and indirect mechanical transmission.
4. Comment on Myiasis.
5. What is annoyance?
6. Comment on dermatosis.
7. What are the symptoms of dengue fever?
8. What is the causative organism and vector involved in chikungunya disease?
9. What are the symptoms of dengue fever?
10. Give the diagrammatic representation of life cycle of head louse.
11. Bring out the role of *Culex fatigans* as vector of filariasis.
12. What are the diseases caused by *Musca domestica*?
13. Differentiate between the head and body louse
14. Comment on microfilaria.
15. Write short notes on filariasis.
16. What are the personal protective measures for mosquito?

UNIT V

1. Mention the role of natural enemies in pest control.
2. Mention the use of crop rotation in pest control.
3. How do you control pests by trap cropping?
4. Define Integrated Pest Management.
5. What do you mean by Phyto-sanitary certificate?

6. What are systemic poisons? Mention their advantages.
7. Enumerate the mode of action of arsenicals.
8. List out the insecticides of plant origin.
9. Comment on Pyrethroids
10. Write any 5 insecticides that are banned in India.
11. What is biological control?
12. What do you know about *Bacillus thuringiensis* as a biopesticide?
13. What is called pest resurgence?
14. Comment on permethrin.
15. Write an account of use of insect hormones in pest control
16. Define antifeedants / chemosterilants. How do they work in pest control?
17. Write a note on sterile male technique.
18. Distinguish between stomach and contact poison.

Section C (5x6=30)

UNIT I

1. Make an outline classification of Ametabola with examples.
2. Comment on any three orders of importance as parasites of vertebrate animals
3. Comment on any three orders important as pest of stored foods
4. Comment on the salient features of the order Lepidoptera and Hymenoptera
5. Explain the pinning methods commonly used in the dry preservation of insects.
6. Outline the steps involved in the preparation of permanent slides of insects.
7. Explain briefly the methods of permanent preservation of insects.

UNIT II

1. Bring out the economic importance of honey bees
2. Write a short note on economic importance of *Bombyx mori*
3. Outline the steps involved in the manufacture of shellac.
4. Discuss the chemical composition and the nutritive values of honey.
5. Discuss the chemical composition and medicinal values of bee wax
6. Explain the role of insects as pollinators
7. What are scavengers? Explain.

8. Give examples of how insects are used in medicine
9. Write an account of insects used as food.
10. What are predator insects? How these insects are valuable to man?

UNIT III

1. Analyse the damage caused, biology and control measures of any two pests of paddy.
2. Describe any two pests of sugarcane and their control measures.
3. Explain the mode of attack and control of any two pests of coconut.
4. What are internal and external feeders? Describe how they damage the stored products.
5. Elaborate on the pests that affect stored pulses.
6. Enumerate the pests of stored grains.
7. Explain about the insect predators.

UNIT IV

1. Explain the role of mosquito as a biological vector of human diseases
2. Explain the role of housefly as a vector of human diseases. Add a note on its control
3. Discuss the life cycle and diseases caused by house fly
4. Summarize the causative agents, vectors and symptoms of Dengue.
5. Appraise the life cycle of filarial worm. Add a note on the symptoms of filariasis.
6. Give an account on the different types of mechanical transmission with suitable examples.
7. Elaborate the different type of biological transmission with suitable experiments.
8. Comment on the various control measures for control of mosquitoes.

UNIT V

1. Explain the strategies of biological control of pests.
2. Comment on the different types of pests. Enlist the mechanical methods of pest control.
3. Discuss the pros and cons of the biological control of pest management
4. Describe the natural control of insect pests
5. Mention the types of cultural practices and mechanical methods adopted to control pests
6. Explain the legislative measures to prevent the introduction of foreign pests

7. Give details about the bacteria based bio- pesticides used in India
8. Classify insecticides based on their mode of action.
9. Mention any five synthetic pyrethroids and their pesticidal effect
10. Write an account of organophosphorous and organochlorine pesticides.
11. Give an account on autocidal control.
12. Comment on male sterile technique for insect pest control.
13. Explain the principles and tactics of Integrated pest Management
14. Analyze the recent trends in pest control

Section D (3x12=36)

UNIT I

1. Present an account on binomial naming, identification and hierarchical categorization of insects.
2. Make an outline classification of class Insecta up to the orders with suitable examples.
3. Point out the key characters and significance of any six orders of Holometabola.
4. Point out the key characters and significance of any six orders of Hemimetabola.
5. Comment on any six orders of major economic importance in relation to cultivated plants
6. Evaluate the essential equipments and methods of collection of insects
7. Explain the methods of killing and preservation of insects

UNIT II

1. "Silk worm is a productive insect" - Discuss
2. Discuss the byproducts of beekeeping
3. Write an account on biology of lac insect and lac cultivation.
4. Outline the steps involved in the manufacture of shellac and its economic importance.
5. Discuss the use of insects in forensic investigations.

UNIT III

1. Narrate the pests of stored products and their control measures.
2. Describe the damage caused, biology and control measures of any three pests of paddy.
3. Describe the damage caused, biology and control measures of any three pests of sugarcane.
4. Explain the mode of attack, biology and control measures of any three pests of coconut.

5. Evaluate the life cycle of any three pests of paddy. Explain the damage caused by the pests and methods to control the pests.
6. Present the life cycle of pests of Sugarcane. Add a note on the damage caused and control measure.
7. Differentiate External and internal feeders of stored food materials by citing two examples each.

UNIT IV

1. Describe the biology, medical importance and control of human louse
2. What are biological vectors? Discuss the role of mosquito as vectors of human diseases
3. 'Housefly are the potential vectors of diseases' – Substantiate
4. Elucidate the cause, symptoms, prevention and control of chikungunia and dengue fever
5. What is filariasis? Illustrate the life cycle of the causative organism, and its control.

UNIT V

1. Give an account on the contribution of legal measures on pest control.
2. Critically examine the biological / natural / chemical control of insect pests.
3. Elaborate the microbial pesticides and their role in pest control.
4. Elucidate the methods of control in pest management.
5. Analyse the ways in which biological control can be used to control pest numbers Add a note on its advantages.
6. Explicate the various types of chemical pesticides and comment on its mode of action.
7. What do you mean by Integrated Pest Management? Give a brief account of integrated tactics involved in the control of sugarcane pests.

I M.Sc Zoology

Semester II

Core I Animal Physiology Subject Code: 21PZOC21

QUESTION BANK

Section –A (1 mark)

Choose the correct answer

Unit I

1. Stenson's duct carries saliva from _____ gland and opens into oral cavity.
a. parotid b. submaxillary c. sublingual d. labial
2. In the stomach parietal cells secrete
a. pepsin b. gastrin c. mucin **d. hydrochloric acid**
3. The release of bile from gall bladder is stimulated by the gastrointestinal hormone.
a. secretin b. insulin c. glucagon **d. cholecystokinin**
4. Which of the following is the correct matching of given substrate, the enzyme acting upon it and the end product?
a. fats - lipase – fattyacids b. starch – amylase – amino acids
c. protein – pepsin – glucose d. triglycerides – trypsin – monoglycerides
5. After a fatty meal, most of the fats would be
a. absorbed into chylomicrons in the lymphatics
b. absorbed in the portal circulation and transported to the liver
c. absorbed in the portal vein and transported in the hepatic artery
d. absorbed as triglycerides into the portal vein and bypass the liver
6. The blood vessel that carries deoxygenated blood from the heart to lungs is
a. pulmonary artery b. pulmonary vein c. aorta d. portal vein
7. _____ generates the electrical impulses that coordinates heart muscle contractions.
a. Bundle of His b. AV node **c. SA node** d. Purkinje fibre
8. If the heart rate is 72/minute, duration of each cardiac cycle is _____ second.
a. 0.1 **b. 0.8** c. 0.6 d. 1.4

9. Which resuscitation is also called as Holger Nielson method?

- a. Mouth-to-mouth method
- b. Back pressure arm lift method**
- c. Positive pressure method
- d. Negative pressure method

10. The most severe stress for human beings at high altitude is usually -----

- a. high winds and extreme cold
- b. low air pressure**
- c. high air pressure
- d. daily alternating climate extremes

11. Common early symptoms of hypoxia at high altitude include -----

- a. difficulty in thinking
- b. increase in heart rate
- c. increase in respiratory rate
- d. all of the above**

12. The condition characterized by the ill effects of hypoxia at high altitude is-----

- a. necrosis
- b. acclimatization
- c. mountain sickness**
- d. nitrogen narcosis

13. A deep sea diver feels of severe intolerable pain in his knee joints, soon after ascending to the sea level. The most common cause for this condition is-----

- a. increased pH
- b. increased PCO₂
- c. increased O₂
- d. nitrogen bubbles**

14. Cells most sensitive to nitrogen narcosis are -----

- a. myocardial cells
- b. neurons**
- c. hepatocytes
- d. renal tubular epithelial cells

15. During hard exercise accumulation of----- causes an oxygen debt

- a. lactic acid**
- b. carbon dioxide
- c. glucose
- d. water

Unit III

1. Blood vessels leading into the glomerulus are called

- a. afferent arterioles**
- b. efferent arteriole
- c. renal artery
- d. renal vein

2. Urinary bladder is not found in
a. shark b. fresh water fishes c. alligator d. man
3. Podocytes are present in
a. ureter b. Loop of Henle c. proximal convoluted tubule **d. Bowman's capsule**
4. The animal which retains urea for hypertonicity is
a. elasmobranch b. man c. bird d. amphibian
5. The nephrons having the corpuscles in the outer cortex of the kidney are
a. Juxta medullary nephrons **b. cortical nephrons** c. maculadensa d. renal corpusles
6. Which one of the following is a high threshold substance?
a. glucose b. urea c. phosphate d. creatinine
7. Decrease in blood sodium level stimulates the release of
a. aldosterone **b. antidiuretic hormone** c. renin d. angiotensinogen
8. Calcium level in plasma falls after
a. thyroidectomy **b. parathyroidectomy** c. adrenalectomy d. vasectomy
9. Counter current exchanger is formed by
a. maculadensa **b. vasa recta** d. cortex d. pelvis
10. The chief excretory organs of annelids are
a. solenocytes b. contractile vacuoles c. malpighian tubules **d. nephridia**

Unit IV

1. The Nissl granules of nerve cells are made up of -----
a. ribosomes b. proteins c. DNA d. RNA
2. Nerve cells do not divide because they do not have-----
a. mitochondria **b. centrosome** c. acrosome d. nucleus
3. Where do you find node of Ranvier?
a. On an axon b. In the cell body c. On a dendrite d. In axoplasm
4. What significant event occurs within a neuron that results in an action potential?
a. Calcium is released b. Enzymes are activated

c. ATP is formed **d. Ion channels are opened**

5. During the propagation of nerve impulse the action potential results from the movement

of -----

a. K^+ ions from intracellular fluid to extracellular fluid

b. K^+ ions from extracellular fluid to intracellular fluid

c. Na^+ ions from intracellular fluid to extracellular fluid

d. Na^+ ions from extracellular fluid to intracellular fluid

6. Which one of following is an example of conditional reflex?

a. Sneezing b. Yawning c. Secretion of sweat **d. Salivation at the smell of food**

7. Which one illustrates a reflex arc?

a. Brain \rightarrow spinal cord \rightarrow muscle b. Muscle \rightarrow receptor \rightarrow brain

c. Muscle \rightarrow spinal cord \rightarrow brain **d. Receptor \rightarrow spinal cord \rightarrow muscle**

8. During synaptic transmission of nerve impulse the neurotransmitter _____ is released from the synaptic vesicle

a. acetylcholine b. lysine c. estrogen d. melatonin

9. What is sarcomere?

a. Part between two H lines b. Part between two A lines

c. Part between two Z lines d. Part between two I bands

10. Which of the following is the component of actin filaments of a sarcomere?

a. Myosin and troponin b. Troponin and actin

c. Actin and myosin **d. Actin, troponin and tropomyosin**

11. The contractile protein of skeletal muscle involving ATPase activity is-----

a. actin **b. myosin** c. troponin d. tropomyosin

12. Upon stimulation of skeletal muscles sarcoplasmic reticulum immediately releases-----

6. The endocrine gland which contributes to setting the body's biological clock is
 a.thymus **b.pineal** c.pituitary d.thyroid
7. The androgen that maintains sexual organs and secondary sexual characteristics in males is
 a. progesterone b.estrogen c.relaxin **d.testosterone**
8. Which of the following hormone is not a secretion product of human placenta?
a.prolactin b.estrogen
 c.progesterone d.human chorionic gonadotropin
9. Which one of the following pairs is incorrectly matched?
 a.insulin-Diabetes mellitus(disease)
b.glucagon-beta cells (source)
 c.corpus luteum-progesterone(secretion)
 d.somatostatin – delta cells (source)
10. Select the correct matching of a hormone and its disorder.
 a.thyroxine – cretinism
 b.antidiuretic hormone – Diabetes insipidus
 c.corticosteroids – Addison's disease
d.adrenalin – Acromegaly

Section B (2 marks)

Unit I

1. What are the salivary glands of man?
2. Mention the parts of stomach
3. What is the composition of bile?
4. Comment on the structural features of intestinal villi
5. What do you mean by GI hormones? Give two examples.
6. List down the components of conductive system of heart
7. Distinguish between minute volume and stroke volume
8. Bring out the causes and symptoms of orthostatic hypotension
9. Why stroke occurs in man?

10. Enlist the clinical manifestations of hypertension.

Unit II

1. Differentiate between internal and external respiration
2. Outline the anatomy and function of alveoli
3. Define tidal volume and vital capacity
4. Point out the role of chemoreceptors in modulating respiratory rhythm
5. What is the major difference between Bohr's effect and Haldane's effect?
6. When does a person need artificial respiration?
7. Mention the types and uses of ventilator in resuscitation
8. What are the effects of hypoxia at high altitude?
9. What is mountain sickness? What are its symptoms?
10. What is acclimatization? Give an example
11. Relate the variation of water pressure with depth in a deep sea
12. List down the factors increasing pulmonary ventilation during exercise

Unit III

1. Define vasa recta and its function
2. Why are terrestrial animals not ammonotelic?
3. What is the significance of juxta glomerular apparatus in kidney function?
4. What is dripping nose?
5. Comment on contractile vacuoles
6. Differentiate between malphigian tubules and malphigian capsules.
7. What is ionic regulation?
8. Explain how urea is synthesized through ornithine cycle?
9. Mention any four excretory structures present in animals.
10. Distinguish between cortical and medullary nephrons.

Unit IV

1. State the differences between axon and dendrite
2. Make an outline classification of neurons.

3. What is meant by saltatory conduction of nerve impulse?
4. Compare and contrast electrical and chemical synapse
5. What are the basic components of a reflex arc?
6. Distinguish between inborn and acquired reflexes with examples
7. What is the significance of reflex action?
8. What is sarcomere?
9. Enlist the contractile proteins of muscle
10. Give a note on excitation-contraction coupling in muscle
11. What happens in the muscle during the Cori cycle?
12. Present the summary of energetics of muscle contraction

Unit V

1. Classify the hormones based on chemical nature
2. Write down the releasing factors released from hypothalamus
3. Distinguish between acromegaly and acromicria
4. What is goiter? What are its types?
5. Draw a neat sketch of the location of thyroid gland and mark the parts
6. Highlight the dual nature of pancreas.
7. Enlist the hormones secreted by adrenal gland.
8. Comment on Sertoli cells and Leydig cells
9. Demonstrate the relationship between corpus luteum and pregnancy.
10. What are hormonal mimics?

Section C (6 marks)

Unit I

1. Describe the physiological functions of saliva
2. Enumerate the functions executed by gastric juice
3. Present an account on the role of pancreatic juice in the digestion of food
4. Comment on the crypts of Lieberkuhn.
5. What are the contributions made by bile to fat digestion?
6. Elucidate the factors determining cardiac output

7. Explain how heart beat is regulated in man
8. What is stroke? Explain its types, risk factors and symptoms.
9. Mention the types of hypertension and its manifestations in Man.

Unit II

1. Describe the functional anatomy of respiratory tract of man.
2. Elucidate the mechanism of respiration in man
3. Critically evaluate the role of respiratory centers in the control of respiration
4. Present the step-by-step procedure for Holger Nielsen method of artificial respiration
5. How does haemoglobin transport oxygen in the blood?
6. Examine the oxygen - haemoglobin dissociation curve
7. Illustrate the Hamburger's phenomenon with a suitable sketch
8. Discuss the mountain sickness and acclimatization to hypoxia at high altitude
9. What is nitrogen narcosis? What are its consequences in divers?
10. Explain the respiratory responses to exercise

Unit III

1. "The composition of glomerular filtrate and urine is not same"- Comment.
2. State the importance of counter current systems in renal function.
3. Describe the mechanism of ultrafiltration in Bowman's capsule.
4. Elucidate the structure of nephron and urine formation.
5. Illustrate the various osmoregulatory mechanisms of invertebrates
6. Enumerate the functions of human kidney.
7. Explain how ionic regulation is effected in marine fishes
8. Narrate the endocrine regulation of water and mineral balance.
9. What is urine? Describe its chemical composition.

Unit IV

1. Illustrate the distinctive structural features of neuron with a sketch.
2. What is an action potential of a neuron? How is it generated?
3. What is synapse? What are its types?

4. How does a nerve impulse cross a synapse?
5. What is reflex? Enumerate its properties
6. Write down the methods of classification of reflexes citing suitable examples
7. “A sarcomere is the basic contractile unit of muscle fiber” -Justify
8. Analyze the structure of contractile proteins of muscle
9. Elucidate the sliding filament theory of muscle contraction with a schematic drawing.
10. Assess the role of carbohydrate metabolism in the energetics of muscle contraction

Unit V

1. Present the causes, signs and symptoms of disorders associated with the pituitary
2. Analyse the role of hormones of islets of Langerhans in the regulation of blood sugar level.
3. Describe the functions of thyroid gland.
4. “Adrenal corticosteroids help to withstand stress and trauma of life-”Substantiate
5. Elaborate on the functions of estrogens
6. Discuss the male sex hormones and their actions.
7. Enumerate the endocrine functions of placenta
8. Critically evaluate the role of hormones in neoplastic growth.
9. Compare and contrast estrous cycle and menstrual cycle.

Section D (12 marks)

Unit I

1. Enumerate the composition and functions of succus entericus
2. Present an account on the gastrointestinal hormones highlighting their sources and functions.
3. “Intestinal villi is the ultimate absorption unit”– Substantiate
4. Describe the structure of human heart with labeled sketches
5. Narrate the sequence of events and subdivisions of cardiac cycle
6. Critically evaluate the regulatory mechanisms for maintaining blood pressure in man

Unit II

1. Analyze the mechanisms of transport of carbon dioxide in the blood of man
2. What is artificial respiration? Explain its types and significance.
3. Evaluate the adjustments made in the body at high altitude during acclimatization
4. Discuss the nervous and chemical mechanisms of regulation of respiration.
5. Elaborate on the causes, symptoms, treatment and prevention of decompression sickness

Unit III

1. Evaluate the anatomical and physiological basis of counter-current mechanism in kidney.
2. Describe the mechanism involved in the formation of concentrated urine.
3. Analyse the organs of excretion found in various animals with neat and labeled sketches.
4. Analyse the osmoregulatory mechanisms of fresh water and marine organisms
5. Elucidate the structure of nephron and physiology of excretion in man
6. Classify the organisms based on their excretory products with suitable examples
7. Compare the osmo-ionic regulations in invertebrates and vertebrates

Unit IV

1. Trace the ionic basis of nerve impulse and its propagation in a neuron.
2. Describe the structure and transmission of nerve impulse in neuromuscular junction.
3. Examine the sequence of events involved in the molecular mechanism of skeletal muscle contraction.
4. Summarize the sources of energy for muscle contraction

Unit V

1. Discuss the basic strategies of hormone action.
2. Indicate the integration between the hypothalamus and hypophysis
3. Enlist the hormones produced by pituitary. Add a note on the actions carried out by them.

4. Describe the histology, hormones and functions of thyroid gland.
5. Comment on the roles played by hormones in parturition and lactation.

I M.Sc Zoology
SEMESTER II Core I : Animal Physiology
Code : 21PZOC21

Unit I

Digestive and Circulatory Systems Digestive system : gastrointestinal secretory functions and the glands - role of GI hormones. Structure of mammalian heart-cardiac cycle - cardiac output-control of heart beat - blood pressure and its regulation – related diseases (hypertension, hypotension, stroke)

Unit II

Respiratory System Human respiration:

Anatomy and Physiology of the respiratory tract- transport of oxygen and carbondioxide- regulation of respiration-artificial respirationphysiological response to oxygen deficient stress (diving, high altitude) and exercise.

Unit III

Neuromuscular System Nervous system:

neurons –structure and types- nerve impulse propagation – concept of synapse- transmission of electrical and chemical synapse- reflex arc-- reflex action. Muscular system:Structural basis of contraction - sliding filament theory – mechanism and energetics of muscle contraction.

Unit IV

Excretory System Human kidney:

nephron – mechanism of urine formation – regulation of ionic and osmoregulation in invertebrates – Protozoa, crustaceans and insects, Chordates – fishes, birds and mammals

Unit V

Endocrinology:

Basic mechanisms of hormone action -endocrine glands in mammal –pituitary, thyroid, adrenal and islets of Langerhans - hormones and functions-hormonal disorders- role of hormones in menstrual and estrous cycle-pregnancy – parturition – lactation - hormones and neoplastic growth.

Books for Reference

1. Hoar 1975. General and Comparative Physiology. Prentice. Hall of India Pvt Ltd, New Delhi.
2. Sembulingam K, and Prema Sembulingam. 2006. Essentials of Medical Physiology Jay Pee Brothers, New Delhi.
3. Kunt Schmidt-Nielsen K. 1985. Animal Physiology, Adaptation and Environment Cambridge University Press, Cambridge.
4. Ladd Prosser C. 1984. Comparative Animal Physiology, Third edition. Satish Book Enterprise Book Sellers and Publishers, Agra.
5. Malcolm S. Gordon. 1984. Animal Physiology Principles and Adaptations. Third edition. Collier MacMillan International edition. Collier MacMillan Publishers, London.
6. Nagabhushanam, R and M.S. Kodarkar. 1978. Textbook of Animal Physiology, Oxford and IBH Publishing Co., New Delhi. 22
7. Bentley P.J. 1980. Comparative Vertebrate Endocrinology, First edition Chand & Company Ltd, Delhi.
8. Constance R. Martin. 1985. Endocrine Physiology, First edition. Oxford University Press, New York
9. Prakash S. Lohar. 2005. Endocrinology – Hormones and H

I M Sc. Zoology

Semester II - Core II - Immunology Sub. Code: 21PZOC22

Question bank

Section A (1 mark)

Unit I

1. Monoclonal antibodies are _____
 - a. heterogenous antibodies
 - b. heterogenous antibodies produced from single clone of plasma cells
 - c. homogenous antibodies
 - d. **homogenous antibodies produced from single clone of plasma cells**
2. Which antibody is a significant component of the sero-mucous secretions of the salivary gland and intestine?
 - a. IgM
 - b. IgE
 - c. **IgA**
 - d. IgG
3. During the maturation of a B lymphocyte the first immunoglobulin heavy chain synthesized is the
 - a. **μ chain**
 - b. gamma chain
 - c. epsilon chain
 - d. alpha chain
4. What type of cell is fused with a myeloma cell when producing a hybridoma?
 - a. B lymphocyte
 - b. T lymphocyte
 - c. **Plasma cell**
 - d. Hepatocyte
5. The genetic variability in immunoglobulin structure and function was explained by _____ models
 - a. recombination signal sequence model
 - b. fluid mosaic model
 - c. **germ line and somatic variation model**
 - d. Bennett three gene model
6. The phenomenon of sequential change in immunoglobulin during cell lineage is called
 - a. **class switching**
 - b. allelic exclusion
 - c. inversion
 - d. deletion
7. The joining of signal sequences follows a rule called as _____
 - a. one turn rule
 - b. two turn rule
 - c. **one turn-two turn joining rule**
 - d. V-J joining rule
8. The light chain contain _____ gene segments
 - a. **V, J and C**
 - b. V and J
 - c. V,J, C and D
 - d. V and D

9. The heavy chain gene family is situated on chromosome _____ in humans
 a. 12 b. 16 c. **14** d. 18
10. A mammalian immune system can generate _____ different antibody specificities
 a. **10^8 to 10^{11}** b. 10^2 to 10^4 c. 10^5 to 10^7 d. 10^3 to 10^5

Unit II

1. The strength of multiple interactions between a multivalent antibody and antigen is called
 a. bonus effect b. **avidity** c. affinity d. cross reactivity
2. Passive agglutination detects antibody concentrations as low as _____
 a. 0.1mg/ml b. 0.01mg/ml c. **0.001mg/ml** d. 0.0001mg/ml
3. Agglutination reaction is more sensitive than precipitation for the detection of
 a. **antigens** b. antibodies c. complement d. antigen- antibody complexes
4. In which of the following case a large lattice is formed?
 a. Antibody in excess b. **Antigen antibodies are in optimal proportion**
 c. Antigen in excess d. Antibody in minimum
5. An epitope is
 a. **the area on an antigen which contacts antibody**
 b. the area on an antibody which contacts antigen
 c. usually composed of a linear sequence of amino acids
 d. usually associated with a concave region of antigen
6. The affinity of an antibody can be determined by measuring
 a. its concentration
 b. the valency of antigen binding
 c. **the amount of antibody bound at various antigen concentration**
 d. the ability to neutralize bacterial toxins
7. Binding of antigen to antibody is through
 a. disulphide bridges b. amide formation
 c. covalent bonds d. **electrostatic interactions**
8. Chemically an antibody is
 a. **protein** b. lipoprotein c. lipid d. nucleoprotein
9. Conversion of antigen into harmless insoluble matter by
 a. **agglutination** b. opsonisation c. neutralisation d. activation

10. All the following are true of antigen EXCEPT which one of the following?
- a. They contain epitopes
 - b. They will react with antibodies
 - c. They contain antigenic determinants
 - d. **They contain paratopes**

Unit III

1. Allergy to penicillin is an example of _____ hypersensitivity
- a. **type I**
 - b. type II
 - c. type III
 - d. type IV
2. The most common class of antibody involved in type II hypersensitivity
- a. IgM
 - b. **Ig G**
 - c. IgE
 - d. IgD
3. Type III hypersensitivity is triggered by
- a. mast cells and IgE
 - b. K cells & IgG
 - c. **deposition of antigen antibody complex**
 - d. TH cells
4. Type IV hypersensitivity is also called as _____ hypersensitivity
- a. immediate type
 - b. **delayed type**
 - c. cytotoxic
 - d. immune complex
5. Anaphylactic reactions are mediated by
- a. **mast cells**
 - b. lymphocytes
 - c. macrophages
 - d. natural killer cells
6. Type I hypersensitivity is characterized by
- a. cytotoxic reactions
 - b. cell-mediated reactions
 - c. immune – complex deposition
 - d. **immediate release of preformed mediators by mast cells**
7. Wheal and flare reaction is characteristic reaction associated with identification of
- a. **type I**
 - b. type II
 - c. type III
 - d. type IV
8. Which HLA specificity is helpful to diagnose ankylosing spondylitis?
- a. DR 2
 - b. DR 3
 - c. B 8
 - d. **B 27**
9. Which MHC class is found on all nucleated cells and is necessary for cytotoxic T cell function?
- a. class II
 - b. class III
 - c. **class I**
 - d. class I and III
10. The test that is done prior to transplantation surgery to determine the compatibility of MHC protein is called
- a. MHC matching
 - b. MHC typing
 - c. **tissue typing**
 - d. blood HLA test
11. MHC is located on the short arm of chromosome _____
- a. 7
 - b. **6**
 - c. 8
 - d. 2

Unit IV

- The first line of defense against viral infection is called
 - innate immune response**
 - adaptive immune response
 - cell mediated immune response
 - humoral immune response
- Find out the correct statement
 - Increased number of B cells in severe type covid patients
 - Increased number of T cells in severe type covid patients
 - Increased number of inflammatory cytokines in severe type covid patients**
 - Increased number of NK cells in the peripheral blood of covid patients
- Which among the following is a cytosolic sensor that recognize the influenza virus?
 - RIG -1**
 - TLR 3
 - TLR 7
 - TLR 8
- This type of disease results from the inability of the immune system to distinguish self from nonself antigens
 - anaphylaxis
 - autoimmune diseases**
 - prophylaxis
 - immune deficiency disease
- In type I diabetes, the target of the autoimmune attack is
 - all of the cells in the islets of Langerhans
 - the β cells in the islets of Langerhans**
 - the glucagon producing cells in the islets of Langerhans
 - cells throughout the body which have an insulin receptor
- Which of the following is a non-organ specific autoimmune disease?
 - Myasthenia gravis
 - Systemic lupus erythematosus**
 - Hashimoto's thyroiditis
 - Perinicious anaemia
- Exophthalmos is often associated with
 - Hashimoto's disease
 - primary myxedema
 - Grave's disease**
 - autoimmune hemolytic anaemia
- Lens antigens of the eye are
 - cross reacting antigen
 - sequestered antigens**
 - neoantigens
 - high affinity antigens
- Pernicious anaemia can be treated with
 - thyroxine
 - insulin
 - vitamin B12**
 - Acetylcholine esterase inhibitors
- Rheumatoid factors are
 - DNA – anti DNA immune complexes
 - auto antibodies to IgM
 - auto antibodies to complement components
 - auto antibodies to IgG**

Unit V

1. An example of known oncogenic virus is
 - a. Herpes virus
 - b. HIV-2
 - c. **Epstein Barr virus**
 - d. *Proteus mirabilis*
2. In Burkitt's lymphoma, a vaccine against which of the following might prove useful?
 - a. **Epstein Barr virus**
 - b. Marek's disease virus
 - c. HTL- 1
 - d. HMTV
3. The normal immunological control of tumours is referred to as
 - a. immunological tolerance
 - b. **immune surveillance**
 - c. type II hypersensitivity
 - d. immunological silence
4. Tumour that continues to grow and becomes progressively invasive is called
 - a. benign
 - b. transformed
 - c. cyst
 - d. **malignant**
5. Tissue transfer between genetically different members of the same species is called
 - a. autograft
 - b. isograft
 - c. **allograft**
 - d. xenograft
6. Immunosuppressive drug which probably attacks DNA by alkylation and cross linking is
 - a. azathioprine
 - b. **cyclophosphamide**
 - c. cyclosporine
 - d. rapamycin
7. Graft vs host disease often accompanies transplantation of
 - a. cartilage
 - b. kidney
 - c. **bone marrow**
 - d. heart
8. A very rapid response to a second allogenic graft is
 - a. **specific antigens of the MHC**
 - b. dependent on minor histocompatibility complex
 - c. transferred by platelets
 - d. transferred by IgA
9. Hyper acute graft rejection is caused by
 - a. **preformed antibodies**
 - b. CD4 cells
 - c. CD8 cells
 - d. platelets
10. Which of the following is true?
 - a. **BCG is a live attenuated vaccine**
 - b. Measeles vaccine is a killed vaccine
 - c. Live vaccines should be administered to immunocompromised person
 - d. Killed vaccines are infectious

Section B (2 marks)

Unit I

1. What are immunoglobins?
2. Name the five classes of immunoglobins
3. Distinguish the variable and constant region in the Ig molecule
4. Define monoclonal antibodies
5. Define polyclonal antibodies

6. Define hybridoma technology
7. Comment on germ line theory
8. What is junctional flexibility?
9. What is class switching?
10. What is meant by one-turn/two turn joining rule?

Unit II

1. Define antibody avidity
2. Define antibody affinity
3. Write the principle of immune electrophoresis
4. What is immune fluorescence?
5. Define the term 'bonus effect'
6. What is cross reactivity?
7. Distinguish between agglutination and precipitation
8. What are fluochromes?
9. Comment on precipitin curve
10. Differentiate equivalence zone from zone of antigen excess and zone of antibody excess

Unit III

1. Define hypersensitivity
2. Define anaphylaxis
3. What is Prausnitz- Kustner (P.K) test?
4. Differentiate active cutaneous anaphylaxis from passive cutaneous anaphylaxis
5. Outline the procedure for Mantoux reaction
6. Define Arthus reaction
7. Distinguish between reverse Arthus reaction and passive Arthus reaction
8. What are rhoam?
9. What is MHC?
10. Define HLA

Unit IV

1. What are chemokines?
2. Comment on lymphopenia

3. Define cytokine storm
4. What is STAT protein? State its role in viral invasion
5. What are Pathogen Recognition Receptors? Give example
6. How does IgA prevent influenza virus infection?
7. What is autoimmunity?
8. What are anti idiotypic antibodies?
9. What is sequestered antigen? Give an example
10. Comment on cross reactive antigen

Unit V

1. What is immune surveillance?
2. State any two functions of NK cells
3. What is the role of CTL in tumour immunity?
4. Distinguish between resting and activated macrophages
5. Mention the cytokines involved in tumour immunity
6. What is allograft? Give example
7. Differentiate autograft from allograft
8. What is second set graft rejection?
9. What are passenger cells?
10. Mention the immunosuppressive agents
11. Comment on BCG vaccine

Section C (5 marks)

Unit – I

1. Explain the basic structure of immuno globulins
2. Differentiate serum IgA from secretory IgA
3. Explain the structure of IgM
4. Describe the functions of immune globulins
5. Describe the production of monoclonal antibodies.
6. Explain the genetic model for immunoglobulin structure
7. Describe the organization of immunoglobulin genes
8. Explain Dryer and Bennett two gene model

9. Describe the organization of immunoglobulin in the heavy chain gene
10. Describe the rearrangements in the light chain V-J DNA segment

Unit II

1. List out the salient features of antigen antibody reaction
2. Describe the method and applications of immunofluorescence technique
3. Distinguish between single radial immune diffusion and double immune diffusion
4. Differentiate between agglutination and precipitation
5. Mention different types of forces that cause antigen and antibody reaction
6. Comment on rocket immune electrophoresis
7. Explain immune diffusion technique
8. Explain multivalency of antigen and mechanism of binding with antibody
9. Bring out the principles of ELISA
10. List out the applications of ELISA

Unit III

1. What is allergy? How are allergens related to the immune response?
2. Enumerate antibody mediated cytotoxic hypersensitivity
3. Comment on Arthus reaction
4. Distinguish between RIST and RAST
5. Describe Anaphylaxis.
6. Expound complex mediated hypersensitivity.
7. Explain the structure of MHC class-I molecule
8. Describe the structure of MHC class-II molecule
9. Discuss HLA typing
10. Write the importance of HLA typing in paternity testing

Unit IV

1. Trace the role of cytokines and chemokines in immunity and immunopathology during corona virus infection
2. Explain how the interferon induce innate immune response against corona virus infection
3. Discuss the cell mediated responses during corona virus infection

4. Explain the role of antibodies in reducing the corona virus infectivity.
5. State the roles played by macrophages, NK cells and dendritic cells in the elimination of Influenza virus
6. Describe humoral immune response against influenza virus infection
7. Discuss cellular immune response against influenza virus infection
8. Trace the causes of autoimmune diseases
9. Describe the symptoms, diagnosis and treatment of rheumatoid arthritis
10. Discuss the symptoms, diagnosis and treatment of Grave's disease

Unit V

- 1 "Immunological tolerance is an asset to our immune system" - Justify
2. Narrate the role of NK cells in natural immunity to tumour cells
3. Explain the activation and proliferation of T cells in tumour immunity
4. What are interleukins? Write their significance
5. How would you prevent graft rejection?
6. What is immunosuppression? How is it caused?
7. Outline the phenomenon of graft versus host reaction
8. What are immune suppressive agents? Mention their importance in transplantation
9. Bring out vaccination schedule
10. What are live vaccines? How would you reduce the virulence of microorganisms artificially?

Section D (10 marks)

Unit – I

1. Describe the structure and functions of different classes of immunoglobulins
2. Describe hybridoma technology
3. What are polyclonal antibodies? Explain the production of polyclonal antibodies
4. Enumerate the hypotheses of generation of antibody diversity
5. Explain the organization and rearrangement of Ig genes
6. Discuss gene rearrangements in variable region
7. Explain the mechanism of variable region DNA rearrangements
8. Define class switching. Explain the mechanism of class switching

9. Write notes on a) Light chain rearrangement b) Heavy chain rearrangement

Unit II

1. Describe the method to separate serum proteins using immunoelectrophoresis
2. How would you locate and identify antigen using immunofluorescence?
3. What is agglutination? Explain the reaction with examples
4. Explain the various antigen antibody reaction
5. Explain the principle, procedure and applications of single radial and double Immunodiffusion
6. Describe different types of agglutination reaction
7. Describe the salient features of antigen antibody reaction
8. Elaborate different types of ELISA and its applications
9. Explain precipitation and agglutination reactions
10. List out the various tests to detect antigen antibody reaction

Unit III

1. Elaborate IgE mediated hypersensitivity
2. What is anaphylaxis? Describe various types of anaphylaxis
3. Explain type II hypersensitivity
4. Explain immune complex mediated hypersensitivity
5. Discuss delayed type hypersensitive reaction
6. What is hypersensitivity? Classify and describe the types of hypersensitivity
7. Describe the immediate type hypersensitivity reactions with examples
8. Describe the structure, distribution and functions of Major Histocompatibility Complex
9. Compare and contrast the MHC class I, II and III products with respect to structure, distribution and function
10. Write an account of clinical importance of HLA typing

Unit IV

1. Explain innate immune response against corona virus infection
2. Elaborate adaptive immune response against corona virus infection
3. Describe innate immunity to influenza virus infection

4. Narrate the role humoral immune system and cellular immune system in eliminating influenza virus.
5. What are autoimmune diseases? Classify them with examples
6. Describe any five autoimmune diseases with a note on their causes, symptoms and treatment

Unit V

1. Narrate the methods by which an immune system responds to tumour
2. Explain how tumour antigens are useful in the diagnosis, prognosis and monitoring therapy for tumour cells
3. Describe natural immunity to tumours including the functions of macrophages and natural Killercells
4. Discuss T – cell mediated immunity to tumours, including cytokines and cytotoxic T cell immune mechanisms
5. Illustrate the therapeutic approaches to eliminate tumour burden
6. What is graft vs host reaction? Describe its mechanism and clinical symptoms
7. What is allograft rejection? Explain its mechanism
8. Classify the different types of grafts and enumerate the problem that arise in transplantation
9. Explain the mechanism of graft rejection

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI

QUESTION BANK

I M.Sc Zoology

Semester II - Core III Applied Biotechnology Sub. Code : 21PZOC23

Section A (1 Mark)

Choose the correct Answer

Unit I

- _____ production is the largest dairy industry in the world.
a. Wine b. **Cheese** c. SCP d. Butter
- Pseudomonas sp* along with _____ substrate is used for single cell protein production.
a. **alkane** b. toluene c. Insulin d. Interferon
- The imperial chemical industry has manufactured SCP of *Methylphilus methylotrophus* and marketed in the name -----.
a. **Pruteen** b. Humulin c. Toprina d. Toruteen
- Biogas is a fuel gas consists of methane and CO₂ in the ratio of _____.
a. 8:2 b. **2:1** c. 3:1 d. 1:3
- The proteolytic bacteria degrade protein into amino acids, such microbes are called as _____.
a. **hydrolytic fermentative bacteria** b. saprolytic fermentative bacteria
c. hydroxy fermentative bacteria d. non hydrolytic fermentative bacteria
- Primary metabolite is also referred as _____.
a. **Trophophase** b. Idiolute c. Intermediate d. idiophase
- _____ is the metabolic product of *Saccharomyces cerevisiae*.
a. H₂O b. **CO₂** c. H₂ d. CO
- Thirty five anthracyclines are produced by a single strain of _____.
a. **Anthramycetes** b. *Streptomyces* c. *Saccharomycetes* d. *Actinomycetes*
- Casein gets converted when the acidified milk is treated with _____.
a. renin b. **rennet** c. sephadex d. resin
- SCP produced from ethanol is called _____.
a. Toprina b. Pruteen c. **Toruteen** d. Altin
- _____ metabolism are not essential for growth and multiplication of cells.
a. Primary b. **Secondary** c. Tertiary d. Intermediate
- The biosynthesis of enzyme is blocked by the addition of certain substances to the culture. This process is called _____.
a. feedback repression b. catabolic repression
c. **repression** d. progression

13. The process of precipitating unwanted protein and some other materials by adding certain chemicals to the solution is called
- negative precipitation**
 - positive precipitation
 - normal precipitation
 - abnormal precipitation
14. Bacterial SCP are rich in _____
- amino acids
 - nucleic acids**
 - lipid
 - carbohydrate
15. During world war II biomass of _____ was consumed as SCP
- Bacillus megaterium*
 - Methylomonas clara*
 - Candida utilis***
 - Saccharomyces cerevisiae*
16. _____ method is used to produce enzymes in a commercial scale.
- Deep bed cultivation
 - Solid substrate cultivation**
 - Submerged cultivation
 - Fermentation

Unit II

1. Gemtuzumab monoclonal antibody is used to treat _____.
- cancer
 - AIDS
 - acute myeloid leukaemia**
 - metastatic breast cancer
2. Monoclonal antibodies were first made by _____.
- Milton
 - Milstein**
 - Eric
 - Keller
3. Somatotropin is a proteinaceous hormone which is made up of _____ amino acid.
- 181
 - 191**
 - 193
 - 198
4. The treatment of diabetes by injecting insulin is named _____.
- insulin therapy**
 - pituitary therapy
 - adenotherapy
 - none
5. Somatotropin is mixed with _____ and used for injection
- cresol**
 - aerosol material
 - lipoids
 - asbestos
6. The injection of individual cells in a suspension into the bone marrow is called _____.
- inesting
 - transfusion**
 - transfection
 - infection
7. Oncogene *abl* is associated with _____.
- thyroid carcinoma
 - lymphocytic leukaemia**
 - osteocarcinoma
 - colon cancer
8. The MCA named _____ is mainly used for kidney transplantation.
- orthclone OKT-3**
 - osteoclone OST-3
 - orithro ORI-3
 - None
9. The deficiency of somatotropin leads to _____.
- SCID
 - dwarfism**
 - gigantism
 - sickle cell anaemia
10. Which of the following is the first therapeutic product produced by recombinant technology?
- Reconsulin
 - Humulin**
 - Protropin
 - Humatrope

Unit III

- EPA stands for _____.
 - Environmental pollution agency
 - Environmental protection agency**
 - Environmental protection authority
 - Eco protection agency
- Pollution monitoring using biosystems is called _____.
 - biomonitoring**
 - environmental monitoring
 - bioresource management
 - biosensors
- _____ test is used to detect fecal pollution.
 - IMVIC
 - Ames Test
 - Coliform test**
 - Catalase test
- _____ are pollution induced small peptides present in plant cells.
 - Metallothionins
 - Polychelatins**
 - Defensins
 - Hepcidin
- _____ are metal pollution induced small peptides present in animal cells.
 - Metallothionins**
 - Polychelatins
 - Defensins
 - Hepcidin
- _____ enzyme is a biomarker to detect pollution using fishes.
 - Acetylcholine esterase**
 - Choline esterase
 - Oxygenase
 - Carboxylase
- _____ are helminths that are used in bioassay for detection of organic matter in water.
 - Round worms
 - Tapeworms
 - Rotifers**
 - Bdelloidea*
- _____ are used as biomarkers used for measurement of cell viability.
 - Mitochondria
 - Lysosomes**
 - Golgi bodies
 - Endoplasmic reticulum
- The _____ test is used to detect chemical mutagens and their carcinogenicity.
 - IMVIC
 - Ames Test**
 - Coliform test
 - Catalase test
- _____ is a reporter gene used in bioluminescent bioassays.
 - Gus
 - Lux**
 - GFP
 - Lox
- _____ is closely linked with global warming
 - O₂
 - CO₂**
 - N₂
 - CO
- _____ are involved in biocalcification.

- a. Fungi b. **Corals** c. Bacteria d. Plants

13. Biosensors that sense pollutions by the production of heat are called as _____ biosensors.

- a. conductimetric b. potentiometric c. **calorimetric** d. amperometric

14. Man-made compounds that are usually non-biodegradable.

- a. Antibiotics b. **Xenobiotics** c. Antisepctic d. Organic

15. Superbug is constructed from

- a. *Clostridium* b. *Aspergillus* c. *Pseudomonas* d. *Bacillus*

16. Transgenic tobacco containing nitroreductase gene of *Enterobacter cloacae* degrades

- _____ a. Mercury b. **TNT** c. SDS d. Arsenic

Unit IV

1. Insulin is a hormone secreted by the ----- of the islets of Langerhans of pancreas.

- a. alpha cells b. **beta cells**
c. gamma cells d. adrenal cortex

2. Eli Lilly manufactures _____.

- a. toruteen b. alkane c. pruteen d. **humulin**

3. _____ is the most common retrovirus being used to introduce gene into animal cell.

- a. **MuLv** b. GEMO c. GoMs d. CaMV

4. A fast growing transgenic mouse called _____.

- a. **super mouse** b. special mouse c. nude mouse d. knock-out mouse

6. Name the animal virus used for generation of transgenic animals.

- a. **MuLV** b. HIV c. SarsCoV d. Pappiloma virus

7. The first gene therapy used cells altered outside the recipient's body and is called _____ gene therapy.

- a. in situ b. in vivo c. **ex vivo** d. vaccine

8. _____ is used to treat osteoporosis.

- a. Relaxin b. Porosin c. **Calcitonin** d. Lysin

9. Interferon is an _____.

- a. antibacterial protein b. **antiviral protein**
c. microbial protein d. antifungal protein

10. Introduction of mutant _____ gene into mice generates knock out mice with Kaposi's Sarcoma.
- a. collagen b. **HIV TAT** c. casein d. *TAT*
11. SV40 is an _____ virus.
- a. ontogenic b. **oncogenic** c. harmful 4. Infectious
12. _____ virus causes warts in cattle.
- a. Baculovirus b. SV40 c. **Bovine papilloma virus** d. Papova virus

Unit V

1. 10nm = _____ m
- a. **10^{-8}** b. 10^{-7} c. 10^{-9} d. 10^{-10}
2. The size of the nanoparticles is between _____ nm
- a. 100 – 1000 b. 0.1 – 10 c. **1 – 100** d. 0.01 – 1
3. Who coined the word 'nanotechnology'?
- a. **Erick Drexler** b. Richard Feynman c. Sumi O Tijima d. Richard Smalley
4. _____ contains nanoparticles prepared by using biologically processed metal ores
- a. Homeopathic medicines b. Modern antibiotics
- c. **Ayurvedic Bhasmas** d. Modern cosmetics
5. One micrometer (micron) is _____ nm.
- a. **1000** b. 100 c. 10 d. 0.01
6. The most important property of nanoparticles is _____.
- a. force b. **friction** c. pressure d. temperature
7. Which of the following synthetic method is eco-friendly?
- a. RF Plasma b. **Combustion** c. Thermolysis d. Sol-gel
8. Nanoparticle-fluid suspensions are _____
- a. Nanocrystals b. **Nanofluids** c. Nanimaterials d. Carbon tubes
9. What is a bucky ball?
- a. **A carbon molecule** b. Nick-name for Mercedes-Benz
- c. Plastic d. Explosive
10. _____ is called as the father of nanotechnology
- a. J.L. Baird b. **Richard Feynman** c. Agarwal d. Daniel

Section B (2marks)

Unit I

1. What is strain improvement?
2. What are the uses of bioethanol?
3. Comment on single cell protein.
4. Mention the composition of biogas.
5. Define methanogenesis.
6. Write any two advantages of microbial production of enzymes.
7. Mention the composition of biogas.
8. Comment on gasohol.
9. Write down the alternate names of biogas.
10. Write any four industrially important enzymes produced by microbes.
11. What is meant by feedback repression.

Unit II

1. Define genetic diseases.
2. Distinguish between somatic cell and germline gene therapies.
3. Write short notes on human growth hormone
4. What are the uses of insulin?
5. Comment on recombinant vaccines.
6. Comment on somatic cell fusion.
7. What is hybridoma technology
8. Comment on monoclonal antibody.
9. Comment on germline gene therapy.
10. What is antisense gene therapy?
11. What are the causes and symptoms of Hepatitis B?
12. What is humulin?

Unit III

1. What is biomonitoring?
2. Comment on biosensors.
3. Comment on biological calcification.
4. What is the role of CO₂ in global warming
5. Add a note on phytochelatins.
6. Define xenobiotics.
7. Mention the importance of coliform test.
8. What are biosensors?
9. Enumerate the types of biosensors.
10. What are biodegrading agents? Give an example.
11. How are polychlorinated biphenyl compounds degraded?
12. Differentiate insitu and exsitu bioremediation.
13. Enlist the advantages of biodegradation.
14. What is biomagnifications?
15. Enlist the advantages of insitu bioremediation.

16. Write the difference between biostimulation and bioaugmentation.

Unit IV

1. What is transgenesis?
2. What are the uses of transgenic animals?
3. Mention the ethical and legal aspects of transgenic animals.
4. What is vector?
5. What are the advantages of genetically engineered microbes.
6. Mention the application of genetic engineering.
7. What is transfusion.
8. Comment on SV40.
9. Add a note on Glo fish.
10. Name few animal ethical committees.
11. List any two advantages of genetically modified animals.
12. Enlist two risks of genetically modified animals.

Unit V

1. What is meant by nano?
2. Define nanoparticles
3. Comment on nano-structured materials?
4. Classify nanomaterials and give examples.
5. What is the difference between nanoscience and nanotechnology?
6. Mention the uses of nanocrystals?
7. What is a Quantum dot?
8. Why is nanotechnology called “green technology”?
9. What are fullerenes?
10. Write any two applications of nanotechnology in health and medicine
11. How is nanotechnology useful in destroying tumours?
12. Differentiate top down from bottom up approaches of nanoparticle synthesis.
13. Comment on nano-composites.

Section C (5 marks)

Unit I

1. What are the scope and importance of applied biotechnology?
2. Enlist the characteristics of human growth hormone.
3. Discuss the various methods of preparation of single cell protein
4. Write an explanatory note on microbial strains.
5. Enumerate the steps involved in enzyme production.
6. Enlist the characteristics of biogas.
7. Name the methods of strains improvement.
8. Elucidate the nutritional value of single cell proteins.

9. Give an account on microbial production of food.
10. Explain the importance of SCP
11. Enumerate the biosynthesis of bioethanol.
12. Write down the applications of biogas
13. Explain the methods of isolation and improvement of microbial strains.
14. Enumerate the methods of production of penicillin.
15. Illustrate the functions and application of biogas.
16. Explain the role of microorganisms in biogas production.

Unit II

1. Explain the methods of gene therapy used for treatment of adenosine deaminase deficiency.
2. Write an essay on in vivo gene therapy for treatment of cancer.
3. Distinguish between ex vivo and in vivo gene therapy.
4. Explain gene therapy and its applications
5. State the clinical applications of gene therapy.
6. Enlist the importance of human growth hormone and its application.
7. Emphasize the applications of hybridoma technology.
8. Sketch the steps involved in preparation recombinant vaccine for Hepatitis B
9. Depict the vaccine development methodology for influenza.

Unit III

1. Enumerate the reasons for the recalcitrance of xenobiotics.
2. What is in situ bioremediation? Outline the types.
3. Enlist the types of Ex situ bioremediation.
4. Enumerate the factors affecting biodegradation
5. Sketch the steps involved in development of a multimetal resistant strain of bacteria by genetic engineering.
6. Outline the biotechnological methods for measurement of pollution.
7. Sketch the animal test systems in bioassay.
8. Analyse the role of CO₂ in atmospheric pollution and write on the importance of biocalcification to reduce atmospheric CO₂.
9. Analyse the process of biodegradation of polychlorinated biphenyl compounds.
10. Outline the methodology of genetic improvement of bacterial strain for multimetal resistance.

Unit IV

1. Enumerate the physical containment of genetically modified organisms.

2. Enlist the parameters that are monitored for the welfare of transgenic animals.
3. Mention the ethical and legal aspects of transgenic animals.
4. Schematically represent the steps of production of transgenic fish.
5. Emphasize the importance of knockout mice.
6. Explicate the methodology of genetic engineering of microbes for production of human growth hormone

Unit V

1. What are nanocrystals? Explain their applications?
2. Give a brief account on nanofluids.
3. Explain the properties of nanofluids.
4. Enlist the applications of nanobiosensors.
5. Analyze the different types of carbon nano materials?
6. Give the physical properties of nanomaterials?
7. Briefly narrate the applications of nanotechnology in health and medicine?
8. Classify nanomaterials and give examples for them?
9. Explicate green synthesis of nanoparticles.

Section D (10 marks)

Unit I

1. Enumerate the various techniques used for isolation and improvement of microbial strains.
2. Explain the methods of microbial production of alcoholic beverages.
3. Explain the process of production of bioethanol. Comment on its advantages
4. Give a detailed account on biogas production. Add a note on its advantages.
5. Schematically represent the commercial production of penicillin from *Penicillium chrysogenum*
6. With a neat flow chart explain the production and purification of biodiesel from vegetable oil.
7. With a neat diagram explain the types of biogas plants.
8. What are single cell proteins? Give an account on industrial preparation of any two single cell proteins.

Unit II

1. Describe the in vivo gene therapy for cancer.
2. Write in detail the production of hybridoma.
3. What is monoclonal antibody? Describe the production of monoclonal antibody.
4. Gene therapy is an alternative to the conventional methods to treat cancer'- Substantiate.
5. Enumerate the contributions of biotechnology to the realm of healthcare.
6. Emphasize the importance of recombinant vaccine for hepatitis B and Influenza and explain their production.
7. How is ex vivo gene therapy applied for treatment of adenosine deaminase deficiency.

Unit III

1. Enlist the characteristic features of an organism used in bioassays for pollution detection. Explain the role of animals in monitoring pollution.
2. Critically evaluate the biotechnological methods to control CO₂ pollution.
3. Evaluate the bioremediation methodologies for metal pollution.
4. Comment on the different methods of bioremediation.
5. Schematically explain the steps involved in construction of 'Superbug'.

Unit IV

1. Briefly describe the various steps involved in the production of transgenic mice.
2. Discuss briefly the applications of genetic engineering techniques.
3. Illustrate the construction of viral vectors for animal transformation.
4. With a neat illustration explain the microinjection method for production of transgenic mice.
5. Give an elaborate account on the embryonic stem cell method for production of transgenic animals.
6. Enumerate the importance of transgenic mice.

7. Critically analyse the ethical implications on transgenic animals.

Unit V

1. Briefly narrate the history of nanomaterials.

2. Give some present and future applications of nanomaterials.

3. Briefly narrate any two bottom up and top down approaches for synthesis of nanoparticles.

4. Enlist the properties of nanomaterials and classify them.

5. State the benefits of nanotechnology to mankind.

6. Explain the basic concepts and applications of nanobiosensors?

7. Analyze the different types of nanobiosensors and their applications.

8. Narrate the role of nanotechnology in health and medicine

9. Describe the role of nanocrystals in biological detection.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI

Semester II

CORE IV

I M.Sc Microbiology

Sub.Code: 21PZOC24

QUESTION BANK

Section A (1 mark)

Choose the correct answer

Unit –I

- Five kingdom system of classification was proposed by ----- in the year 1969
a. Stamir and Niel b. **R.H.Whittakaer** c. Carl Lineaeous d. Cavailier-smith
- Identify the kingdom which do not have a defined nucleus or organelle.
a. **Monera** b. Protista c. Fungi d. Plantae
- Amoeba comes under the kingdom _____
a. Monera b. **Protista** c. Fungi d. Plantae
- Mushroom, molds and yeast are classified under _____ kingdom.
a. Monera b. Protista c. **Fungi** d. Plantae
- Name the protozoan which exhibit amoeboid movement
a. Ciliophora b. Mastigophora c. Sporozoa d. **Sarcodina**
- Modern trend in bacterial taxonomy is based on ----- analysis of microorganisms
a. phenotypic b. **genetic** c. phylogenetic d. physiological
- Identify the prokaryotes without cell wall that are placed in the class Mollicutes
a. **Mycoplasma** b. Actinomycetes c. Cyanobacteria d. Arachaeobacteria
- Mention the number of nucleotides present in 16srRNA
a. **1500** b. 120 c. 2900 d. 2000
- Which is called as a universal tool for the phylogenetic analysis?
a. **Ribosomal RNA** b. Ribosomal DNA
c. DNA hybridization d. DNA homology

10. Which one of the following causes typhus fever?
 a. Chlamydias b. **Rickettsias** c. Actinomyctes d. Cyanobacteria
11. The earthy odour to soil after the rain is due to the presence of -----
 a. aminosugar b. glutamate c. **geosmines** d. fattyacid
12. ----- is the phototropic Gram negative bacteria
 a. **Helicobacteria** b. Bifidobacteria c. Micrococcus d. Arthrobacter
13. Which of the following is wall –less bacteria?
 a. Chlamydias b. **Mycoplasma** c. Rickettsias d. Actinomyctes
14. The bacteria grows in human breast milk
 a. Frankia b. Micrococcus c. Helicobacillus d. **Bifidobacterium**
15. Which is called as baker’s yeast?
 a. ***Saccharomyces cerevisiae*** b. *Saccharomyces ludwigi*
 c. *Saccharomyces boulasdii* d. *Saccharomyces pastorianus*
16. Which one of the following inference indicates the ability of an organism to utilize citrate as a sole source of carbon in Simmon’s citrate medium?
 a. Blue colour b. Appearance of growth c. **Both a and b** c. Red colour
17. Catalase production is negative in which of the following?
 a. ***Streptococcus*** b. *Salmonella* c. *Proteus* d. *Staphylococcus*
18. Indole test is used to identify the microbes which -----
 a. **tryptophan into indole** b. tryptophan into glucose
 c. tryptophan into alanine d. tryptophan into peptone
19. Which colour appear when the citrate test is positive?
 a. Green b. **Blue** c. Red d. Purple
20. Example of urease positive bacteria is -----
 a. *E.coli* b. *Providencia sp* c. *Yersinia pestis* d. ***Klebsiella sp***

Unit –II

- Gram staining is an example of
 - acid fast stain
 - acid stain
 - differential stain**
 - flagellar stain
- Counter stain used in Gram staining is
 - safranin**
 - crystal violet
 - carbol fuschin
 - acetocarmine
- The most common stains used in Gram staining is
 - crystal violet and methylene blue
 - crystal violet and safranin**
 - crystal violet and carbol fuschin
 - safranin and methylene blue
- In Gram staining iodine is used as a -----
 - fixative
 - solubilizer
 - mordant**
 - stain
- Which one of the following is used as endospore stain?
 - Schaeffer-fulton**
 - Crystal violet
 - Carbol fuschin
 - Acetocarmine
- is used to stain flagella
 - Carbol fushsin**
 - Safranin
 - Crystal violet
 - Malachite green
- The differential staining property of Gram staining is primarily due to
 - difference in lipid content in Gram positive and Gram negative bacteria**
 - difference in protoplasmic contents in Gram positive and Gram negative bacteria
 - difference in teichoic acid content in Gram positive and Gram negative bacteria
 - difference in protein content in Gram positive and Gram negative bacteria
- The spherical shaped bacterium is called
 - bacillus
 - coccus**
 - spirillum
 - diplococcus
- The bacilli arranged in pairs are called
 - streptobacilli
 - diplobacilli**
 - staphylobacilli
 - spirillum
- _____ is a culture medium which allows the growth of particular variety of bacteria
 - Complex medium
 - Minimal medium
 - Selective medium**
 - Enriched medium
- Mention the culture medium for which the exact composition is known
 - simple
 - complex
 - defined**
 - natural

12. Which one of the following method is best for getting pure culture ?

- a. **Streak plate** b. Agar slant c. Staining d. Serial dilution

Unit –III

1. Which of the following is not found in bacteria?

- a. **Endoplasmic reticulum** b. Cell wall c. DNA d. Cell cytoplasm

2. The main difference between Gram positive and negative bacteria lies in the composition of

- a. cilia b. **cell wall** c. nucleolus d. cytoplasm

3. Bacterial fimbriae present on the outer cell surface are used for

- a. cellular activity b. **adherence to surfaces**
c. motility d. cell wall synthesis

4. The bacteria containing sex pili are called ----- cells

- a. **F⁺** b. F⁻ c. F⁺⁺ d. F⁺

5. The bacterium contains only one flagellum at the end is

- a. amphitrichous b. peritrichous c. **monotrichous** d. lophotrichous

6. Name the intracytoplasmic membranous structure present in bacteria.

- a. Magnetosome b. **Mesosome** c. Chlorosome d. Capsule

7. Some bacteria contain an extra chromosomal circular DNA called as

- a. nucleoid b. **plasmid** c. ribosome d. chromatophores

8. Plasmid integrated to a bacterial chromosome is called as.

- a. apsome b. chromosome c. **episome** d. mesosome

9. Which of the following is protein coat of a virus?

- a. Capsomere b. **Capsid** c. Facet d. Vertices

10. Mention the virus that causes damage in the cells in which they live

- a. Virion b. Viroid c. **Virulent** d. Non virulent

11. TMV is a _____

- a. **plant virus** b. animal virus c. bacteriophage d. bacterial virus

12. What is the other name for a non enveloped virus?

- a. Enveloped virus b. Provirus c. **Naked virus** d. Latent virus

13. Which of the following leads to the destruction of the host cells?
 a. **Lytic cycle** b. Lysogenic cycle c. Prophage cycle d. Temperate phage cycle
14. All fungi are usually
 a. autotrophs b. saprophytes c. parasites **d. heterotrophs**
15. What is the study of fungi called?
 a. Fungology b. **Mycology** c. Mushrooming d. Zygology
16. Thread like filaments of fungi are known as
 a. Conidia b. Mycorrhiza c. Sporangium **d. Hyphae**
17. The cell wall of fungi is made up of
 a. cellulose b. pectin c. **chitin** d. suberin
18. Fungi can be distinguished from algae in
 a. cellulosic cell wall and chlorophyll is absent
 b. nucleus is present
 c. mitochondria are absent
 d. **cell wall is chitinous and chlorophyll is absent**
19. What is the mutualistic relationship shown in lichens?
 a. **Fungi and algae** b. Fungi and plants
 c. Fungi and insects d. Fungi and humans
20. Fungal spores produced asexually at the tips of hyphae are called
 a. anthospores b. sporangiophores c. **conidia** d. meiospores
21. Aflatoxin is produced by
 a. bacteria b. virus c. **fungi** d. nematode
22. *Penicillium* belongs to
 a. Deuteromycetes b. Phycomycetes c. **Ascomycetes** d. Basidiomycetes
23. *Penicillium* is used in the production of
 a. antibiotics b. cheese fermentation c. **both a and b** d. none of the above
24. Which one of the following is known as blue mould?
 a. ***Penicillium*** b. *Rhizopus* c. *Mucor* d. *Aspergillus*

Unit –IV

1. Name the process of making beer
 - a. Fermentation
 - b. **Brewing**
 - c. Vinification
 - d. Lagginger
2. Which one of the following is called as the brewers yeast?
 - a. *Saccharomyces ludwigi*
 - b. ***Saccharomyces cerevisiae***
 - c. *Saccharomyces boulasdii*
 - d. *Saccharomyces pastorianus*
3. The unfermented grape juice of crushed grapes is called _____ -
 - a. pomace
 - b. **must**
 - c. dry wine
 - d. mother wine
4. Name the wine made from grapes without the skin.
 - a. Red wine
 - b. **White wine**
 - c. Dry wine
 - d. Rose wine
5. What is the raw material used to make red wine?
 - a. Green grapes
 - b. **Black grapes**
 - c. Golden grapes
 - d. Yellow grapes
6. The vinegar obtained from apple juice is called
 - a. alegar
 - b. malt vinegar
 - c. **cider vinegar**
 - d. rice vinegar
7. Name the thin film of gelatinous bacteria formed during the production of vinegar.
 - a. **Mother vinegar**
 - b. White vinegar
 - c. Dry vinegar
 - d. Malt vinegar
8. Which microorganism aids in the formation of vinegar?
 - a. Yeast
 - b. **Bacteria**
 - c. Virus
 - d. Fungi
9. Name the microorganism that produces Penicillin.
 - a. ***Pencillium chrysogenum***
 - b. *Bacillus circulans*
 - c. *Streptomyces hygrosopicus*
 - d. *Streptomyces aurofaciens*
10. Name the type of fermenter used in the production of penicillin.
 - a. Steam fermenter
 - b. **Batch fermenter**
 - c. Airlift fermenter
 - d. Mist fermenter
11. Identify the bacteria used in the production of streptomycin antibiotic.
 - a. *Saccharomyces cerevisiae*
 - b. ***Streptococcus griseus***
 - c. *Bacillus thuringiensis*
 - d. *Acetobacter aceti*

Unit- V

1. A virus which emerges suddenly and spreads globally is called -----
 - a. **epidemic**
 - b. endemic
 - c. pandemic
 - d. zoonotic
2. A common sign of amoebiasis is
 - a. chest pain
 - b. cough
 - c. frequent urination
 - d. **loose stools**
3. Identify the protozoan which causes amoebiasis or amoebic dysentery
 - a. *Trypanosoma brucei*
 - b. ***Entamoeba histolytica***
 - c. *Entamoeba gingivass*
 - d. *Plasmodium vivax*
4. Entamoeba histolytica infection occurs in the _____
 - a. **liver & intestine**
 - b. intestine & heart
 - c. liver & heart
 - d. heart & brain
5. Laboratory diagnosis of *Entamoeba histolytica* depends on identification in the _____
 - a. blood
 - b. salaiva
 - c. urine
 - d. **stool**
6. Find out the carrier fly which causes kala-azar disease
 - a. **Sand fly**
 - b. Tsetse fly
 - c. House fly
 - d. May fly
7. Which of the following protozoan is responsible for leishmaniasis?
 - a. *Trypanosoma brucei*
 - b. *Entamoeba hystolytica*
 - c. ***Leishmaniasis donovani***
 - d. *Plasmodium vivax*
8. Identify the symptoms of leishmaniasis
 - a. Disturbed sleep pattern
 - b. Diarrhea
 - c. **Black fever**
 - d. Skin allergy
9. Name the bacteria that cause diphtheria.
 - a. ***Coryne bacterium diphtheriae***
 - b. *Bacillus circulans*
 - c. *Neisseria gonorrhoea*
 - d. *Clostridium botulinum*
10. Which part of the body does diphtheria affect?
 - a. **Throat and Nose**
 - b. Intestine & Heart
 - c. Liver & heart
 - d. Heart & Brain

11. Name the bacteria that causes tetanus.
- a. *Corynebacterium diphtheriae* b. *Bacillus circulans*
c. *Neisseria gonorrhoeae* d. ***Clostridium tetani***
12. _____ is a sexually transmitted disease
- a. Dengue b. Rabies c. Tetanus d. **Gonorrhea**
13. Identify the animal that spreads rabies.
- a. Sheep b. **Dog** c. Fish d. Cow
14. _____ of the infected animal causes rabies.
- a. skin b. blood c. **saliva** d. claws
15. Identify the virus that causes rabies
- a. Paramyxo virus b. **Rhabdo virus** c. Herpes virus d. Rubiola viurs
16. Name the major vector for dengue virus in Asia.
- a. ***Aedes aegypti*** b. *Aedes albopictus* c. *Aedes africanus* d. *Aedes furcifier*
17. Which of these is not a reservoir for chikungunya virus ?
- a. Humans b. Monkeys c. Bat d. **Chicken**
18. What is the incubation period for chikungunya disease?
- a. **1-12 days** b. 13-18 days c. 19-25 days d. 25-30 days
19. Aspergillosis is recognized in tissue by the presence of
- a. metachromatic granules b. psuedohyphae
c. **septate hyphae** d. budding cells
20. Which of the following fungi produces carcinogenic toxic metabolites?
- a. *Aspergillus fumigatus* b. *Cryptococcus neoformans*
c. *Coccidioides immitis* d. ***Aspergillus flavus***
21. Aspergillus species are
- a. **mould fungi** b. dimorphic fungi c. yeast d. primary infections

22. Which of the following is/are used in the treatment of actinomycosis?

- a. Surgical debridement
- b. Tetracycline
- c. **Penicillin G**
- d. Sulfamethoxazole

23. Actinomycosis is mainly caused by

- a. *Actinomyces asteroides*
- b. *Nocardia asteroides*
- c. ***Actinomyces israelii***
- d. *Actinomyces viscosus*

Section B (2 marks)

Unit-I

1. Mention the basis on which five kingdom concept was classified.
2. Define ribotyping
3. What is genomic G+ C ratios?
4. What are protozoans?
5. Define mycoplasma
6. Write the salient features of archebacteria.
7. Why is 16s rRNA commonly used for sequencing purpose?
8. Define mycelium
9. List out the type of fever caused by Rickettsias
10. Enlist the significance of construction of phylogenetic tree
11. What is Bergey's Manual of Determinative bacteriology used for?
12. How staining and biochemical tests are used to identify bacteria?
13. What is biochemical analysis?
14. What is the principle of biochemical test?
15. Why is it important to identify bacteria?
16. List out any six biochemical test to identify the bacteria
17. Differentiate catalase test from oxidase test
18. How will you identify Gram positive and negative bacteria based on methyl red test?
19. Comment on citrate utilization test

Unit-II

1. What is meant by pure culture technique?
2. Define culture medium
3. Differentiate enrichment medium from enriched medium
4. Differentiate living medium from synthetic medium
5. What is natural medium?
6. Write the composition of Mac Conkey's agar medium
7. Distinguish between synthetic and semi-synthetic medium
8. Distinguish between *Streptococci* and *Staphylococci*
9. Comment on acid-fast staining
10. What are vibrioid and helical spirilli?

Unit –III

1. Classify bacteria based on the presence of flagella
2. What are the functions of bacterial capsule?
3. List out the functions of pili
4. Define plasmid
5. What are magnetosomes?
6. What is coenocytes?
7. Define viroids
8. Define hypha
9. Actinomycetes are referred as "Thread or Ray bacteria" why?
10. Differentiate haplobiontic from diplobiontic type life cycle of yeast
11. List out the benefits of penicillium.

Unit –IV

1. What is fermentation?
2. Mention the raw materials used in the production of ethanol.

3. Name the microorganisms involved in the production of ethanol.
4. What is must?
5. What is dry wine and sugary wine ?
6. Mention the steps in production of wine.
7. What is brewing?
8. What is lagging?
9. Define Wort.
10. Name the raw materials used in beer making.
11. What is vinegar ?
12. Define mother vinegar.
13. Name the types of vinegars.
14. What are the different methods in production of vinegar?
15. Define antibiotics
16. How is penicillin produced?
17. Name the raw materials used in the production of penicillin.
18. Mention the uses of penicillin.
19. Mention the use of fermentor in penicillin production.
20. Mention the uses of streptomycin.

Unit- V

1. Define microbial diseases
2. What is amoebiasis?
3. What are the causes of amoebiasis?
4. What are the symptoms of amoebiasis?
5. Mention the method of treatment for amoebiasis?
6. Name the causative agents of leishmaniasis
7. What are the causes of leishmaniasis?

8. What are the symptoms of cutaneous leishmaniasis?
9. What method of treatment is used to cure leishmaniasis?
10. Comment on diphtheria.
11. What are the long term effects of diphtheria?
12. What is the main cause of diphtheria?
13. What are the sources of tetanus infection?
14. Comment on gonorrhoea.
15. Differentiate ebola from dengue.
16. Distinguish between chikungunya and dengue.
17. What is rabies?
18. What is covid-19?
18. Compare actinomycosis and aspergillosis.
19. Name the causative agents of actinomycosis.
20. What are the symptoms of aspergillosis?

Section C (5 marks)

Unit- I

1. Write notes on two kingdom classification.
2. Enlist the distinct features of algae.
3. Bring out the salient features of protozoa.
4. List out the various steps involved in rRNA sequencing
5. Explain how ribosomal RNA and sequencing helps in microbiology?
6. Explain the life cycle of chlamydiae
7. Describe the general characteristics of Actinomycetes
8. Discuss the general features of the class Mollicutes
9. Describe Sugar fermentation test
10. Discuss MRVP test to identify the bacteria
11. Distinguish between indole production and urease production test

Unit-II

1. Classify the culture media based on consistency and composition
2. Explain the technique followed in streak plate for the isolation of bacteria
3. Enlist the types of media used for the culture of pathogens
4. List out the cultural characteristics of bacteria and fungi
5. Explain the morphological characteristics of microbial cell
6. Describe the serial dilution technique
7. Discuss the mechanism of differential staining
8. Illustrate the procedure involved in acid fast staining
9. Analyse the special staining techniques for capsule, spore and flagella

Unit –III

1. Describe the structure of *E. coli*
2. Give an account of fimbriae
3. Discuss the structure of plasmid and its functions
4. Describe the structure of TMV
5. Explain the structure of bacteriophage with neat diagram
6. Describe the structure of flagella and its types
7. Describe the structure of fungi
8. Explain the structure of penicillium

Unit –IV

1. Outline the steps involved in wine production
2. Bring out the process of production of beer.
3. Illustrate the steps involved in beer making.
4. How is ethanol produced by fermentation?
5. Illustrate the steps involved in vinegar making.
6. Explain the recovery and purification process in the production of penicillin.
7. Illustrate the classification of streptomycin

Unit- V

1. Explain prevention and treatment of amoebiasis.
2. Explain the causative agents, symptoms and diagnosis of leishmaniasis.
3. Describe the causative agents, symptoms and treatment of diphtheria.
5. Explicate the symptoms, diagnosis and treatment of tetanus.
6. Discuss about gonorrhoea.
7. Elucidate - chikungunya
8. Write notes on dengue.
9. Give a detailed account on rabies.
10. Expond the symptoms, diagnosis and treatment of ebola.
11. Discuss the the symptoms, diagnosis and treatment of corona virus
11. Give an account on actinomycosis.
12. Write a note on aspergillosis.

Section D (10 marks)

Unit- I

1. Explain the five kingdom system of classification.
2. . Explain the general characteristics of algae and protozoa
3. Illustrate the modern trends in classification of bacteria
4. Describe the construction of phylogenetic tree
5. How ribosomal RNA sequences are determined and used in construction of phylogenetic tree?
6. Give an account on the general features of actinomycetes
7. Explain the general characters of rickettsias

Unit- II

1. Classify the culture media based on consistency and uses
2. Explain the different methods followed in the isolation of pure culture
3. Enlist the various types of culture media used in bacterial cultivation
4. Describe the morphological characteristics of bacteria

Unit- III

1. Describe the structure of bacteria
2. Discuss the different types of virus with an example
3. Explain the life cycle of actinomycetes
4. Discuss the types of life cycle in yeast

Unit - IV

1. Describe the culture, process and production of ethanol.
2. Enumerate the steps involved in culture, process and production of methyl alcohol.
3. Elucidate the culture process and production of wine.
4. Discuss the culture process and production of beer.
5. Enumerate the culture process and production of vinegar.
6. Describe the biochemical process involved in the production of antibiotics
7. Outline the steps involved in the production of penicillin and mention its applications.
8. Outline the steps involved in the production of streptomycin and mention its applications.

Unit - V

1. Describe the viral diseases of man and its control measures
2. Enumerate the protozoan diseases in man.
3. Elucidate the bacterial diseases in man.
4. Give an account on bacterial diseases of man and its control measures
5. Discuss the symptoms, diagnosis and treatment of protozoan diseases
6. Describe the fungal diseases in man.

ST.MARY'S COLLEGE (Autonomous), THOOTHUKUDI

II M.Sc Zoology Semester III

Core I - Computational Biology Course Code:21PZOC31

(for those who joined in July 2021 and after)

Question Bank

Section A (1mark)

Choose the correct answer

Unit I

1. What number would you divide by to calculate the mean of 3,4,5,6 ?
a. 6 b. 3 c. 5 d. **4**
2. Which of the following is not a measure of central tendency ?
a. Mean b. Mode c. **Range** d. Median
3. Which of the following is a position average ?
a. Mode b. Harmonic mean c. Geometric mean d. **Median**
4. A sample of body weights (in pounds) is as follows: 116, 168, 124, 132,110.
The median of the sample is _____
a. **124** b. 116 c. 132 d. 130
5. The most widely used measure of central tendency is _____
a. **arithmetic mean** b. geometric mean
c. harmonic mean d. weighted arithmetic mean
6. The place of a value in a series is _____
a. mean b. mode c. **median** d. range
7. The mean of four numbers is 71.5. If three of the numbers are 58, 76 and 88, what is the value of the fourth number?
a. **64** b. 60 c. 76 d. 82
8. Algebraic expression to define the arithmetic mean is _____
a. $\bar{x} = X/(n)$ b. $\bar{x} = \Sigma x/n$ c. $\bar{x} = \sqrt{(\Sigma x/n)}$ d. $\bar{x} = n/N$
9. Which is the mode for the following data? 2, 4, 3, 4, 5, 4
a. 2 b. 3 c. **4** d. 5
10. Which among the following curve is obtained in symmetrical distribution ?
a. **Bell shaped** b. S shaped c. J shaped d. Irregular shaped

11. Peakedness of a frequency curve is called as _____
 a. mesokurtic b. **leptokurtic** c. platykurtic d. bimodal
12. Find out the formula for range from the following
 a. $R = L - S$ b. $R = L + S$ c. $R = \frac{L+S}{2}$ d. $R = 2L + S$
13. How many quartiles are there in quartile deviation?
 a. **3** b. 2 c. 4 d. 5
14. What is the mean of squared deviation called as?
 a. mean deviation b. quartile deviation c. **variance** d. standard error of mean

Unit II

1. In hypothesis testing, the most common level of significance (alpha) that is used by statisticians is _____ -
 a. 0.95 b. 0.50 c. 0.01 d. **0.05**
2. Which of the following is explained by $(p+q)^n$?
 a. **a binomial experiment** b. a normal experiment
 c. a randomized experiment d. an observational study
3. Process in which trials are statistically independent and each trial of event has only two outcomes is classified as _____ process
 a. **Bernoulli** b. Bayes c. Laplace d. Gauss
4. Discrete probability distribution in which the outcome is rare and very small is classified as _____ distribution
 a. **Poisson** b. normal c. cumulative d. weighted
5. Which is not a property of the standard normal distribution?
 a. It is bell shaped b. **It is skewed to the right**
 c. It is unimodal d. It is symmetric about the mean
6. When a distribution is bell shaped, approximately what percentage of data values will fall within one standard deviation of the mean?
 a. 50% b. 95% c. **68%** d. 99%
7. Identify the scientist who devised Student's t-test
 a. **W.S. Gosset** b. Mann-Whitney
 c. Maurice Kendall d. David B. Duncan

8. Find out the statistical test that is used to compare an observed and expected distribution
- a. Z test b. χ^2 test c. Variance ratio test d. Bartlett's test
9. Chi-square is zero when expected frequency is _____
- a. lesser than observed frequency b. **equal to the observed frequency**
 c. double that of the observed frequency d. greater than the observed frequency
10. To determine variation in wing length of butterfly from five different places which would be best statistical test?
- a. Wilcoxon test b. paired sample t-test c. **F-test** d. Newman-Keuls test

Unit III

1. To determine the relationship between variables we would use _____
- a. **correlation coefficient** b. regression coefficient
 c. paired t-test d. 2x2 C table
2. If an investigator would like to estimate the effect of temperature and oxygen consumption then temperature is called a/an _____ variable
- a. dependent b. **independent** c. confounding d. outcome
3. If both variables X and Y increase or decrease simultaneously then the correlation is said to be _____
- a. **positive** b. negative c. spurious d. zero
4. Coefficient of correlation _____
- a. can take any value b. is always more than 1
 c. is always less than 1 d. **can take any value between +1 and -1**
5. In a scatter diagram if all the plotted points lie in a straight line in upward direction then coefficient of correlation is _____
- a. $r=+0.5$ b. **$r=+1$** c. $r=+0.9$ d. $r=+0.75$
6. Pearson's correlation coefficient denoted by r measures _____ of variables
- a. probability distribution b. frequency distribution
 c. skewness d. **degree and direction of correlation**
7. Formula for rank correlation coefficient is _____
- a. **Spearman** b. Karl Pearson
 c. Laplace d. R.A.Fisher

8. Testing the significance of correlation coefficient employs _____
 a. **t-test** b. F-test c. ANOVA d. EDA tool
9. In simple regression the number of variables involved are _____
 a. 1 b. **2** c. 3 d. 4
10. If the regression coefficients of X on Y and Y on X are 0.4 and 0.9 then the coefficient of correlation is _____
 a. 0.65 b. -0.65 c. **0.6** d. -0.6

Unit IV

1. Name the cell in which the data is being entered in MS-Excel
 a. **Active cell** b. Dialogbox c. Spread sheet d. Folder
2. What is the opening page of the MS-Excel programme ?
 a. Chart wizard b. Graphics viewer c. **Spread sheet** d. Electronic pad
3. Identify the statistical software with specialized modules for genomics and meta analysis
 a. Sigma plot b. **Genstat** c. SPSS d. Fisat
4. Name the technique that reduces the variables in a multidimensional data
 a. **Principal component analysis** b. Regression analysis
 c. Correlation analysis d. Covariance analysis
5. The plotting features in Genstat graph should be set in _____ menu.
 a. **attributes** b. graphics c. data info tool d. intelligent engine
6. The value of any point on the graph is identified by clicking _____ button in Genstat software
 a. **Data info tool** b. attribute menu c. graphics editor d. graphics menu
7. What is the statistical package for social sciences?
 a. PCA b. Sigma Plot c. Genstat d. **SPSS**
8. In SPSS _____ displays the output and errors
 a. Data editor b. **output viewer** c. syntax editor d. script window
9. We can save the files in different forms in SPSS by clicking _____.
 a. **Save as type** b. save as c. data d. transform
10. _____ is the multivariate method of analysis used for multidimensional data set
 a. Genstat b. MS-Excel c. **PCA** d. SPSS

Unit V

1. Ancestral node of the phylogenetic tree is called _____
 - a. **root**
 - b. branch
 - c. clade
 - d. OTU
2. A conserved pattern of amino acids found in two or more proteins is called _____
 - a. promotor
 - b. **motif**
 - c. Pfam
 - d. domain
3. PAM stands for _____
 - a. **Point Accepted Mutation**
 - b. Point Accept Mutation
 - c. Point Accepted Mutant
 - d. Point Accepted
4. PIR was established in _____
 - a. **1984**
 - b. 1982
 - c. 1981
 - d. 1980
5. The alignment over entire length of two sequences is called _____
 - a. local alignment
 - b. **global alignment**
 - c. multiple alignment
 - d. pairwise alignment
6. PAM matrix was introduced by _____
 - a. **Dayhoff *et al* .,**
 - b. Henihoff
 - c. Richard Bellman
 - d. Smith
7. Find out the common tools for progressive alignment method
 - a. CLUSTAL
 - b. T-COFFEE
 - c. PIPE-UP
 - d. **All the above**
8. Which among the following is an annotated protein sequence database ?
 - a. **PIR**
 - b. Genbank
 - c. BLAST
 - d. FASTA
9. Which of the following is a nucleotide sequence database ?
 - a. **DDBJ**
 - b. EXProt
 - c. NCBI
 - d. UniProt
10. BLOSUM matrix was invented by _____
 - a. **Henihoff**
 - b. Eugene Myers
 - c. Samuel Karlin
 - d. Warren Gish

Section B (2 marks)

Answer in about 50 words

Unit I

1. What is harmonic mean ?
2. Define mode
3. Differentiate between mean and median
4. Distinguish harmonic mean from arithmetic mean

5. What is leptokurtic ?
6. What is skewness and kurtosis in statistics ?
7. Give the meaning of negative skewness
8. Write a short note on variance
9. Recall the uses of coefficient of variation
10. List out the different measures of dispersion
11. Define quartile deviation
12. What is mean deviation?

Unit II

1. Distinguish between point estimate and interval estimate.
2. .What is null hypothesis? Give an example.
3. Write down the concept of degrees of freedom.
4. Expand the binomial expression $(p + q)^n$
5. Comment on the Pascal's pyramid.
6. Define Poisson distribution. Give two examples.
7. Derive the mathematical equation for normal curve.
8. Highlight the contribution of Gosset to the test of significance of variables.
9. Enumerate the assumptions and characteristics of chi-square test.
10. What is meant by RBD in two way ANOVA?

Unit III

1. Illustrate the cause and effect relationship with an example.
2. Distinguish between positive and negative correlation.
3. Differentiate between linear and nonlinear correlation
4. Sketch and interpret the scatter diagram for $r = +1$ and $r = > + 0.5$
5. Bring out the uses of correlation graph
6. How do you interpret correlation co-efficient?
7. What is regression? Give an example.
8. What are regression lines?
9. Write down the algebraic expression of regression equations
10. Indicate the relationship between correlation coefficient and regression coefficient

Unit IV

1. What is Genstat ?
2. Bring out the significance of Genstat graphics
3. Enlist the formatting tools available in MS -Excel program
4. Write short note on sorting of data in MS-Excel
5. List down the features of a spreadsheet
6. Explain active cell
7. Mention the purpose of PCA
8. What is SPSS ?
9. Name the four windows of SPSS
10. What is data view window in SPSS?

Unit - V

1. What is DDBJ ?
2. Distinguish between pairwise and multiple sequence alignment
3. What are dot plots ? Give uses of dot plots in sequence analysis
4. List out the types of sequence alignment
5. What is progressive alignment ?
6. Define gap
7. Comment on traceback
8. Define likelihood ratio
9. Give a note on clade
10. Differentiate between rooted and unrooted phylogenetic trees

Section C (5 marks)

Answer in about 200 words

Unit I

1. Find the mean number of potatoes per plant given the following frequency of occurrence

Number of potatoes per Plant (X)	4	6	3	8	9	5
Number of plants (f)	17	9	5	20	15	12

2. Define and compute the mean, median and mode for the following data of weight of a species of frog
Weight in gm: 16, 11, 8, 10, 14, 16, 9, 13, 12, 9
3. Percentage of body weight of five fishes are given below. Find out the harmonic mean
73, 68, 59, 65, 66
4. Enumerate the properties of symmetrical, positively and negatively skewed distribution
5. How will you measure the skewness of a distribution ?
6. What is kurtosis of a distribution? How would you measure it?
7. Distinguish range from decile range. Explain how to calculate range and decile range
8. Calculate the standard deviation and standard error for the following data.
Number of eggs: 42, 44, 58, 55, 89, 98, 66
9. Explain the uses of coefficient of variation. The statistics on the length and weight of 20 *Tilapia* are given below. Demonstrate which of these two variables is less consistent and why?

	Length	Weight
Mean	67.20 mm	137.50 g
Standard Deviation	3.68 mm	13.37 g

10. State the differences between mean deviation and standard deviation

Unit II

1. What is Poisson distribution? Explain its properties and applications.
2. Give an account on properties of binomial distribution.
3. Point out the properties of normal distribution. How do you fit a normal curve?
4. Differentiate between null and alternative hypothesis.
5. Describe the basic steps involved in the testing of hypothesis.
6. Chi-square test is a valuable statistical device to test goodness of fit"- Interpret.
7. Discuss 2x2 contingency table
8. Comment on the assumptions underlying ANOVA.
9. Write explanatory notes on factorial design of two way ANOVA

10. Estimation of oxygen content in the water of a lake yields a mean of 50 ppm with SD of 5 ppm. Estimate the mean oxygen content of the lake with 95% and 99% confidence using student's t-test

Unit III

1. What is correlation? Explains its types with suitable examples.
2. Evaluate the uses of scatter diagram and correlation graph in the study of relationship between two variables.
3. Calculate the Karl Pearson's coefficient of correlation between length (X in mm) and weight (Y in g) of an ornamental fish. Test its significance using t- test

X	8	10	15	17	20	22	24	25
Y	25	30	32	35	37	40	42	45

4. Present the method to calculate Spearman's rank correlation coefficient
5. Discuss the coefficient of determination
6. Write down the types and properties of regression lines
7. Describe the algebraic method of fitting regression equations
8. How are correlation and regression coefficients related?
9. Compare and contrast correlation and regression in a tabular form
10. Evaluate the uses of regression equations in the forecasting of values of variables.

Unit IV

1. What are the salient features of MS -Excel?
2. Outline the steps for data entry and calculation of arithmetic mean using MS-Excel
3. Construct an algorithm to create 3D graph using Genstat
4. Explain the significance of Genstat in statistical analysis
5. Explain the features of spread sheet and the steps for data entry
6. Enumerate the applications of Principal Component Analysis.
7. What are the menus and icons of SPSS program?
8. Prepare an algorithm for performing ANOVA using MS-Excel
9. Bring out the steps for t- test using MS-Excel
10. Describe the special features and significance of SPSS package

Unit V

1. Comment on DDBJ
2. Give an account on PIR
3. Differentiate between PAM and BLOSUM matrices
4. Enlist the application of Multiple Sequence Alignment
5. Examine pairwise sequence alignment
6. Explain Dot matrix analysis
7. What is neighbor-joining method? How is it useful in constructing phylogenetic trees?
8. Provide an account of various softwares used for the construction of phylogenetic trees
9. Describe the structure of a phylogenetic tree
10. Explain UPGMA method of phylogenetic tree construction

Section D (10 marks)

Answer in about 400 words

Unit I

1. Describe the construction and uses of a stem and leaf diagram
2. The following data is on blood-glucose (in mg/100 ml) of adult male *Rana limnocharis*. Construct a stem-and-leaf-diagram and comment on the nature of the distribution
35.2 35.6 35.3 36.2 36.6 35.9 34.7
36.3 36.1 36.2 35.6 35.3 37.0 34.4
35.2 36.1 35.7 34.6 35.7 36.8 34.7
35.2 37.1 35.0 34.9 34.8 35.6 35.5
35.2 35.5 35.2 35.1 35.8 37.5 34.1
3. What is box plot? Describe the construction and uses of a box plot
4. Dispersion is the degree of scatter of variables about a central value"- Evaluate.
5. Compute the standard deviation for the following data of length (mm) of a species of aquarium fish. Analyze its stability by calculating the coefficient of variation.

Length in mm	0-6	6-12	12-18	18-24	24-30
No. of fish	4	8	16	9	3

6. Calculate the standard deviation and standard error for the following data

No. of children per family	1	2	3	4	5
Frequency (f)	7	23	18	7	2

Unit II

1. Evaluate the theoretical probability distributions which have relevance to biology
2. State the similarities and differences between binomial and Poisson distribution
3. What is student's t-test? Explain its applications in biological research
4. Blood samples were taken from 16 hepatitis patients and 9 healthy controls. The following data were obtained on the percentage of yeast cells killed by monocytes in the culture.

Control	Patients
$n_1=9$	$n_2=16$
$X_1=44.22$	$X_2=28.22$
$S_1=6.17$	$S_2=4.11$

Is there significant evidence to claim that the mean percentage of yeast cells killed by monocytes among controls is higher than among patients?

5. Write down the working procedure of chi-square test and enumerate its important applications.
6. On the basis of following data test whether there is association between cancer and smoking

	Cancer	No cancer
Smokers	234	66
Non-smokers	50	350

7. In experimental biology hypothesis testing helps in statistical inference” – Justify.
8. Outline the step-by-step procedure for the partitioning of variance in one way ANOVA.
9. The following data represent the gain in weight (in kg) of a species of edible fish Cultured on diet formulations (D_1 , D_2 , D_3 and D_4) for a period of 3 months. Perform one way ANOVA and analyze these data for significant difference among the diet formulations in terms of gain in weight.

D ₁	D ₂	D ₃	D ₄
4	8	5	1
5	7	7	4
1	9	8	1
3	6	6	3
2	10	9	1

10. Critically analyse the applications of ANOVA in various experimental designs.

Unit III

1. Obtain the coefficient of correlation for the following data on the length (X in cm) and weight (Y in g) of fish. Test its significance using t-test

X	5	7	3	1	9	12	8	3
Y	8	9	5	4	9	13	7	9

2. Karl Pearson's correlation coefficient describes the degree and direction of relationship between variables - Evaluate
3. Calculate the Spearman's rank correlation for the following data on the marks obtained by the students in Biochemistry and Biostatistics

Marks in Biochemistry	25	50	28	25	70	90	76	45	30	19	26
Marks in Biostatistics	30	60	50	40	85	90	56	82	42	31	49

4. Derive the two regression equations from the following data. Estimate the value of X when Y = 40

X	48	50	54	60	64	58
Y	22	32	29	33	30	36

5. Obtain the regression equations for the length and weight of a species of fish. Predict the value of Y when X = 60 cm and X when Y = 200 g

X (length): n = 1000 Mean = 68 cm SD = 2.5 cm

Y (weight): $n = 1000$ Mean = 150g SD = 20g
r between X and Y = 0.6.

6. Enlist the applications of regression analysis in biological research

Unit IV

1. Evaluate the applications of MS-Excel in data analysis
2. Explain the steps to perform t- test and ANOVA using MS - Excel
3. Write the procedure for data entry and statistical analysis in MS -Excel
4. What is SPSS program? Examine the lay out, menus, icons and its applications
5. Describe the drawing features in Genstat
6. How do you create graph using Genstat graphics?

Unit V

1. Present an account of nucleotide and protein sequence databases
2. Outline Smith –Waterman algorithm for local sequence alignment
3. How will you align two sequences using Needleman and Wunch Algorithm?
4. Highlight PAM matrix in sequence alignment
5. Elaborate the process of multiple sequence alignment
6. Give the importance of maximum parsimony and maximum likelihood methods in
Phylogenetic analysis
7. Evaluate the reliability of the inferred phylogeny using bootstrapping and jackknifing

Unit II

1. Identify the sex composition normally maintained in the brooder stock in male and female
 - a. 1: 1
 - b. 1:2
 - c. **2:1**
 - d. 1:3
2. Which among the following is known as perennial bundh?
 - a. Dry bundh
 - b. **Wet bundh**
 - c. Banks
 - d. Bulans
3. Induced breeding is successfully applied in _____
 - a. **Catla**
 - b. *Mystus*
 - c. *Mullet*
 - d. *Channa*
4. Transport of fish seeds using traditional method with earthen pots are known as _____ system
 - a. closed
 - b. artificial
 - c. **open**
 - d. natural
5. Find out the best anaesthetic agent for transportation of fish seeds
 - a. Sulphuric acid
 - b. Nitric acid
 - c. **Carbonic acid**
 - d. Sodium bicarbonate
6. Spat refers to the seeds of
 - a. **oyster**
 - b. prawn
 - c. Clarias
 - d. Mrigal
7. Indicate the materials used for collection of spats
 - a. **culch**
 - b. paars
 - c. stake
 - d. nacre
8. The outer epithelial layer of the mantle secretes a pearly liquid called _____
 - a. nucleus
 - b. **nacre**
 - c. spats
 - d. oysters
9. Write the larval stage in edible oyster which develops functional foot to facilitate crawling at the bottom
 - a. Trocophore
 - b. Umbo
 - c. **Pediveliger**
 - d. Late umbo
10. Which among the following country practices pond method for seaweed culture?
 - a. India
 - b. **Taiwan**
 - c. Japan
 - d. USA

Unit III

1. Name the eggs of *Artemia*
 - a. **cyst**
 - b. ren
 - c. silver pearl
 - d. spat
2. Which one of the following is commonly called as rotifer?
 - a. **Brachionus**
 - b. *Daphnia*
 - c. *Chlorella*
 - d. *Spirulina*
3. Indicate the brine shrimp
 - a. *Portunus*
 - b. *Moina*
 - c. **Artemia**
 - d. *Daphnia*

5. _____ is the most suitable fish for sewage fed fish culture
 - a. *Catla*
 - b. *Rohu*
 - c. ***Tilapia***
 - d. *Clarias*
6. The dilution ratio of freshwater and sewage in sewage fed fish culture pond is _____
 - a. 1:3
 - b. 2:3
 - c. **1:5**
 - d. 2:5
7. Sewage can be used for fish culture after treatment in _____
 - a. **oxidation pond**
 - b. chemical pond
 - c. aquatic pond
 - d. storage pond
8. The fish suitable for paddy cum fish culture is _____
 - a. *Mystus*
 - b. *Tuna*
 - c. **Common carp**
 - d. *Silver carp*
9. Brackish water fish culture is practiced in pokkali fields of _____
 - a. West Bengal
 - b. **Kerala**
 - c. Tamil Nadu
 - d. Karnataka
10. Which one of the following is live fish?
 - a. *Catla*
 - b. *Mrigal*
 - c. ***Murrel***
 - d. *Grass carp*

Unit V

1. Identify the process of crossing two different species
 - a. Polyploidy
 - b. Out breeding
 - c. **Hybridization**
 - d. Gynogenesis
2. Monosex culture is practiced in the culture of _____
 - a. *Catla*
 - b. ***Tilapia***
 - c. *Mullet*
 - d. *Chanos*
3. _____ hormone causes the sex reversal in the female fish of *Tilapia*
 - a. **Androgen**
 - b. Estrogen
 - c. Estradiol
 - d. Testosterone
4. Which among the following is the direct method of gene delivery in transgenesis?
 - a. **Microinjection**
 - b. Electroporation
 - c. Lipofection
 - d. Transfection of DNA
5. Write the genes that are used to identify the success of a gene transfer effort
 - a. Promoter
 - b. Enhancer
 - c. **Reporter**
 - d. Structural
6. Which among the following hormone is used to suppress gonadal development?
 - a. Androgen
 - b. **Estradiol**
 - c. Estrogen
 - d. Testosterone
7. Name the development of organisms entirely from the maternal chromosome
 - a. Androgenesis
 - b. **Gynogenesis**
 - c. Polyploidy
 - d. Parthenogenesis

8. The trading of fresh fish for human consumption is called
- Inland fish marketing
 - Marine fish marketing
 - Export fish marketing
 - Fresh fish marketing**
9. Which of the following is exported in live fish marketing?
- Channa*
 - Mugil*
 - Tilapia*
 - Etroplus*
10. Identify the headquarters of CMFRI
- Cochin**
 - Chennai
 - Mandapam
 - Hyderabad

Section B (2 marks)

Answer in about 50 words

Unit I

1. Define aquaculture
2. What are capture fisheries and culture fisheries?
3. Comment on blue revolution
4. Name any four organizations related to aquaculture and fisheries
5. Write notes on nursery pond
6. List down the cultivable organisms in culture ponds
7. Define mariculture
8. Mention the advantages of liming in culture pond
9. List out the predatory organisms in culture pond
10. Define biological oxygen demand

Unit II

1. How will you select a good brooder?
2. What is breeding hapa?
3. Define wet bundh
4. Write a note on fry
5. Comment on hypophysation
6. Discuss the closed system of fish seed transport
7. Write a note on the different larval stages of edible oyster
8. Define graft tissue
9. How is natural pearl formed?

10. Distinguish between edible oyster and pearl oyster culture

Unit III

1. List the importance of *Artemia* in aquaculture
2. Why is artificial feed described as formulated feed?
3. Write a short note on batch culture of rotifer
4. What is Banta's medium?
5. Define compound feed
6. Mention the symptoms of *Erythrocytic necrosis*
7. What is soft-shell syndrome?
8. Write the symptoms of whirling disease
9. List the parasitic impact of *Ligula* on fish
10. Define killed whole cell vaccines

Unit IV

1. Define water pollution
2. Mention any two effects of pollutants in fisheries
3. Define sewage
4. List the names of suitable fishes for sewage fed fish culture
5. What is integrated fish culture?
6. Comment on paddy-cum-fish culture
7. How will you select the fishes suitable for paddy-cum-fish culture?
8. Define pen culture
9. Write the difference between pen and cage culture
10. What are the advantages of culturing air breathing fishes?

Unit V

1. Define polyploidy
2. Write a note on manual sexing in monosex culture
3. List the significance of sterile fish in aquaculture
4. Write down the principle of electroporation
5. What is transgenesis?
6. Define gynogenesis
7. Comment on androgenesis

8. Write a note on marine fish marketing
9. What does channel flow refer to?
10. Write the role of NABARD in aquaculture

Section C (5 marks)

Answer in about 200 words

Unit I

1. Bring out the importance of aquaculture
2. Discuss the scope of aquaculture
3. Explain the fresh water aquaculture in Tamil Nadu
4. Summarize the monk type drainage system in a fish pond
5. Write a short note on the types of ponds used for fish culture
6. Explain the different steps involved in pond preparation
7. Discuss the types of fertilizers used in fish ponds and their importance
8. Explain the chemical and biological factors of productivity in aquaculture in ponds
9. How will you control predators in a culture pond?
10. Summarize how to control weeds in a culture pond

Unit II

1. Give a brief account on brooder care management
2. Explain the collection of seeds from natural sources
3. Discuss bundh breeding
4. Present the methodology of induced breeding
5. Discuss open system of fish seed transport
6. Outline the steps involved in closed system of fish seed transport
7. Distinguish between cage culture and raft culture
8. Compare on bottom and off bottom culture of edible oyster
9. Explain the different steps of laboratory phase in pearl production
10. Summarize the steps involved in pond culture of seaweed

Unit III

1. Outline the steps involved in the culture of diatom using polythene bags
2. Discuss the culture of *Artemia* in saltern
3. Explain the feedback culture of rotifer

4. List out the criteria for a good quality artificial feed
5. Present the bacterial diseases affecting fishes
6. Discuss the fungal diseases in fish
7. Summarize the nutritional deficiency diseases in fish
8. Discuss any three ectoparasites affecting fish and their control measures
9. Present a short note on the endoparasitic diseases of fish
10. Describe the different types of fish vaccines

Unit IV

1. Discuss the effect of water pollution in fisheries
2. Explain the advantages of sewage fed fish culture
3. Summarize the techniques used for treatment of sewage water
4. Present the objectives and advantages of integrated fish farming
5. Give a short note on paddy-cum-fish culture
6. Briefly explain poultry-cum-fish culture
7. Describe animal-cum-fish culture and its advantages and disadvantages
8. Discuss the different types of pens used for fish culture
9. Explain the various types of cages used in fish culture
10. Give a short account on air breathing fishes

Unit V

1. Discuss hybridization in fishes
2. Explain the process of polyploidy in fishes
3. How is monosex fish produced?
4. Give a brief account on sterile fish
5. Outline the steps involved in the production of transgenic fish
6. Compare the microinjection and electroporation methods of gene delivery
7. Bring out the application of transgenesis in aquaculture
8. Distinguish between gynogenesis and androgenesis
9. Explain the marine fish marketing system
10. Give a brief account on CMFRI

Section D (10 marks)

Answer in about 400 words

Unit I

1. Elaborate the role of aquaculture in alleviating food crisis
2. Discuss the various types of aquaculture practiced in India
3. Describe the layout and construction of a fish pond
4. Outline the problems due to predators and weeds in culture ponds. Add a note on control measures.
5. "Water quality parameter in aquaculture system is of pivotal importance" –Justify

Unit II

1. Analyze the various modes of transportation of fish seeds
2. Evaluate the technique of induced breeding in fish
3. Investigate the different methods involved in the culture of edible oyster
4. Examine the steps involved in pearl oyster culture
5. Describe the different methods of culture of seaweed

Unit III

1. What are live feed organisms? Examine the mass culture of *Artemia* for aquaculture
2. Analyze the steps involved in the preparation of formulated feed
3. Describe the bacterial and fungal diseases of fish
4. Investigate the nutritional deficiency diseases of fish and their control measures
5. Give a detailed account on the ecto and endoparasites of fish
6. Evaluate the principles of fish health management

Unit IV

1. Write the importance of water pollution management in fish culture.
2. Give an account on sewage -fed fish culture in India
3. Elaborate the different types of integrated fish farming
4. Present an account on fish culture in pens
5. Describe the methods of culture of air breathing fishes

Unit V

1. Investigate the process of hybridization in fish
2. Describe in detail the production of monosex fish
3. Evaluate the steps involved in the production of transgenic fish
4. Give an account on aquaculture economics
5. Analyze the various types of marketing adopted in aquaculture

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI
II M.Sc Zoology Semester III
Core III: Developmental Zoology Course Code: 21PZOC33
(for those who joined in July 2021 and after)
Question Bank

Section A (1mark)

Choose the correct answer

Unit I

1. Transformation of spermatids into mature spermatozoa is called _____.
a. spermatogenesis b. **spermiogenesis**
c. capacitation d. previtellogenesis
2. Identify the cell, from which gametes are produced.
a. **Primordial germ cells** b. Spermatocytes c. Germ cells d. Sertoli cells
3. _____ is a complex collection of mitochondria and polar granules
a. **Poleplasm** b. Nucleoplasm c. Cytoplasm d. Protoplasm
4. Acrosome is derived from _____.
a. **Golgi apparatus** b. mitochondria c. nucleus d. ribosomes
5. Calcium – binding protein is called _____.
a. modulin b. **calmodulin** c. fertilizin d. fertilin
6. The Fertilizin- Antifertilizin theory was formulated by _____.
a. **F.R. Lillie** b. Butcher c. Allen d. August Weismann
7. The glycoprotein membrane present around mammalian egg is called _____.
a. **zona pellucida** b. corona radiata c. jelly coat d. cumulus layer
8. Polyspermy is prevented permanently by _____.
a. **cortical granule reaction** b. changing the membrane potential
c. increasing the potassium ions d. capacitation.
9. Which among the following is the type of frog's egg?
a. Isolecithal b. Telolecithal c. **Mesolecithal** d. Centrolecithal
10. Which among the following is the type of insect's egg?
a. Isolecithal b. Telolecithal c. Mesolecithal d. **Centrolecithal**
11. The cleavage pattern in seaurchin embryo is _____.
a. **radial** b. spiral c. discoidal d. superficial

10. The migration of individual cells from the surface layers into the interior of the embryo is called _____.
- a. **ingression** b. invagination c. involution d. delamination
11. The mechanical agent for karyokinesis is _____.
- a. **mitotic spindle** b. contractile ring c. centromere d. centriole
12. During sea urchin gastrulation chondroitin sulphate proteoglycan is secreted by _____ cells.
- a. epithelial cells b. **vegetal plate** c. mesenchyme d. ectodermal
13. Which of the following is the future posterior end of the embryo?
- a. Animal pole b. Ventral pole c. Venterolateral side d. **Blastopore**
14. Chorda-mesodermal mantle penetrates as a single unit between _____.
- a. ectoderm and mesoderm b. **ectoderm and endoderm**
c. endoderm and mesoderm d. endoderm and mesenchyme
15. Which of the following refers to 'rolling in' of the cells during gastrulation?
- a. Concrescence b. Invagination c. **Involution** d. Ingression
16. Migration of group of cells towards each other to form a single mass of tissue is _____.
- a. constriction b. **concrecence** c. infiltration d. ingression
17. Which of the following refers to the separation of a layer of cells from another layer by splitting?
- a. Polyinvagination b. Divergence c. **Delamination** d. Elongation
18. Movement of blastomeres from surface to the interior of embryo is _____.
- a. epiboly b. extension c. epiauxesis d. **emboly**
19. In protostomes, blastopore develops into _____.
- a. **mouth** b. eye c. spiracle d. anus

Unit III

1. Which among the following is associated with the development of nervous system, heart and liver respectively?
- a. **Ectoderm, mesoderm and endoderm** b. Endoderm, mesoderm and ectoderm
c. Mesoderm, ectoderm and endoderm d. Endoderm, mesoderm and endoderm
2. Relay centre for optic and auditory neurons is _____.
- a. **thalamus** b. hypothalamus c. hippocampus d. cerebrum

3. Complex muscular movements are coordinated by _____.
- a. cerebrum b. midbrain c. thalamus d. **cerebellum**
4. Reflex centre of involuntary activities is _____.
- a. cerebrum b. cerebellum c. **medulla** d. midbrain
5. Cranial nerve developed from rhombomere r6 is _____.
- a. trigeminal b. facial c. vestibuloacoustic d. **glossopharyngeal**
6. Which of the following is called as the fourth germ layer because of its importance?
- a. Lateral plate mesoderm b. Neural ectoderm
- c. Epidermal ectoderm d. **Neural crest**
7. The first functional unit in the developing embryo is _____.
- a. nervous system b. **circulatory system** c. digestive system d. respiratory system
8. The heart develops from
- a. foregut endoderm b. **lateral plate mesoderm**
- c. ectodermal epithelium d. mesodermal angioblasts
9. Presence of two left sides or two right sides in heart is correlated with the presence of _____.
- a. liver b. pancreas c. **spleen** d. kidney
10. Heart becomes four chambered on _____ week in human development.
- a. 5th b. 7th c. 9th d. 11th
11. Indicate the derivative of fourth pair of pharyngeal pouches.
- a. Thyroid glands b. **Parathyroid glands** c. Walls of tonsils d. Eustacean tube
12. One among the last of the mammalian organ to fully differentiate is _____.
- a. **lung** b. heart c. liver d. pancreas
13. Contraction of heart cells in the embryo is regulated by the electrical stimuli from _____.
- a. cerebrum b. cerebellum c. mid brain d. **medulla oblongata**
14. Which of the following develops in amniotes and remains functional in their adult life?
- a. Pronephros b. Mesonephros c. **Metanephros** d. Both (a) and (b)
15. Which of the following is the first morphological sign of eye development?
- a. Optic cup b. **Optic sulci** c. Optic stalk d. Optic vesicle

16. Kidney develops from _____ mesoderm.
- a. **intermediate** b. lateral plate c. paraxial d. ventral
17. The outermost embryonic membrane is the _____.
- a. allantois b. amnion c. **chorion** d. yolk sac
18. Name the type of placenta present in man.
- a. **Monodiscoidal** b. Bidiscoidal c. Diffuse d. Cotyledonary
19. Which of the following is NOT a function of placenta?
- a. nutrient transfer b. respiratory gas transfer c. **urine formation** d. waste elimination

Unit IV

1. Transformation of one differentiated cell type into another is _____.
- a. transplantation b. transdetermination c. **metaplasia** d. hyperplasia
2. The imaginal discs, instead of developing the proper organ develop into some other part is called _____.
- a. transplantation b. **transdetermination** c. metaplasia d. hyperplasia
3. Find the part from which a new lens can be formed in Wolffian regeneration.
- a. **Dorsal iris** b. Retina c. Epithelium d. Neural ectoderm
4. The undifferentiated totipotent cells present in larva of *Drosophila* are called _____.
- a. **imaginal discs** b. neoblasts c. mesenchymal cells d. interstitial cells
5. To regulate transcription, activators bind to _____.
- a. TATA box b. promoter c. **enhancers** d. coding region
6. In heavy chain class of an antibody the constant region ϵ chains induce _____.
- a. lysis b. agglutination
- c. **inflammatory responses** d. macrophage digestion of an antigen
7. In heavy chain class of an antibody the constant region α chains allow _____.
- a. lysis b. **secretion into milk, sweat etc**
- c. inflammatory responses d. agglutination
8. In amphibian oocytes synthesis of ribosomal RNA occurs during _____ stage.
- a. leptotene b. zygotene c. pachytene d. **diplotene**
9. In female mammals, most of the inactive X chromosome become _____.
- a. active X factor b. euchromatin c. **heterochromatin** d. replicated

10. At which developmental stage of *Drosophila* genes for glue protein puff out?
- Early stage of the second instar larva
 - Late stage of the second instar larva
 - First half of the last larval stage
 - Last half of the last larval stage**
11. In *Drosophila* salivary glands ecdysone– sensitive puffs occur during _____.
- early stage of the second instar larva
 - late stage of the second instar larva
 - early stage of the third instar larva
 - late stage of the third instar larva**
12. Later puff formation in the salivary gland chromosome of *Drosophila* needs _____.
- ecdysone
 - juvenile hormone
 - ecdysone and early puff products**
 - early puff products
13. Dying cell undergoes a type of cell suicide called _____.
- hyperplasia
 - dysplasia
 - necrosis
 - apoptosis**
14. Show the germ layer that determines the pattern of cell death between digits in birds.
- Ectoderm
 - Mesoderm**
 - Endoderm
 - Epidermal ectoderm
15. Which of the following triggers the cellular changes that lead to apoptotic cell death?
- EGL- 1
 - CED- 9
 - CED- 4
 - CED- 3**
16. Identify the animal having longest longevity.
- Butterfly
 - Gorilla
 - Tortoise**
 - Eel
17. Find the molecule that is NOT an antioxidant.
- Retinoic acid**
 - Ascorbic acid
 - Tocopherol
 - Beta-carotene
18. Show the indication of cellular senescence.
- Hypertrophy
 - Accumulation of colloid
 - Atrophy
 - Replicative limit**
19. One of the DNA damage resulting aging is _____.
- replicative limit
 - base substitution
 - telomere dysfunction**
 - inversion
20. Senescence can be delayed by _____.
- caloric restriction**
 - DNA damage
 - high appetite
 - protein diet
21. Name the syndrome of premature aging due to gene mutation.
- Werner’s syndrome
 - Hutchinson-Gilford progeria**
 - Parkinson’s disease
 - Alzheimer’s disease

Unit V

1. Find out the holometabolous insect from the following.
- Cockroach
 - Bug
 - Drosophila***
 - Grasshopper

2. The hormone which retains the insect in its larval state is _____.
 a. ecdysone b. **juvenile hormone** c. thyroxine d. prolactin
3. Which of the following hormone is secreted from corpora allata?
 a. Ecdysone b. **Juvenile hormone** c. Thyroxine d. Prolactin
4. Name the gland which secretes ecdysone.
 a. **Prothoracic gland** b. Pituitary gland c. Corpus cardiacum d. Thyroid gland
5. Which of the following is the progressive change during amphibian metamorphosis?
 a. Degeneration of gills b. **Enlargement of lungs**
 c. Disappearance of horny teeth d. Disappearance of lateral line sense organ.
6. In anuran metamorphosis high activity of enzymes of ornithine cycle is related with the synthesis of _____.
 a. protein b. uric acid c. ammonia d. **urea**
7. When the regenerated part is an addition to the existing part, it is called _____ type of regeneration
 a. morphallaxis b. **epimorphosis** c. heteromorphosis d. super regeneration
8. Regeneration involving a reorganization of the remaining parts of the body of an animal is called _____.
 a. **morphallaxis** b. epimorphosis c. heteromorphosis d. super regeneration
9. In planarians, the undifferentiated cells accumulate in few layers to give rise to an outgrowth called _____.
 a. **regeneration blastema** b. mesenchymal cells c. interstitial cells d. myoblasts
10. Morphallaxis regeneration is best seen in _____.
 a. sea urchin b. **Hydra** c. urodel amphibian d. lizard

Section B (2 marks)

Answer in about 50 words

Unit I

1. What is gametogenesis?
2. Define spermiogenesis.
3. What is fertilization cone?
4. Comment on grey crescent.
5. Write short notes on male and female pronucleus.

6. Sketch and label the parts of sea urchin egg.
7. What is ZP3 protein?
8. What is capacitation?
9. What are cortical granules?
10. Define spermatogenesis.
11. Comment on vitelline membrane.
12. What is parthenogenesis?
13. Differentiate between arrhenotoky and thelytoky.

Unit II

1. How does yolk affect cleavage?
2. What is centrolecithal egg?
3. Distinguish between meridional and vertical cleavage planes.
4. What is midblastula transition?
5. Differentiate radial from spiral holoblastic cleavage.
6. Define stereoblastula.
7. Write short notes on discoidal cleavage.
8. What is meant by spiral holoblastic cleavage?
9. Define bilateral holoblastic cleavage.
10. Enlist the features of rotational holoblastic cleavage.
11. Write about compaction during cleavage in mammals.
12. List out the various morphogenetic movements.

Unit III

1. Define neurula
2. What is spina bifida?
3. What are median hinge point cells?
4. What is meant by anencephaly?
5. Define rhombomeres.
6. Mention the modifications of pharyngeal pouches in mammals.
7. Name the functional kidneys in different vertebrates.
8. Write short notes on pronephros.

9. How is endocardial cushion formed?
10. Define cardia bifida.
11. Mention the extra embryonic membranes and the germ layers from which they are derived.
12. Enlist the functions of amnion.
13. List out the functions of allantois.
14. What is a placenta?
15. Differentiate indecuate placenta from deciduate placenta.
16. Distinguish between yolk sac placenta and chorio- allantoic placenta.

Unit IV

1. Define transdetermination.
2. Comment on imaginal discs.
3. What is meant by gene stability?
4. What are amplified genes?
5. Write a short note on clonal selection theory.
6. How are antibody light chain genes created?
7. How are antibody heavy chain genes created?
8. Define class switching.
9. Define apoptosis.
10. Distinguish between necrosis and apoptosis.
11. Write short notes on cellular senescence.
12. Comment on mutation accumulation hypothesis.

Unit V

1. Differentiate hemimetabolous from holometabolous insects.
2. What is ecdysone?
3. What is juvenile hormone?
4. Define moulting.
5. What is corpus allatum?
6. Define autotomy.
7. Write short notes on heteromorphosis.

8. What is epimorphosis?
9. Comment on morphallaxis.
10. Define blastema
11. What is lentectomy?
12. Define dedifferentiation

Section C (5 marks)

Answer in about 200 words

Unit I

1. Explain the structure of sea urchin egg.
2. Illustrate the structure of mammalian egg.
3. Describe the structure of sea urchin sperm.
4. Illustrate the structure of mammalian sperm.
5. How do sperms recognize eggs during fertilization?
6. Explain the biochemical events that occur during fertilization.
7. Discuss the mechanism of preventing polyspermy.
8. Analyze the mechanism of gamete fusion.
9. Comment on the activation of egg metabolism.
10. Explain the mechanism of acrosome reaction in fertilization of mammals.

Unit II

1. Illustrate the planes of cleavage.
2. Describe radial holoblastic cleavage.
3. Explain rotational holoblastic cleavage.
4. Write a note on bilateral cleavage.
5. Explain discoidal cleavage.
6. What is superficial cleavage? Explain it with an example.
7. Describe the fate map of frog.
8. Illustrate the fate map of sea urchin.
9. Mention the factors controlling cleavage cycle.
10. Analyse the various morphogenetic movements that occur during amphibian gastrulation.

Unit III

1. Categorize the derivatives of ectoderm, mesoderm and endoderm.
2. Analyse the mechanism of neural tube formation with suitable diagrams.
3. Briefly narrate the formation of brain from neural tube.
4. Discuss the development of respiratory tube in mammals.
5. Outline the development of digestive tube.
6. Describe the development of metanephric kidney.
7. Highlight the events in the development of heart.
8. Explain the types of placenta based on distribution of villi.
9. Analyse the types of placenta based on histology.
10. Narrate the development of amnion and chorion in chick.
11. Illustrate the formation of yolk sac and allantois in chick.

Unit IV

1. Explain transdetermination with examples.
2. Describe metaplasia with examples.
3. Illustrate the creation of antibody light chain and heavy chain genes.
4. Explain class switching in the heavy chain gene.
5. Write a brief note on selective gene transcription.
6. Explain the activation of dormant genes by somatic cell fusion.
7. Describe the mechanism of ribosomal gene amplification.
8. 'Separation of digits is the result of programmed cell death' – Explain.
9. Discuss apoptosis in a nematode worm.
10. 'Telomere dysfunction induces senescence' – Explain.
11. 'Aging is a genetically determined and programmed process' – Evaluate the statement.

Unit V

1. Describe the process of molting in insects.
2. List out the hormones involved in insect metamorphosis.
3. Enumerate the various progressive and regressive changes that occur during anuran metamorphosis.
4. Comment on epimorphosis with suitable examples.
5. Explain morphallaxis with suitable examples.

6. Summarize the different types of regeneration with suitable examples.
7. Explain the regeneration in invertebrates.
8. Describe the process of regeneration in vertebrates.
9. Explain the mechanism of regeneration in amphibia.
10. Describe the process of regeneration in *Planaria* with suitable diagram.

Section D (10 marks)

Answer in about 400 words

Unit I

1. Explain the structure of sea urchin gametes.
2. Discuss the mechanism of recognition and contact of sea urchin gametes.
3. Present an account on gamete fusion and activation of egg metabolism.
4. Describe the structure of sperm and egg in mammal.
5. Explain the mechanism of fertilization in animals.
6. Outline the steps involved in spermatogenesis.
7. Highlight the steps involved in oogenesis.

Unit II

1. Explain the patterns of cleavage with neat sketches.
2. Elaborate the types of holoblastic cleavage.
3. Describe meroblastic cleavage.
4. Compare and contrast cleavage in *Drosophila* and sea urchin eggs.
5. Differentiate cleavage in the egg of frog from that of bird.
6. Describe the cleavage process in mammal.
7. Critically analyse the mechanism and regulation of cleavage cycles.
8. Bring out the salient features of sea urchin gastrulation.
9. Present the events that occur during gastrulation of an amphibian.

Unit III

1. Draw and describe neural tube formation.
2. Explain the differentiation of neural tube into the central nervous system.
3. Analyse the steps involved in the formation of digestive tube and its derivatives.
4. Narrate the development of heart.
5. Highlight the events during the development of eye.

6. Explain the development of kidney in mammals.
7. Describe various kinds of placenta found in mammals.
8. Discuss the role of placenta during development of foetus.
9. How are the extra-embryonic membranes of chick developed? What role do they play in the development of embryo?

Unit IV

1. Discuss in detail genomic equivalence.
2. “ Irreversible genetic loss is a result, not a cause of cellular differentiation”- Evaluate this statement in the light of lymphocyte rearrangement.
3. Describe selective gene transcription.
4. Discuss amplification of ribosomal RNA genes.
5. Explain the control of gene expression.
6. Evaluate the programmed cell death in development.
7. Critically analyse the causes of senescence.

Unit V

1. Analyze the hormonal influence on insect metamorphosis.
2. Highlight the role of thyroxine in amphibian metamorphosis.
3. Describe the mechanism of limb regeneration in amphibia.
4. Present an account on regenerative ability in various animals.
5. Give a brief description on different types of regeneration.

ST.MARY'S COLLEGE (Autonomous) THOOTHUKUDI

II M.Sc Zoology Semester III

Core –IV Research Methodology and Biotechniques Course Code : 21PZOC34

(for those who joined in July 2021 and after)

Question Bank

Section A (1 mark)

Choose the correct answer

Unit I

1. What is research?
 - a. Searching again and again
 - b. Finding solution to any problem
 - c. **Working in a scientific way to search for truth of any problem**
 - d. Taking survey
2. Conference proceedings are considered as _____ documents
 - a. conventional
 - b. **primary**
 - c. secondary
 - d. tertiary
3. You have been asked to write a research report to which you must attach a list of references. Information about which of the following would you include in the list of references?
 - a. only those texts cited in the report
 - b. only journal articles
 - c. **all text consulted as well as all texts cited in the report**
 - d. only references from online source
4. It is in this section that you fully interpret and evaluate your results
 - a. introduction
 - b. methods
 - c. procedure
 - d. **discussion**
5. When a citation includes more than _____ authors, only the surname of the first author is cited followed by *et al.*,
 - a. 3
 - b. **2**
 - c. 5
 - d. 6
6. Which of the following abbreviations cannot be used in a research report?
 - a. IQ
 - b. sec. for second
 - c. yr. for year
 - d. **mo. for month**

7. Plagiarism refers to _____
- contriving data in survey and research reports.
 - making errors in paraphrasing or citations
 - illegal duplication of print and electronic work.
 - presenting ideas and expressions of others as your own without proper acknowledgement**
8. _____ should be placed in chronological order
- reference**
 - articles
 - journals
 - discussion
9. At the end of your essay you must have a section entitled _____
- literature cited**
 - literature viewed
 - literature carried
 - literature seen
10. Review articles and systematic reviews are the _____
- secondary sources**
 - tertiary sources
 - primary sources
 - both primary and secondary

Unit II

1. Which of the following involves preventing transmission of diseases in the laboratory?
- Biosafety**
 - biosecurity
 - biohazard
 - biofuel
2. An approved eye protection devices (such as goggles) are worn in the lab _____
- to avoid eye strain
 - only if you don't have corrective glasses
 - improve your vision
 - anytime chemicals, heat or glassware are used**
3. Which of the following footwear is best in the lab?
- sandals
 - open-toed shoes
 - closed-toed shoes**
 - shoes appropriate for the weather
4. Identify the validity of a patent
- 10 years
 - 15years
 - 20 years**
 - 25years
5. Name the citation metric used for number of publications with at least 10 citations
- h-index**
 - i-10 index
 - impact factor
 - g-index
6. The copyright act was amended in the year _____
- 1999
 - 1957**
 - 1975
 - 1952
7. The ethics committee should be comprised of atleast _____members.
- 6
 - 5**
 - 8
 - 9
8. The patent act was amended in the year
- 1957
 - 1999
 - 1970**
 - 1945

9. Osmium tetra oxide is used in electron microscopy as a _____
 a. precipitator b. mordant c. **staining agent** d. fixing agent
10. Which instrument is more useful to study the surface details of specimen?
 a. phase contrast microscope b. **scanning electron microscope**
 c. light microscope d. transmission electron microscope
11. Why are thin sections of specimens necessary in transmission electron microscope?
 a. electrons are negatively charged b. electrons have a wave nature
 c. electrons have no mass d. **electrons have a poor penetrating power**
12. The dye molecule used to stain specimens in fluorescence microscopy is _____
 a. auxochrome b. **fluorochrome** c. chromophore d. neutral dye
13. _____ is used for the measuring the dimensions of microscopic objects
 a. **ocular and stage micrometer** b. spectrophotometer
 c. calorimeter d. spectrofluorimeter
14. A sharp metal probe is used in _____ microscope
 a. **atomic force** b. phase contrast c. electron d. fluorescence
15. Which one of the following is used to study the non conductors?
 a. polarizing microscope b. optical microscope
 c. scanning tunneling microscope d. **atomic force microscope**

Unit IV

1. The source of visible light in UV-VIS spectrophotometer is _____ lamp
 a. **Tungsten lamp** b. hydrogen c. deuterium d. mercury
2. The amount of light absorbed by a material is proportional to the concentration of the absorbing solution is referred as _____
 a. **Beer's law** b. Boger-lambert law c. Poiseuille's law d. Janseen law
3. The correct order for the basic features of a mass spectrometer is _____
 a. acceleration, deflection, detection, ionisation
 b. **ionisation, acceleration, deflection, detection**
 c. acceleration, ionisation, defection, detection
 d. acceleration, deflection, ionisation, detection

4. Prisms or grating are used in _____
- a. Colorimeter
b. **Spectrophotometer**
c. Atomic absorption spectroscopy
d. Atomic emission spectroscopy
5. The method of formation of small droplets from the liquid sample is called _____
- a. **nebulization** b. amplification c. absorption d. evaporation
6. The colour of light given off when a sample is heated corresponds to _____
- a. **the energy difference between the ground state and excited state of an element**
b. the amount of energy added to the sample
c. the heat of the element
d. the amount of energy subtracted from the sample
7. The magnets used in NMR spectrophotometer are capable of producing _____
- a. **strong magnetic fields** b. week magnetic fields
c. photo electric fields d. light emitting fields
8. Which one of the following is used to determine vitamins?
- a. turbidimeter b. nephelometer c. **fluorimetry** d. phosphometry
9. Which one of the following is used to produce pulsating light?
- a. nebulizer b. monochromator c. **chopper** d. radiation
10. _____ is used to analyze the metal in tissues
- a. mass spectrometry b. **atomic absorption spectroscopy**
c. atomic emission spectroscopy d. fourier transform spectroscopy
11. _____ is used to detect element in plants and soils
- a. mass spectrometry b. atomic absorption spectroscopy
c. **atomic emission spectroscopy** d. fourier transform spectroscopy

Unit-V

1. The separation technique of charged molecules under the influence of electric current is called _____
- a. colony hybridization b. **electrophoresis** c. dot blot technique d. Western blotting
2. Electrophoretic mobility depend on _____
- a. net charge b. molecular radius. c. pH. d. **both a and b.**

13. An isoelectric point pH is _____
a. acidic b. **neutral** c. basic d. hyperalkaline
14. GM counter measures _____
a. **the arrival of individual photons of ions of radiation or high energy particles**
b. the incidence of light
c. the incidence of heat
d. electronic pulses
15. _____ technique using X- ray film to visualize molecules or fragments of molecules that have been radioactively labeled.
a. **Autoradiography** b. Isoelectric focusing c. Spectrophotometer d. Scintillation counter

Section B (2 marks)

Answer in about 50 words

Unit I

1. Differentiate between basic and applied research
2. Write short notes on abstract
3. Define sequence annotation?
4. What is citation sequence system of citing references in the text of a research report?
5. Write short notes on Bibliography
6. Define plagiarism
7. Write short notes on index cards
8. What are reference cards?
9. Define keywords
10. What is internet?
11. Define e-journals
12. Name the primary sources
13. Define citing literature
14. What are the collections of tertiary sources?
15. How will you write intext reference to a journal for articles with more than 10 authors?

Unit II

1. What is Intellectual property right?
2. Explain H-index
3. Define i10 index
4. Write short notes on patent
5. Show the steps to calculate the citation index in Google scholar
6. Explain copyrights
7. What are the different types of patent?
8. Who are the members of the ethics committee?
9. What is the role of the ethics committee?
10. List out some safety measures to be followed in the laboratory

Unit III

1. List out the components of phase contrast microscope
2. Define numerical aperture
3. What is fluorophore?
4. Differentiate auto-fluorescence from induced fluorescence
5. Name the two types of illumination used in the fluorescence microscope
6. What is polarizer?
7. What are accessory slots?
8. Differentiate positive staining from negative staining
9. What is freeze fracture?
10. Write a short note on electron gun
11. Distinguish SEM from TEM
12. Comment on ocular and stage micrometer

Unit IV

1. Define Beer - Lambert's law
2. Mention the function of photomultiplier tube
3. Write a short note on monochromator
4. Define Stokes' shift
5. What is nebulizer?
6. Write the principle of flame photometry

7. Differentiate atomic absorption spectroscopy from atomic emission spectroscopy
8. Mention the function of chopper in the atomic absorption spectrophotometer
9. List out any two applications of Atomic emission spectroscopy
10. What is Nuclear Magnetic Resonance spectroscopy?
11. Enlist the types of NMR spectrometer
12. Write the principle of ESR

Unit V

1. Define the principle of electrophoresis
2. Differentiate between the gels used in PAGE and SDS-PAGE
3. What is the role of SDS in SDS-PAGE?
4. Write the purpose of a stacking gel
5. What is the purpose of a separating gel?
6. Define Isoelectric focusing
7. Write any two applications of SDS - PAGE electrophoresis
8. What is meant by Autoradiography?
9. Define GM counter
10. Enlist the different types of rotors used in centrifuge
11. Give the applications of column chromatography

Section C (5 marks)

Answer in about 200 words

Unit I

1. Discuss the role of internet in literature collection
2. Define bibliography. Comment on the preparation of working bibliography of a research report.
3. Write an account on the abstract of a research paper
4. Write short notes on e-journals
5. Explain the Name – year system of citing references in the research report.
6. Suggest a format for writing an article in the scientific journal
7. Discuss on interpretation and report writing in a research report
8. What is plagiarism? What are measures to be followed in URKUND?
9. Write an account on the different components in a research manuscript

10. Explain the formatting and typing in a research report

Unit II

1. Explain the following research metrics: (i) H-index (ii) i10 index
2. Write a detailed account on the patent procedure in India
3. Differentiate between Copyrights and Patent
4. Explain the role of Ethical committee in research
5. Write down the steps to calculate the citation index in Google scholar and Scopus
6. How will you measure the citation index in SCI and ICI ?
7. Write short notes on Intellectual property rights
8. Write short notes on Copyrights
9. Explain the importance of safety measures in the laboratory
10. Explain the different types of patent

Unit III

1. Describe the principle involved in phase contrast microscope
2. Evaluate the principle and working mechanism of polarization microscope
3. Elucidate the principle and working mechanism of transmission electron microscope
4. Discuss the principle and working mechanism of scanning electron microscope
5. Illustrate the structure of an electron gun
6. Explain the procedure of sample preparation for the electron microscope
7. Describe the principle and working mechanism of trans-fluorescence microscope
8. Evaluate the principle and working mechanism of epi-illumination fluorescence microscope
9. Discuss the principle and working mechanism involved in atomic force microscope
10. Outline the role of ocular and stage micrometer in calculating the diameter of the object

Unit IV

1. Explain the role of photocell and photomultiplier tubes in the spectrophotometer
2. Illustrate the role of single beam and double beam in spectrophotometer
3. Evaluate the principle and working mechanism of flame photometer
4. Comment on spectrofluorometer
5. Describe the principle, instrumentation and application of atomic absorption spectrophotometer
6. Discuss the principle and working mechanism of atomic emission spectrophotometer
7. Write down the applications of ESR

8. Comment on Fourier Transform NMR Spectroscopy
9. Describe the principle and working mechanism of continuous wave NMR spectrometer
10. Describe the principle and working mechanism of FTIR

Unit V

1. Explain the uses of SDS- PAGE in quantitative analysis of proteins
2. Describe the different types of rotors used in centrifuge
3. Write an account on isoelectric focusing
4. Describe the principle and instrumentation of density gradient centrifuge
5. Explain the fundamentals of Geiger- Muller counter
6. Evaluate the principle of column chromatography
7. Write a note on autoradiography with reference to its biological application
8. Describe density gradient centrifugation with a labeled diagram
9. Explain ultracentrifugation and its types
10. Discuss the biochemical applications of radioisotopes

Section D (10 marks)

Answer in about 400 words

Unit I

1. Define research report. Explain in detail the manuscript preparation for the publication of a research report.
2. "Critical review of literature is essential for carrying out research"- Justify
3. Write on different systems of citing references in a research report.
4. Explain the different components in a research manuscript
5. Analyse the experimental designs of a research report based on statistical principles with illustrations
6. Describe the methods of presenting results
7. Organize the layout of formatting and typing a research report

Unit II

1. Analyze the precautions and safety procedures to be followed in the laboratory
2. Explain the importance of Ethics committee in a research
3. Outline the process for filing a patent in India

4. Give a detailed account on Intellectual property rights
5. List down the various steps to measure the quality of a research journal

Unit III

1. Discuss the principle and working mechanism involved in phase contrast microscope
2. Explain the principle, working mechanism and applications of fluorescence microscope
3. Discuss the different types of electron microscope
4. Explain the principle, instrumentation and application of atomic force microscope
5. Discuss the use of stage and ocular micrometer with an illustration

Unit IV

1. Evaluate the principle and working mechanism of UV-visible spectrophotometer
2. Explain the principle, instrumentation and application of atomic spectroscopy
3. Give the methodology and application of NMR in biological science
4. Describe the principle and working mechanism of NMR spectrometer
5. Evaluate the principle and working mechanism of ESR

Unit V

1. Define electrophoresis. Explain the uses of SDS –PAGE in quantitative analysis of proteins
2. What are the basic principles involved in the isoelectric focusing and its significance?
3. Write an account on the principle, working mechanism and application of column chromatography
4. Describe the working of the Geiger- Muller counter with the help of a suitably labelled diagram
5. Write a detailed account on the types of centrifuge

ST. MARY'S COLLEGE (Autonomous) – THOOTHUKUDI
END SEMESTER EXAMINATION

II M.Sc. Zoology

Self Study: Zoology for Competitive Examinations Course Code: 21PZOSS1

Semester III – November 2023

(for those who joined in July 2021 and after)

Time: 2 hours

Max. marks: 50

Answer any FIFTY of the following (50 X 1 = 50 marks)

Choose the correct answer

- Name the classification based on comparison of one or few characteristic.
a. Natural system of classification b. Artificial system of classification
c. Phylogenetic system of classification d. All of these
- Closely related, morphologically similar sympatric population, but reproductively isolated are designated as _____.
a. clones b. demes c. clines d. sibling species
- Radial symmetry is characteristic of _____.
a. Echinodermata only b. Coelenterata and Porifera
c. Echinodermata and Porifera d. Echinodermata and Coelenterata
- Find the most primitive group of animals which are multicellular.
a. Coelenterata b. Colonial protozoans c. Sponges d. Nemertine
- Notochord is restricted to the anterior part of body, proboscis in animals of which group?
a. Urochordata b. Hemichordata c. Cephalochordata d. Chordata
- Bony fish are included in the order _____.
a. Osteichthyes b. Chondrichthyes c. Agnatha d. Apoda
- Primitive reptiles with solid skull belong to the sub class _____.
a. Anapsida b. Parapsida c. Diapsida d. Metatheria
- Which one of the following is a metatherian animal?
a. Echidna b. Kangaroo c. Shrew d. Pangolin
- What is the main basis of classification in the five-kingdom system?

20. Pick up the secretion of parietal cells of stomach from the following.
- a. Pepsin b. Gastrin c. Mucin d. Hydrochloric acid
21. The change in shape of the lens during accommodation of the eye is brought about by _____.
- a. aqueous humour b. vitreous humour c. ciliary body d. eye lid
22. Where are histamine-secreting cells found?
- a. Nervous tissue b. Connective tissue c. Epithelial tissue d. Muscular tissue
23. Which is the largest cell in the human body?
- a. Macrophage b. Ovum c. Granule cell d. Gland cell
24. Typically, spiders' blood is blue due to the presence of _____
- a. haemocyanin b. hemerythrin c. haemoglobin d. anthocyanin
25. Name the individual which has different alleles of a gene.
- a. Allelopathic b. Homozygous c. Heterozygous d. Epistatic
26. Which of the following cross would produce the ratio of 9:3:3:1?
- a. AAbb x aaBB b. AaBb x aabb c. AaBb x AaBb d. AABB x aabb
27. When the father is Rh⁺ and mother is Rh⁻, the disease that occurs in the baby is _____.
- a. sickle cell anemia b. erythroblastosis foetalis
- c. thalassemia d. erythromatosis
28. Name the smallest segment of DNA capable of being separated and exchanged with other chromosome.
- a. Cistron b. Muton c. Recon d. Replicon
29. During protein synthesis AUG functions as the initiator codon in mRNA. What should be the anti codon on the tRNA molecule that picks up and brings the amino acid specified by this codon?
- a. TAC b. UAC c. GUA d. CAU
30. What is the physical basis of mutational hotspots?
- a. Transposans b. Tautomers c. Palindromes d. Transitions

31. A spontaneous mutation usually originates as an error in_____.
- a. DNA replication
 - b. DNA transcription
 - c. translation
 - d. reverse transcription
32. Which among the following is the raw material for evolution?
- a. Variation
 - b. Isolation
 - c. Mutation
 - d. Migration
33. Who coined the term ‘isolating mechanism’?
- a. Darwin
 - b. Lamarck
 - c. Dobzhansky
 - d. Wallace
34. The phenomenon of a harmless species resembling a harmful species is called as _____mimicry.
- a. Batesian
 - b. warning
 - c. aggressive
 - d. protective
35. Show the earliest fossil of prehistoric man.
- a. *Dryopithecus*
 - b. *Sivapithecus*
 - c. *Australopithecus*
 - d. *Ramapithecus*
36. Show the hominin which used first Oldowan tools, then Acheulean tools.
- a. *Australopithecus*
 - b. *Homo habilis*
 - c. *Homo ergaster*
 - d. Neanderthals
37. Identify the model that is now known to be correct for the structure of biological membrane.
- a. Page's model
 - b. Lac Operon model
 - c. Fluid mosaic model
 - d. Lock and Key model
38. Which of the following can control the electrical behaviour of the cell?
- a. Ion channels
 - b. Receptors
 - c. Antigens
 - d. Antibodies
39. Which of the cell organelle serves to process, package and export proteins?
- a. Mitochondria
 - b. Endoplasmic reticulum
 - c. Golgi apparatus
 - d. nucleolus

40. Name the smooth endoplasmic reticulum in the retinal cells.
- a. Sarcoplasmic reticulum
 - b. Retinal reticulum
 - c. Myeloid bodies
 - d. Amyloid bodies
41. Which of the following organelles is directly connected to the outer membrane of the nucleus of eukaryotic cell?
- a. Mitochondrion
 - b. Lysosome
 - c. Golgi apparatus
 - d. Endoplasmic reticulum
42. Cdk2/cyclin E functions in_____.
- a. G₂ - M transition
 - b. G₁ - S transition
 - c. M
 - d. G₂
43. At which cell cycle checkpoint is the cell cycle halted if the cell's DNA is damaged?
- a. G₁-S
 - b. S-G₂
 - c. G₂-M
 - d. G₀-G₁
44. Name the pairing of homologous chromosomes.
- a. Tetrads
 - b. Crossing over
 - c. Synapsis
 - d. Terminalisation
45. The presence of a chiasma indicates that two chromatids_____.
- a. are about to form a synapsis
 - b. have exchanged parts
 - c. are identical
 - d. are in a synaptonemal complex
46. In the protein synthesis, tRNA carrying the initiating amino acid enters in which site of ribosome?
- a. 'A' site
 - b. 'P' site
 - c. Anticodon site
 - d. Recognition site ++
47. In replication of DNA, the helix is opened and untwisted by_____.
- a. ribase
 - b. ligase
 - c. helicase
 - d. polymerase
48. During DNA replication the synthesis of the lagging strand of DNA results in fragments known as_____.
- a. Okazaki fragments
 - b. satellite segments
 - c. Kornberg segment
 - d. double-helix segment

ST. MARY'S COLLEGE (Autonomous) THOOTHUKUDI

II M.Sc Zoology

Semester IV

Core I – Marine Biotechnology Course Code: 21PZOC41

(for those who joined in July 2021 and after)

Question Bank

Section A (1 mark)

Choose the correct answer

Unit I

1. The study of marine organisms in relation to their environment is _____
a. Limnology b. **Oceanography** c. Estuarine biology d. Marine engineering
2. The disphotic zone extends from _____
a. 70-100 m b. 60-90 m c. **80-200m** d. 10- 200m
3. The zone which lies between highest high tide and lowest low tide is _____
a. eulittoral zone b. abyssal zone c. bathyal zone d. **intertidal zone**
4. The organisms which move with the direction of water current are _____
a. nekton b. crab c. **plankton** d. fish
5. The outer limit of the rocky shore is _____
a. **spraying zone** b. balanoid zone c. oyster zone d. sub tidal zone
6. Which one of the following is a sandy shore organism?
a. Chiton b. Ascidian c. Sea anemone d. **Balanoglossus**
7. Many muddy shore beaches are occupied by _____
a. corals b. **salt marshes** c. barnacles d. sea urchins
8. Deep sea area starts from _____
a. **continental slope** b. continental shelf c. abyssal zone d. neretic zone
9. Deep sea environment remains _____
a. close to the reach of sun rays b. changing
c. **unchanging** d. close to the land
10. Deep sea animals are _____
a. having hard endo skeleton b. having poorly developed eyes

- c. having swim bladders d. **mostly predators**

Unit II

1. Confluent zone of sea water and fresh water is termed as _____
a. **estuaries** b. salt marshes c. oceanic province d. neritic province
2. Vivipary is an adaptative feature of _____
a. *Avicennia* b. ***Rhizophora*** c. *Salicornia* d. *Suaeda*
3. Pneumatophores are _____
a. positively geotrophic b. negatively phototropic
c. **positively phototropic** d. chemotrophic
4. Major mangrove strand of Tamil Nadu is _____
a. **Pitchavaram** b. Punakayal c. Ramanathapuram d. Thoothukudi
5. Find out the true mangrove from the following
a. *Suaeda* b. ***Rhizophora*** c. *Cressa* d. *Salicornia*
6. Generally mangroves escape from high salinity by _____
a. ultra-filtration mechanism in the root b. salt glands
c. **both (a) and (b)** d. photosynthesis
7. Mangroves maintain high osmotic potential than surroundings by _____
a. **accumulating salts** b. accumulation of vitamins
c. secondary metabolites d. deposition of silt
8. Xerophytic character seen in *Avicennia* is _____
a. sunken stomata b. thick epidermal cells
c. water storing tissues d. **all of these**
9. Which of the following would be considered among the most productive of ecosystems?
a. barrier island b. **estuary** c. river d. salt marsh
10. A mangrove that has prop-like roots is the _____.
a. **black mangrove** b. red mangrove c. white mangrove d. buttonwood

Unit III

1. Red tides are produced by certain species of _____

- a. Mollusca b. diatoms c. pteropods d. **dinoflagellates**

2. Minamata disease is caused by _____
a. **mercury poisoning** b. cadmium poisoning
c. cobalt poisoning d. chlorine poisoning
3. Genetically modified microorganism used in abatement of oil pollution is _____
a. ***Pseudomonas putida*** b. *Xanthomonas citri*
c. *Bacillus subtilis* d. *Pseudomonas aeruginosa*
4. Oil pollution is due to _____
a. leakages of offshore drilling b. ship wreck
c. **both (a) and (b)** d. algal bloom
5. Thermal pollution causes _____
a. **heat shock to marine biota** b. heat shock to fisher folk
c. alter ocean current d. alter waves and tides
6. Thermal pollution _____
a. raises the solubility of oxygen in water
b. lowers the respiratory rates of aquatic organisms
c. nurtures spawning fish
d. **can kill organisms adapted to a particular temperature range by thermal shock.**
7. Which of the following is false?
a. Oil evaporates and undergoes decomposition
b. **The environment recovers more slowly from crude oil spills than from refined oil spills**
c. Recovery from oil spills is faster in warm water than in cold water
d. Estuaries and salt marshes suffer the most damage from oil pollution and cannot be effectively cleaned up.
8. Minamata disease was first discovered in Minamata city, _____
a. **Japan, 1956** b. New Zealand, 1980 c. Korea, 1976 d. Sri Lanka, 1974
9. Microplastics are plastic fragments with a diameter of less than _____
a. more than 5 mm b. **less than 5 mm** c. more than 1 cm d. less than 10mm

10. _____ cannot be digested.

- a. **Microplastics** b. Algal bloom c. Protein d. Microorganisms

Unit IV

1. Name the accumulation of microorganisms and small animals on wet surfaces

- a. **Biofouling** b. Marine Corrosion c. Biodeterioration d. Erosion Corrosion

2. Identify the most serious fouler faced by pearl oyster farmers in India

- a. Bryozoans b. **Barnacle** c. Hydroids d. Sponges

3. Indicate the cosmopolitan serpulid fouler

- a. *B. neritina* b. *B. amphitrite* c. *Avicula vexillum* d. ***Hydroides elegans***

4. Find the potential fouling organism

- a. ***B. neritina*** b. *B. amphitrite* c. *Avicula vexillum* d. *Hydroides elegans*

5. Identify the molluscan borers responsible for biodeterioration

- a. *P. fucata* b. ***T. elongata*** c. *Avicula vexillum* d. *M. casta*

6. Indicate the oil borne preservative used in preventing Teredenid attack

- a. Cashew nut liquid b. Crude oil c. **Creosote** d. fish oil

7. Name the metal used as physical barrier in biodeterioration

- a. **Copper** b. Nickel c. Tin d. Iron

8. Identify the process of degradation of metallic materials due to an electrochemical reaction in the marine environment

- a. Biofouling b. **Marine Corrosion** c. Biodeterioration d. Erosion Corrosion

9. Find the highly localized corrosion on the metal surface

- a. Galvanic Corrosion b. Marine Corrosion c. **Pitting Corrosion** d. Erosion Corrosion

10. Name the anticorrosive pigment

- a. **Zinc Phosphate** b. Copper Sulphate c. Zinc Sulphate d. Copper Nitrate

Unit V

- Name the world's largest manganese nodule region.
 - Clarion-Clipperton Zone**
 - Australia
 - Asia
 - Island
- Write the metal used in welding rod flux coatings.
 - Iron
 - Rutile**
 - Copper
 - Gold
- What are formed in sand and gravel deposited along the edge of large bodies of water?
 - beach placers**
 - sand dunes
 - estuary
 - delta
- Name the typical form of garnet crystal that has 24 sides.
 - hexagon
 - nano
 - topaz
 - trapezohedron**
- Find out the indicator mineral for prospecting diamond.
 - Garnet**
 - Sulfur
 - Zinc
 - Selenium
- Name the chemical isolated from marine fungus *Asteromyces cruciatus*
 - Penicillin
 - Amphotericin
 - Gliovictin**
 - Prostaglandin
- Find the algae from which halogenated lipids are isolated
 - Laurencia* sp.**
 - Gracilaria* sp.
 - Porphyra* sp.
 - Sargassum* sp.
- Identify the species from which nucleoside spongosine was isolated
 - Verongia fistularis*
 - Dasychalina cyathina*
 - Cryptotethya crypta***
 - Halichondria panicea*
- Name the artificial recruitment of aquatic organisms into their natural habitat for stock improvement
 - Sea ranching**
 - Biofouling
 - Corrosion
 - Biodeterioration
- Identify the species of pearl oyster used in sea ranching technique
 - Pinctada maxima*
 - Pinctada fucata***
 - Pinctada albina*
 - Pteria penguin*

Section B (2 marks)

Answer in about 50 words

Unit I

- Define euphotic zone

2. Distinguish between meroplankton and holoplankton
3. Write a short note on eulittoral zone
4. Name the five zones of rocky shore
5. Write a short note on supra littoral fringe
6. Mention the composition of mud
7. Name any four biota of muddy shore
8. Comment on hadal zone
9. Distinguish between bathyal and abyssal zones
10. What is muciferous system?

Unit II

1. Define vivipary
2. What are pneumatophores?
3. Define estuary
4. Write notes on Pitchavaram
5. Write any two morphological adaptations of mangroves
6. Define prop root with example
7. Define Saltwedge estuaries
8. What are partially mixed estuaries?
9. Define Fjords
10. What are Bar – built estuaries?

Unit III

1. Write short notes on Minamata disease.
2. List the sources of marine heavy metal pollution.
3. Write any two control measures of marine heavy metal pollution
4. Give any two sources of marine oil pollution
5. Write any two control measures of marine oil pollution
6. Write the role of *Pseudomonas putida* in pollution control

7. What are oil-degrading bacteria?
8. List the sources of marine microplastics.
9. Write the effects of marine thermal pollution.
10. List the various stages of microplastic degradation.

Unit IV

1. Define biofouling
2. What is macrofouling?
3. List the macrofoulers in marine environment
4. Write a short note on barnacles as biofoulers
5. List the anti-biofouling materials used in marine environment
6. Write a note on molluscan borers
7. Define marine corrosion
8. Discuss pitting corrosion
9. Define galvanic corrosion
10. Illustrate anticorrosive pigments with examples

Unit V

1. List the regions where manganese nodules occur in abundance.
2. Write the chemical composition of garnet.
3. Identify the uses of garnet
4. List the uses of glauconite
5. Write short notes on glauconite
6. Define bioactive compounds
7. Mention the bioactive compounds derived from bacteria
8. Discuss the macroalgae derived bioactive compounds
9. List the steps involved in sea ranching technique
10. Write a short note on sea ranching of pearl oyster

Section C (5 marks)

Answer in about 200 words

Unit I

1. Narrate the adaptations exhibited by planktonic organisms
2. State the salient features of sandy shore
3. Explain the adaptation of intertidal rocky shore fauna
4. Narrate the classification of plankton
5. How the animals are adapted to muddy shore?
6. Explain the salient features of rocky shore
7. State the adaptations exhibited by rock shore fauna
8. Draw a labeled diagram to illustrate the zones of marine environment
9. Analyze the adaptations exhibited by sandy shore animals
10. Explain the role of microbes in marine environment

Unit II

1. What are the morphological adaptations seen in mangroves?
2. What is the role of pneumatophore in marine environment?
3. How mangroves protect the environment?
4. Write notes on mangrove forest in Tamil Nadu.
5. Give an account on fauna of estuaries.
6. Explain the environmental conditions in estuaries.
7. Write notes on
 - i. vivipary
 - ii. physiological adaptations of mangroves.
8. Define estuary. Give an account of the types of estuaries.
9. Write notes on
 - iii. Negative estuary
 - iv. Estuarine birds
 - v. Estuarine benthos

10. Discuss the impacts of dredging in marine habitats.

Unit III

1. Explain the effect of oil pollution on the marine environment.
2. Write the effects of thermal pollution.
3. Give an account of oil pollution.
4. Explain the effect of radioactive pollution.
5. Discuss the role of biotechnology in controlling marine pollution.
6. Give an account of the sources and treatment of oil pollution in the sea
7. Discuss causes, effects and preventive measures of thermal pollution
8. Discuss the adverse effects of radioactive pollution on the marine environment.
9. Explain the effects and control measures of heavy metal pollution.
10. Give an account on bioremediation of microplastics.

Unit IV

1. Discuss about the types of biofouling
2. Summarize the macrofoulers with suitable examples
3. Present the prevention and management of biofouling in marine environment
4. Explain the impact of biofouling in marine environment
5. Analyze the types of biodeterioration
6. Discuss the types of agents involved in biodeterioration
7. Explain the protective methods employed in biodeterioration
8. Discuss the different types of marine corrosion
9. Present the various mechanism of corrosion
10. Summarize the prevention methods of corrosion

Unit V

1. Discuss the formation of the manganese nodules.
2. Explain beach placers.
3. “Petroleum is a marine wealth” - Discuss
4. Write about the formation of Glauconite

5. List out the uses of garnet
6. Explain the marine bioactive compounds derived from marine macroalgae
7. Discuss the significance of marine bioactive compounds
8. Write a brief account on the bioactive compounds from marine sponges
9. Explain the sea ranching technique involved in crustaceans
10. Present the different species of molluscs employed in sea ranching technique

Section D (10 marks)

Answer in about 400 words

Unit I

1. Outline the classification of marine habitat with a neat labelled sketch
2. Appraise the classification of plankton with suitable examples
3. Investigate the different adaptations exhibited by planktons.
4. Analyze the general adaptations of intertidal animals
5. Evaluate the salient features of intertidal sea shore
6. Examine the characteristic features of intertidal muddy shore
7. Compare the features of sandy and rocky shores
8. Evaluate the adaptations of intertidal sandy shore animals
9. Analyze the adaptations of intertidal muddy shore animals
10. Investigate the salient features of marine microbes

Unit II

1. How mangroves are adapted to their environment.
2. What are mangroves? Explain the types of mangrove.
3. Examine the role of mangroves in protecting the environment.
4. Give an account on mangroves of Tamil Nadu.
5. Analyze mangrove-dwelling animals.
6. How will you improve the productivity of estuary?
7. Give an account on flora and fauna of estuary.
8. How estuaries are classified? What are the environmental conditions prevailing in that region?

9. Protection and regeneration of mangroves are necessary - Discuss.
10. How will you conserve mangroves?

Unit III

1. Discuss the adverse effects of radioactive pollution on marine environment.
2. Write about the effects of oil-spill on marine based industries. Add note on their remedial measures.
3. What are the sources of thermal pollution and its effects on environment? Add note on its control.
4. Analyze the effects of oil-spill on the environment. Add note on their remedial measures.
5. Analyze the steps involved in biodegradation of microplastics.

Unit IV

1. Analyze the types of biofoulers with suitable examples.
2. Examine the impact of biofouling in marine environment and prevention.
3. Evaluate the different agents of biodeterioration.
4. Investigate the protective methods for biodeterioration.
5. Analyze the various mechanism and prevention for corrosion.

Unit V

1. Discuss the occurrence and formation of manganese nodules.
2. Explain beach placers.
3. Write about the formation of Glauconite
4. Analyze the composition and gem variety of garnet
5. Give an account on petroleum
6. Examine the bioactive compounds derived from marine organisms
7. Analyze the sea ranching of economically important marine organisms

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI
II M.Sc. Zoology Semester IV
Core II Conservation Biology Sub.Code: 21PZOC42
(for those who joined in July 2021 and after)
Question Bank

Section A (1mark)

Choose the correct answer

Unit I

1. The principles, issues and guidelines relating to human interactions with their environment is referred as _____
 - a. **Environmental ethics**
 - b. Rehabilitation issues
 - c. Watershed management
 - d. Resettlement issues
2. The world environmental protection view based on earth wisdom is called as
 - a. Anthropocentric
 - b. **Eco-centric**
 - c. Environmental ethics
 - d. Industrial Ethics
3. Any system that sustains a limited number of organisms on a long term basis is known as _____
 - a. Intra generational equity
 - b. Inter generational equity
 - c. 3-R approach
 - d. **Carrying capacity**
4. The Environment Protection Act came into force on _____
 - a. **November.19,1986**
 - b. November.20,1986
 - c. November.18,1986
 - d. November.21,1986
5. World Environment Day is celebrated on
 - a. **5th June**
 - b. 5th July
 - c. 9th June
 - d. 9th July
6. Wayanad wildlife sanctuary is situated in _____
 - a. Tamil Nadu
 - b. **Kerala**
 - c. Karnataka
 - d. Andhra Pradesh
7. The Indian Board of wildlife was created in
 - a. 1972
 - b. 1962
 - c. **1952**
 - d. 1942
8. The act which provides for setting up national parks and wildlife sanctuaries is called _____
 - a. Environment Protection Act
 - b. Environmental Ethics Act
 - c. **Wildlife Protection Act**
 - d. Forest Conservation Act

9. Name the act which conserve forests and their related aspects
- a. Environment Protection Act b. **Forest Conservation Act**
 c. Wildlife Protection Act d. Water Prevention and Control Act
10. Which one of the following activities comes under non- forestry activity?
- a.Fencing b. **Mining** c.Check posts d. Making water holes

Unit- II

1. Shifting cultivation is practiced in _____
- a. **Andhra Pradesh** b. Tamil Nadu c. Kerala d. Goa
2. _____ wood is used for packing tea in Assam
- a. Fir b. **Ply** c. Teak d. Mahogany
3. Chipko movement was started to conserve _____
- a. deserts b. grassland c. **forest** d. water
4. Which one of the following is a greenhouse gas?
- a. **CO₂** b. CO c. SO₂ d. NO₂
5. Decrease in species diversity in tropical countries is mainly due to _____
- a. Urbanisation b. Pollution c. **Deforestation** d. Soil erosion
6. Soil erosion can be prevented by
- a. Deforestation b. **Afforestation** c. Overgrazing d. Removal of vegetation
7. Which one of the following is not related to water conservation?
- a. reuse of water b. watershed management
 c. rain water harvesting d. **evaporation of water**
8. Which of the following is an environmental problem related with dams?
- a. checking floods and famines b. generating electricity
 c. provide water to irrigation d. **deforestation**
9. The Cauvery water dispute is between _____
- a. Tamil Nadu and Kerala b. **Tamil Nadu and Karnataka**
 c. Kerala and Karnataka d. Tamil Nadu and Andhra Pradesh
10. Which one of the following is a water rich country?
- a. **Canda** b. Kuwait c.Singapore d. Oman
11. The highest dam constructed on river Bhagirathi is _____
- a. **Tehri dam** b.Nagarjuna Sagar Dam c. Hirakud dam d. Bhakra Nangal Dam

12. In India maximum number of dams are present in _____ state
 a. Gujarat b. Madhya Pradesh c. Uttarakhand d. **Maharashtra**
13. Water managers in Maharashtra are called as _____
 a. Churpun b. **Havaldars** c. Neerkatti d. Dhan
14. Which of the following could be the most socio-economic impact of dams?
 a. checking floods and famines b. generating electricity
 c. loss of biodiversity d. **displacement of tribal people**
15. The dam constructed over Narmada river is _____
 a. Bhakra Nangal b. Hirakund c. **Sardar Sarovar** d. Pong

Unit- III

1. Soil erosion on the slopes can be prevented by _____
 a. Over grazing b. removal of vegetation c. deforestation d. **terracing**
2. Soil erosion can be prevented by _____
 a. overgrazing b. removal of vegetation c. **afforestation** d. deforestation
3. Terrace farming is practiced in _____
 a. coastal areas b. deserts c. **hills** d. plains
4. The largest wind farm of our country is in _____
 a. **Kanyakumari** b. Nagercoil c. Marthandam d. Tirunelveli
5. Identify the cleanest fossil fuel from the following
 a. Petroleum b. Hydrogen c. Coal d. **Natural gas**
6. The foul smell in the domestic gas cylinder is due to _____
 a. **ethyl mercaptan** b. ethyl chloride c. ethyl sulphide d. ethanol
7. Which one of the following is the type of coal with maximum carbon value?
 a. Soft coal b. Brown coal c. **Hard coal** d. Wood
8. Natural geysers which operate due to geothermal energy are located in _____
 a. Sahara b. tar c. **Manikaran** d. Nagpur
9. Find out the name of soft coal
 a. Anthracite b. **bituminous** c. lignite d. peat
10. Fuel used in Brazil and Zimbabwe is _____
 a. Methanol b. hydrogen c. **gasohol** d. coal

11. Nuclear power station in Tamil Nadu is in _____
a. Tarapur b. Rana Pratap c. **Kalpakkam** d. Narora
12. Minimum wind speed required for wind generator is _____
a. 16 b. **15** c. 18 d. 20
13. _____ can be used in fuel cell to generate electricity
a. **Hydrogen** b. Sulphur c. Nitrogen d. Oxygen

Unit- IV

1. Indicate the term which refers to the areas which exhibit high species richness and high species endemism
a. Biosphere reserve b. **Hot-spot** c. Sanctuary d. National parks
2. Find out the example of ex-situ conservation from the following
a. Biosphere reserve b. **Gene bank** c. Sanctuary d. National park
3. Gulf of Mannar Biosphere Reserve is located in _____ state.
a. **Tamil Nadu** b. Kerala c. Karnataka d. Gujarat
4. Indicate the category of a species which is not seen in the wild for 50 years at a stretch.
a. endangered b. **extinct** c. vulnerable d. rare
5. Mundandurai is an _____ sanctuary
a. **tiger** b. elephant c. bird d. squirrel
6. Write the medium in which the cryopreservation of plant seeds and pollen is done
a. **liquid nitrogen** b. ice c. carbon tetrachloride d. ammonia
7. Which of the following country has more Ramsar sites?
a. **United Kingdom** b. Kuwait c. India d. Australia
8. The convention for conservation of wet land is _____ convention
a. **Ramsar** b. Rotterdam c. Stockholm d. Basel
9. The Red Data Book is published by _____
a. WWF b. **IUCN** c. ZSI d. BSI
10. Name the category of animals which are distributed in a restricted place
a. Endangered b. **Endemic** c. Rare d. Extinct

Unit V

- _____ depletes ozone during their 65-110 years stay in the stratosphere.
a. oxygen b. nitrogen c. carbon di-oxide d. **chlorofluorocarbon**
- Which of the following gas has maximum contribution to green house effect?
a. Chlorofluorocarbon b. **Carbon di-oxide** c. Methane d. Nitrous oxide
- Which one of the following destroys ozone umbrella?
a. **Chlorofluorocarbon** b. Nuclear fallout c. Methane d. Nitrous oxide
- We are protected from harmful effects of UV radiation from sun by
a. **oxygen** b. ozone c. carbon di-oxide d. chlorofluoro carbon
- The main requirement for tropical cyclone is _____.
a. **sea surface temperature** b. humidity c. depression d. rain
- What are tropical cyclones in Atlantic Ocean called?
a. Cyclone b. **Hurricanes** c. Typhoons d. Willywilly
- Which type of wild fire burns the suspended material in the canopy level?
a. **Crown fire** b. Ladder fire c. Surface fire d. Ground fire
- When coherent soil masses move down slope due to gravity _____ occurs
a. Cyclone b. **Landslide** c. Earth quake d. Flood
- _____ drought occurs when the moisture level in the soil is insufficient to maintain the average crop yield
a. Hydrological b. Meteorological c. **Agricultural** d. Socio-economic
- Name the tropical cyclones in the sea around Australia
a. Cyclone b. Hurricanes c. Typhoons d. **Willywilly**

Section B (2 marks)

Answer in about 50 words

Unit- I

- Define sustainable development
- What is 3-R principle?
- What is meant by carrying capacity of a system?
- What is earth-centric thinking?
- What is human-centric thinking?

6. What are the two components of carrying capacity?
7. Distinguish inter-generational equity from intra- generational equity
8. Enlist the measures for sustainable development
9. Explain anthropocentric worldview
10. Differentiate anthropocentric worldview from eco-centric worldview

Unit- II

1. Enlist the major causes of deforestation
2. List out the major consequences of deforestation
3. Define mining. Mention its types
4. What is an aquifer? Mention the types
5. List out the effects of groundwater usage
6. Distinguish between unconfined aquifers from confined aquifers
7. Define hydrological cycle
8. What is meant by ground subsidence?
9. Mention the benefits of dam
10. What is droughts?
11. What is meant by contour cultivation?
12. Explain rain water harvesting.
13. Define watershed management

Unit- III

1. What is meant by rill erosion?
2. Differentiate sheet erosion from gully erosion
3. What is meant by desertification?
4. Enlist the causes of desertification
5. What is wind energy?
6. What do you mean by desertification?
7. How is nuclear energy created?
8. Differentiate renewable energy from nonrenewable energy
9. Name some solar energy harvesting devices
10. Mention any three nuclear power stations in India
11. What are major biotic agents responsible for soil erosion?

Unit IV

1. What is in-situ conservation?
2. Define endemic species
3. Define ex-situ conservation.
4. Recall what are sanctuaries. Give two examples.
5. What is biosphere - reserve? Give two examples.
6. Give any three reasons for loss of our biodiversity.
7. What is NBPGR? Mention its role.
8. List the functions of IUCN.
9. What are hot-spots of biodiversity? Which are the hot-spots in India?
10. Write the expansion of NBPGR and mention its role.
11. Mention the objectives and role of ZSI
12. What is Ramsar convention?

Unit –V

1. What is global warming
2. What is green house effect?
3. Enlist few characters of chlorofluorocarbons
4. Define disaster and give two examples
5. Mention the types of drought.
6. What is ladder fire?
7. What is cyclone?
8. Comment on wild fire.
9. List any two impacts of landslides

Section C (5 marks)

Answer in about 200 words

Unit- I

1. Discuss the salient features of Forest Conservation Act 1980
2. Narrate the features of Environmental Protection Act 1986
3. Explain the guidelines provided under schedule VI under Environment Rules 1986
4. Present the important functions of central government under Environmental Protection Act
5. Explain Wildlife Protection Act 1972

6. Outline the key aspects for sustainable development
7. Present the various measures taken for sustainable development
8. Discuss Anthropocentric worldview for environmental protection
9. Summarize Eco-centric worldview for a healthy environment
10. Analyse the importance of ethical guidelines

Unit- II

1. Discuss the major causes of deforestation
2. Describe the impacts of mining activities of forests
3. Analyse the effects of dams on forests and people with an example
4. Explain the environmental impacts of large dams
5. Give an account on ground water resources and the effects of overuse of ground water
6. Elucidate the causes, effects and prevention of droughts
7. Discuss the conflicts between Tamil Nadu and Karnataka over Cauvery water dispute
8. Describe the various water strategies adopted for conservation of water
9. Discuss the modern techniques for rain water harvesting
10. Describe the traditional method for rain water harvesting

Unit- III

1. How will you prevent soil erosion by following the soil conservation practices?
2. “Climatic and biotic agents are the major causes of soil erosion” - Discuss
3. Give an account on desertification
4. Define Biomass. Explain its types
5. What is nuclear energy? Discuss its two types, merits and demerits
6. “Coal is a non-renewable source of energy” - Justify
7. Discuss the merits and demerits of wind energy
8. Comment on the energy harnessed from oceans
9. Give an account of biofuels
10. What is solar energy? Explain the mode of energy trapping from the sun

Unit IV

1. What are the various ex -situ conservation strategies practiced to conserve biodiversity?
2. What are the major threats to biodiversity?
3. Discuss the various causes of wildlife depletion in our country

4. Write a short account on in-situ conservation of biodiversity
5. Explain the functions of IUCN and WWF in conservation of biodiversity.
6. Compare the objectives and role of BSI and ZSI
7. Write a brief account on National action plan on conservation of biodiversity.

Unit –V

1. List down the impacts of green house effect
2. Explain the harmful effects of climate change
3. Discuss the gases responsible for global warming
4. Elucidate the cause, effect and control of wild fire
5. State the causes and management of landslides.
6. Narrate the various management measures taken during wild fire.

Section D (10 marks)

Answer in about 400 words

Unit- I

1. What is sustainable development? What are the major measures to attain sustainability?
2. Analyze the issues and possible solutions for environment protection
3. Outline the activities and provisions in the Wildlife Protection Act, 1972

Unit- II

1. Describe the economic and ecological importance of forest resources
2. Analyze the water resources and their management
3. Discuss the causes and effects of deforestation
4. “Water – A precious natural resource”- Substantiate
5. Analyze the problems in sharing river water resources
6. Discuss the various methods of harvesting rain water
7. Explain the various measures taken for watershed management

Unit – III

1. Define soil erosion. Explain the types of soil erosion
2. How can you as individual conserve different natural resources?
3. Explain renewable energy resources with examples
4. Explain non-renewable energy resources with examples

5. What is biogas? Discuss the structure and functioning of a biogas plant

Unit –IV

1. Discuss why conservation of wildlife is necessary
2. Explain the need and approaches for the conservation of biodiversity
3. Elaborate the role of various organizations in conservation of biodiversity
4. Analyse the values of biodiversity

Unit V

1. Explain the present and future scenario of the impacts of global warming
2. Describe the destruction of the stratospheric ozone layer and its biological effects.
3. Narrate the types, causes, impacts and management of drought.
4. Explain the cause, effects and management of cyclone
5. Describe the guidelines for disaster management

ST. MARY'S COLLEGE (Autonomous), THOOTHUKUDI

II M.Sc. Zoology Semester IV

Core III - Commercial Zoology Course Code: 21PZOC43

(for those who joined in July 2021 and after)

Question Bank

SECTION A (1 mark)

Choose the correct answer:

Unit I

- Who is called as the father of modern bee keeping?
 - Rev. Fr. Newton
 - Lorenzo L. Langstroth
 - Von Hruschka
 - Von Frisch
- Find out the order to which honey bee belongs to.
 - Lepidoptera
 - Diptera
 - Coleoptera
 - Hymenoptera
- Honey bees are _____.
 - monomorphic
 - dimorphic
 - trimorphic
 - pentamorphic
- Which is the largest bee?
 - Apis cerana*
 - Apis mellifera*
 - Apis florea*
 - Apis dorsata*
- Which of the following is the common name for *Apis dorsata*?
 - Rock bee
 - Little bee
 - Indian bee
 - European bee
- Honey bee colony is termed weak or strong based on _____.
 - Number of cells in the comb
 - Number of worker bees
 - Number of drone bees
 - Amount of honey
- Which one of the following species prefers dark places to construct the comb?
 - Apis dorsata*
 - Apis cerana*
 - Apis florea*
 - Apis mellifera*

8. Which of the following is ferocious and easily provoked to attack?
a. *Apis dorsata* b. *Apis cerana* c. *Apis florea* d. *Apis mellifera*
9. Which of the following species is (or) suitable for apiculture?
a. *Apis cerana* b. *Apis mellifera* c. Both (a) and (b) d. *Apis dorsata*
10. The queen bee lays _____ eggs / day
a. 500 – 1000 b. 1000 – 1500 c. 1500 – 2000 d. 2000 – 2500
11. Limbs of worker bee is modified for collecting _____.
a. nectar b. pollen grain c. propolis d. nectar and pollen
12. The pollen spur of tibia is used to _____.
a. remove particles b. pick up the wax c. remove pollen d. water
13. Bee wax is secreted from the glands of _____.
a. drone b. worker c. queen d. queen and worker
14. The life span of worker bee is _____.
a. 4 weeks b. 5 weeks c. 6 weeks d. 3 weeks
15. Which of the following is NOT a reason for swarming?
a. Adequate space b. Heat
c. Congestion d. Failure of queen to lay eggs
16. Which of the following is used to prevent the escape of the queen from the hive during swarming season?
a. Bee veil b. Bee brush c. Queen excluder sheet d. Queen gate
17. How does the bee carry the pollen to its hive?
a. On its head b. On its front legs c. On its middle legs d. On its hind legs
18. The honey is extracted from the comb by _____ force.
a. centrifugal b. gravitational c. electrical d. chemical

4. Which of the following causes septicemia in bees?

- a. *Bacillus apisepcticus* b. *Bacillus larvae* c. *Bacillus alvei* d. *Bacillus thuringiensis*

5. Name the disease caused by *Pericystis apis*.

- a. Stone brood b. Thai sac brood c. **Chalk brood** d. Foul brood

6. Identify the disease caused by Fungi belonging to the Genus *Aspergillus*.

- a. **Stone brood** b. Thai sac brood c. Chalk brood d. Foul brood

7. Show the disease of honey bees caused by *Bacillus alvei* and *Melissococcus pluton*.

- a. Thai sac brood b. chalk brood c. American foul brood d. **European foul brood**

8. One of the enemy of bee *Galleria mellonella* is a _____.

- a. bird b. **wax moth** c. wasp d. mite

9. One of the enemy of bee and the largest wasp in North India is _____.

- a. *Vespa tropica* b. *Vespa mandarinia* c. *Vespa basalis* d. *Vespa velutina*

10. Identify the endoparasite of bees from the following species of mites.

- a. *Chorioptes bovis* b. *Varroa jacobsoni* c. *Varroa under woodi* d. *Acarapis woodi*

11. Which one of the following is used by bees to fill cracks and to reduce openings?

- a. Pollen b. Honey c. **Propolis** d. Wax

12. Name the gland that secretes royal jelly.

- a. **Hypopharyngeal gland** b. Mandibular gland c. Salivary gland d. Wax gland

13. Which of the following is **NOT** a bee product?

- a. **Nectar** b. Honey c. Bee wax d. Bee venom

14. What does pollen consist of mainly?

- a. Fat b. Monosaccharide c. Disaccharide d. **Protein**

15. In which bee wax glands are found?

- a. Queen b. Drone c. **Worker** d. Both in worker and drone

16. Bee wax is secreted by the glands in _____.
- a. head b. thorax c. **ventral abdomen** d. hind legs
17. Granulation of honey can be prevented by heating up the honey at _____ °C for 30 minutes.
- a. 50 b. **70** c. 90 d. 100
18. In which of the following honey is greatly used?
- a. Siddha medicine b. Ayurvedic medicine
- c. Allopathic medicine d. **Ayurvedic and Unani medicine**
19. Find the important carbohydrate component of honey.
- a. Maltose b. Mannose c. **Levulose** d. Cellulose
20. 200gm honey provides as much as nourishments as _____ litre of milk.
- a. 1.5 b. 3.5 c. 5.5 d. 7.5
21. Show which of the following gives antiseptic property to the honey.
- a. Hydrochloric acid b. Malic acid c. **Formic acid** d. Acetic acid
22. To keep the natural quality of honey it should be stored at _____ °C.
- a. **10- 15** b. 15- 20 c. 20- 25 d. 25- 30
23. The water content of ripe honey is less than _____ %
- a. 80 b. 60 c. 40 d. **20**
24. What is the certification mark given for the honey in India?
- a. ISI b. BIS Hallmark c. **AGMARK** d. Eco mark

Unit III

1. How many times moulting occur during the life of silkworm?
- a. 2 b. 3 c. 4 d. 5
2. Life span of adult *Bombyx mori* is _____.
- a. 2 days b. 3 days c. **3-5 days** d. 6 days

3. Name the stage in which the larva spins silk threads around it.

- a. Egg b. Cocoon c. Zygote d. Worm

4. Which instrument is used to measure the moisture content in the rearing room?

- a. Sphygmomanometer b. Thermometer c. Hygrometer d. Calorimeter

5. The chandrike is used as _____.

- a. mountage b. reeler c. threader d. croissure

6. Which among the following is the fungal disease of silkworm ?

- a. Muscardine b. Flacherie c. Pebrine d. Sotto disease

7. Show the symptom of grasserie disease.

- a. Fever b. Headache c. Jaundice d. Gastric problem

8. Which among the following is the symptom of viral flacherie?

- a. Fever b. Jaundice c. Sluggishness d. Convulsion

9. Uzifly is a _____ of silkworm.

- a. pest b. predator c. pathogen d. host

10. Find out the chemotrap to attract and kill the adult uzifly.

- a. Uzi powder b. Water trap c. Uzi trap d. Uzicide

Unit IV

1. The number of kilograms of cocoons required to obtain one kilogram of reeled silk is known as _____.

- a. denier b. renditta c. shell ratio d. cocoon ratio

2. The unit of thickness of silk filament is _____.

- a. renditta b. denier c. shell ratio d. reelability

3. Double cocoons are formed due to _____.

- a. poor leaf quality b. insufficient food
c. lack of space on mountage d. genetic cause

4. Show India's position in world silk production.

a. I

b. II

c. III

d. last

5. Name the country where the silk industry first started.

a. India

b. China

c. Tibet

d. Africa

6. The beneficiary under MUDRA scheme is _____.

a. farmers

b. Institutions

c. weavers and spinners

d. NGO

7. Silk came to India through _____ in 4th century.

a. Tibet

b. China

c. Africa

d. France

8. Which among the following state is the main producing area for finished silk in the seventeenth century?

a. Karnataka

b. Gujarat

c. Tamil Nadu

d. Andhra Pradesh

9. Which type of silk excels in quality?

a. Univoltine

b. Bivoltine

c. Multivoltine

d. x bi hybrids

10. CSB is controlled by _____.

a. Ministry of Textiles

b. CSR-TI

c. Indian Silk Industry

d. Mughal Kings

Section B (2 marks)

Answer in about 50 words:

Unit I

1. Why do the rock bees unfit for apiculture?
2. Distinguish between Indian bee and European bee.
3. What is a queen excluder sheet?
4. What are the advantages of using comb foundation sheet?
5. How would you extract honey using an extractor?
6. What is a bee brush?

7. What is uncapping knife?
8. Write down the use of bee veil and bee gloves.
9. Enlist the needs for artificial feeding.
10. Define supersedure.
11. Write a short note on swarming.

Unit II

1. List out the diseases of brood.
2. Write short notes on septicemia.
3. Comment on the prevention and control of nosema.
4. Enlist the enemies of bees.
5. How do the wasps affect a colony of bees?
6. How would you protect the bee hive from ants?
7. List out the uses of pollen.
8. Mention any four uses of bee wax.
9. How would you extract bee venom?
10. Comment on the storage of honey.
11. What is AGMARK certificate?
12. Enlist any four uses of propolis.
13. Write down the medicinal properties of royal jelly.

Unit III

1. Write the importance of bed cleaning in silk worm rearing.
2. What type of rearing house is ideal for tropical countries?
3. List any two factors responsible for the successful rearing of silkworm.
4. Define Calcino.

5. List out the symptoms of viral Flacherie.
6. What is Nuclear Polyhedrosis disease?
7. Write a note on *Beauveria bassiana*
8. Comment on antimuscardinic agents.
9. What is Uzi trap? Write its significance.
10. What are the uses of chop sticks and feathers in silk worm rearing?

Unit IV

1. Define double cocoon.
2. How do you calculate shell ratio?
3. Define denier.
4. Differentiate brim and bave.
5. What is the purpose of stifling of cocoons?
6. How do you store the stifled cocoons?
7. What is brushing? What are the equipment used for brushing?
8. Define reeling.
9. Differentiate between reeling end and rosette.
10. List the functions of jette bote.

Unit V

1. Expand CSB and CSR&TI.
2. List the states practicing mulberry cultivation.
3. What are the most popular varieties of silk in India?
4. Mention the important weaving centres in Tamil Nadu.
5. State the reasons behind the decline of Indian silk industry after 1875.
6. Comment on bivoltine silk.
7. Bring out the functions of CSR&TI.
8. Mention the service offered to silk reelers by CSB.
9. Indicate the documents required for availing subsidies and loans for sericulture farming from NABARD.
10. What are the required amenities for getting subsidies and loans in sericulture through NABARD scheme?

Section C (5 marks)

Answer in about 200 words:

Unit I

1. Present an account on the Indian bee.
2. Describe *Apis mellifera* and the advantages of rearing the bee colony.
3. Discuss the popular type of artificial hive used in Tamil Nadu.
4. Describe Langstroth ten- frame hive.
5. Enlist the advantages of using modern hives.
6. Explain the parts and working of a honey extractor.
7. Enumerate the advantages of using queen excluder sheet and queen gate in artificial hives.
8. Briefly explain drone trap, pollen trap and their uses.
9. Discuss the feeding of bees during nectar and pollen dearths.
10. Enumerate the methods of feeding honey bees.
11. What is swarming? How is it controlled?
12. Analyse the various methods of introduction of queen bee.

Unit II

1. Comment on brood foul diseases and add a note on the preventive measures.
2. Explain fungal brood diseases and add a note on the preventive measures.
3. What is nosema disease? Discuss the causative agent and pathology.
4. Discuss the problems caused due to wax moths in a bee colony.
5. Write short notes on injuries caused by ants and wasps to a bee colony.
6. Present an account on the endoparasitic mite infestation of honey bees.
7. Describe the ectoparasitic mites of honey bees.
8. Explain how honey can be used as food.

9. Enumerate the medicinal values of honey.
10. Discuss the nutritive values of honey.
11. Explain the extraction of honey.
12. How would you extract bees wax?
14. Enlist the curative properties of bee venom.
15. Mention the economic importance of bee wax.
16. Describe Cornel bee venom extractor and the extraction of bee venom.
17. How would you extract propolis? Add a note on its uses.
18. Enumerate the medicinal properties of royal jelly.

Unit III

1. Explain the developmental stages of *Bombyx mori*.
2. Distinguish between shelf rearing and floor rearing of silkworm.
3. Explain the measures undertaken to control Uzi fly.
4. Discuss the symptoms of muscardine.
5. What are the control measures of muscardine?
6. Comment on uzi trap.
7. Highlight the physical control of Uzi fly.
8. Discuss the modes of transmission of polyhedrosis virus.

Unit IV

1. Explain the timings and methods of harvesting cocoons.
2. Write an account of cocoon sorting and deflossing.
3. "Hot air drying of cocoons is more scientific" - Justify the statement.
4. "Sun drying of cocoon is simple and cheap" - Explain.
5. Write a brief account on chamber steam stifling.
6. Write the difference between top reeling and sunken system.
7. Analyse the three pan system of cocoon boiling.
8. How do you store stifled cocoons for reeling?
9. Compare the different grades of silk.
10. Differentiate between barrel steaming and chamber steaming.

Unit V

1. Discuss the status of sericulture in Tamil Nadu.
2. Outline the functions assigned to Central Silk Board.
3. Discuss the services of CSB offered to State Sericulture Departments and NGOs.
4. Outline the role of NGOs in the development of sericulture industry.
5. Comment on MSME scheme in the sericulture development.
6. How are the weavers and spinners benefitted through MUDRA scheme.
7. Highlight NABARD subsidies for sericulture farming.
8. Discuss NABARD subsidies for reelers and reeling units.

SECTION D (10 marks)

Answer in about 400 words:

Unit I

1. 'Apiculture is an agri-horticulture and forest based cottage industry' – Justify.
2. Justify the reasons for keeping *Apis cerana* and *A. mellifera* in apiary.
3. Discuss the artificial hives and their advantages.
4. Explain the appliances used in an apiary.
5. What is swarming? Discuss its causes and preventive measures.
6. Outline the technique of rearing and introduction of queen bee.
7. What are comb foundation and smoker? Explain their use in modern bee keeping.
8. Write an account on artificial feeding of honey bees in an apiary.

Unit II

1. What are brood diseases? Describe the mode of infections, symptoms and control measures.
2. Describe any two diseases of adult bees and add a note on control measures.
3. Explain the life cycle, damage caused to the hive and control measures of wax-moths.
4. Outline the insect enemies of bees. Add a note on control measures.

5. Write an account on parasitic mites of honey bees.
6. Enumerate the nutritional and medicinal values of honey.
7. Evaluate the food value of honey.
8. How is bee venom extracted? Enumerate its curative value.
9. Explain the extraction and uses of bee wax.
10. How would you collect pollen from bees? Write down the uses of pollen.
11. Write an account on honey bee products.
12. Analyse the uses and collection of royal jelly.

Unit III

1. Elucidate the life cycle of Mulberry silk worms.
2. Give the details of rearing technology of late age silk worm.
3. With suitable diagrams describe the appliances used in silk worm rearing.
4. Give an account on the symptoms, causative agents of nuclear polyhedrosis diseases of silkworm. What steps will you take to control infection?
5. Present the causative organisms, symptoms and control of muscardine disease of silkworm.
6. Explain the biology and propagatory life cycle of Indian Uzi fly. Suggest the control measures.

Unit IV

1. Explain the commercial characters of cocoon.
2. Define and describe defective cocoons encountered in cocoon market.
3. Describe the cocoon market, marketing and its functioning.
4. Define stifling and describe the methods involved in it.
5. Explain the system of cocoon boiling and its essentiality.
6. Present a detailed account on cocoon boiling and brushing.
7. Analyse the open pan and three pan systems of cocoon boiling.
8. Discuss about reeling operation.
9. Describe the reeling appliances and by products of reeling.

Unit V

1. Give an account of origin, evolution and present status of sericulture in India.
2. "The birth of Central Silk Board is a boon to sericulture" – Justify.
3. Discuss the objectives, organization, functioning and achievements of CSB in India.
4. Present an account on the role of CSR & TI.
5. Select any two schemes for sericulture development.



**St. Mary's College (Autonomous)
Reaccredited with 'A+' Grade by
NAAC (Cycle IV)
Thoothukudi**



**Department of
Mathematics (SSC)
M.Sc Mathematics
Question Bank
2021-2023**

Section - A

Unit: I

- Every group is isomorphic to a subgroup of for some appropriate S .
a) $A(S)$ b) $Z(G)$ c) $N(a)$ d) $A(G)$
- If $\varphi: G \rightarrow H$ is a group homomorphism, then $\ker\varphi$ is the largest normal subgroup of G which..... H .
a) **contained in** b) contains c) not contains d) not contained in
- If any subgroup H of a group G contains a non-trivial normal subgroup then G cannot be
a) abelian b) **simple** c) normal d) non abelian
- If $a \notin Z(G)$ then
a) $N(a) = G$ b) $N(a) \neq G$ c) $Z(G) = G$ d) $Z(G) \neq G$
- Every permutation is the product of cycles.
a) 3 b) **2** c) odd d) even
- The alternating group A_n contains..... permutations.
a) **even** b) odd c) no d) either odd or even
- Conjugacy is relation on a group G .
a) partially ordered b) Reflexive c) equivalence d) both (b) & (c)
- $P(n)$ is the number of where n is an integer.
a) **partitions of n** b) divisors of n
c) prime factors of n d) partitions of a prime factor of n
- $N(a)$ is of G where a is an element of G .
a) Not subgroup b) **subgroup** c) centre d) normal subgroup
- If p is a prime and $p|o(G)$ then G has
a) subgroup of order p b) subgroup of order p^m c) **element of order p** d) prime order

11. If $a \in G$, then $C(a)$ is called
- a) Conjugate of a b) Centre of a c) Normalizer of a **d) Equivalence class of a**
12. $a \in Z(G)$ iff $G = \dots$
- a) Conjugate of a b) Centre of a **c) Normalizer of a** d) Conjugate class of a
13. If $O(G) = P^n$, then the centre of the group is
- a) Conjugate of a b) trivial c) Normalizer of a **d) non trivial**
14. If $O(G) = P^2$, then the group G is
- a) trivial b) non abelian **c) abelian** d) non trivial

Unit: II

15. If p is a prime number and $p^\alpha | o(G)$, $p^{\alpha+1} \nmid o(G)$ then G has a subgroup of order
- a) p^m b) p^n c) **p^α** d) p
16. If $p^m / o(G)$ and $p^{m+1} \nmid o(G)$ then G has a subgroup of order.....
- a) p b) p^{m+1} c) p^α d) **p^m**
17. $n(k) = \dots$
- a) 0 b) $1+p$ c) $1+p+p^2$ d) **$1+p+\dots+p^{k-1}$**
18. S_{p^k} has a sylow subgroup
- a) **P** b) P^k c) P^{k+1} d) P^{k-1}
19. A and B are conjugate then $A = \dots$
- a) **gbg^{-1}** b) $g^{-1}bg$ c) $gg^{-1}b$ d) bgg^{-1}
20. The number of p -sylows subgroup in G is of the form.....
- a) **$1+kp$** b) $1+p$ c) $2+kp$ d) $2+p$
21. The set AxB is a coset of A and B .
- a) **double** b) single c) finite d) infinite
22. In Third Sylow's theorem number of p - sylow's is of the form
- a) $1+km$ b) **$1+kp$** c) $1+Pp$ d) $1+sp$.
23. In Second Sylow's theorem two subgroups of G of same order are.....
- a) **Conjugate** b) Centre c) Normalizer d) Equivalent.
20. In Sylow's first theorem the group G has a
- a) **subgroup** b) element c) Normalizer d) centre.

Unit: III

24. If G is the internal direct product then $N_i \cap N_j = \dots\dots\dots$
a) 0 b) $\{e\}$ c) ab d) $abb^{-1}a^{-1}$
25. If G is the internal direct product of $N_1 \times N_2 \times \dots \times N_n$ and $T = N_1 \times N_2 \times \dots \times N_n$ then G and T are.....
a) abelian b) non abelian c) **isomorphic** d) non isomorphic
26. Every finite abelian group is the direct product ofgroups.
a) abelian b) non abelian c) **cyclic** d) non cyclic
27. If G and G' are isomorphic abelian group then $G(s)$ and $G'(s)$ are.....
a) **isomorphic** b) non isomorphic c) invariants d) abelian
28. Two abelian group of order p^n are isomorphic iff they have invariant.
a) different b) **same** c) group d) subgroup
29. Number of non isomorphic abelian group of order p^n equals number of
a) **partitions of n** b) partition of p c) partition of $n+1$ d) partition of p^n
30. If $a \in N_i, b \in N_j$ then
a) $ab = 0$ b) **$ab = ba$** c) $ab^{-1} = a^{-1}b$ d) $a = b$

Unit: IV

31. If φ is a homomorphism of R into R' then $\varphi(-a) = \dots\dots\dots$
a) $-\varphi(a)$ b) $\varphi(a)$ c) $\varphi(0)$ d) $\varphi(1)$
32. If φ is a homomorphism of R into R' with kernel $I(\emptyset)$ then $I(\emptyset)$ is a of R .
a) group b) **subgroup** c) ideal d) subideal
33. The homomorphism φ of R into R' is an isomorphism iff
a) **$I(\emptyset) = (0)$** b) $I(\emptyset) = (1)$ c) $I(\emptyset) = (R)$ d) $I(\emptyset) = (R')$
34. If U is an ideal of the ring R then is a ring.
a) U/R b) **R/U** c) RU d) UR
35. If R be a commutative ring with unit element whose only ideals are.....
a) R and 1 b) **R and (0)** c) (0) and F d) F and 1
36. M is a maximal ideal of R iff R/M is a
a) ring b) group c) **field** d) quotient ring
37. Every integral domain can be in a field.

- a) embedded b) **imbedded** c) quotient d) ideal

38. If the only ideals of R are (0) and R then R is a

- a) **field** b) group c) ring d) quotient ring

Unit: V

39. An Euclidean ring possesses aelement.

- a) all b) zero c) **unit** d) inverse

40. If $b \in R$ is not a unit in R then

- a) **$d(a) < d(ab)$** b) $d(a) > d(ab)$ c) $d(a) \leq d(ab)$ d) $d(a) \geq d(ab)$

41. If $a, b \in R$ are said to be relatively prime then their gcd is.....

- a) zero b) **one** c) two d) five

42. $J[i]$ is

- a) Ideal b) field c) **euclidean ring** d) integral domain

43. In Fermat theorem the prime number is of the form.....

- a) **$4n+1$** b) $4n+2$ c) $4n+3$ d) $4n+4$

44. $F[x]$ is an

- a) **integral domain** b) field c) polynomial in R d) unique factorization domain

42. In integer monic polynomial the highest coefficient is

- a) zero b) **one** c) two d) five

43. If R is a unique factorization domain then so is

- a) **$R[X]$** b) $F[X]$ c) $r(x)$ d) $f(x)$

44. The product of polynomial is also primitive.

- a) irreducible b) integer c) **primitive** d) any

45. If $a, b \in R$ are said to be associates if

- a) $a = bu$ b) **$b = ua$** c) $a = b^{-1}u$ d) $b = ua^{-1}$

Section B

Unit:I

1. Define Permutation.
2. Define even permutation.
3. Define odd permutation.
4. Define simple.

5. Define normal subgroup.
6. Define conjugate.
7. Define normalizer.
8. Define center of a group.
9. Define kernel.
10. Define right coset.
11. Define the partition of n .

Unit:II

12. Define p-sylow subgroup.
13. Define equivalence class.
14. Define the relation \sim .
15. Define conjugate.
16. Define double coset.

Unit: III

17. Define normal subgroup.
18. Define internal direct product.
19. Define external direct product.
20. Define cyclic group.
21. Define $G(s)$.
22. Define invariants of G

Unit:IV

23. Define ring homomorphism.
24. Define kernel.
25. Define isomorphism.
26. Define ideal.
27. Define maximal ideal.
28. Define imbedded.
29. Define integral domain.

Unit:V

30. Define Euclidean ring.
31. Define principal ideal.
32. Define a divide b .

33. Define greatest common divisor.
34. Define unit.
35. Define associates.
36. Define prime element.
37. Define relatively prime.
38. Define a polynomial.
39. Define product of two polynomials.
40. Define irreducible polynomial.
41. Define primitive polynomial.
42. Define content of polynomial.
43. Define integer monic polynomial.
44. Define unique factorization domain.

Section-C

Unit: I

1. If G is a group, H a subgroup of G and S is the set of all right cosets of H then prove that there is a homomorphism θ of G into $A(S)$ and the kernel of θ is the largest normal subgroup of G which is contained in H .
2. If G is a finite group and $H \neq G$ is a subgroup of G such that $o(G) \nmid i(H)$ then prove that H must contain a nontrivial normal subgroup of G . Also prove that G cannot be simple.
3. Prove that every permutation is the product of its cycles.
4. Prove that every permutation is a product of 2 - cycles.
5. Prove that conjugacy is an equivalence relation on G .
6. Prove $N(a)$ is a subgroup of G .
7. Prove that $a \in Z$ iff $N(a) = G$.
8. If G is finite then prove that $a \in Z$ iff $o(N(a)) = o(G)$.
9. If $o(G) = p^n$, where p is a prime number then prove that $Z(G) \neq \{e\}$.
10. If $o(G) = p^2$, where p is a prime number then prove that G is abelian.

Unit: II

11. If $p^m \mid o(G)$, $p^{m+1} \nmid o(G)$ then prove that G has a subgroup of order p^m .
12. Prove that $n(k) = 1 + p^2 + \dots + p^{k-1}$.
13. Prove that S_{p^k} has a p - sylow subgroup.

14. Prove that the relation \sim is an equivalence relation.
15. If A and B are the finite subgroups of G then prove that
$$o(AxB) = o(A) o(B) / o(A \cap xBx^{-1}).$$
16. If a finite group G is a subgroup of the finite group M and M has a p-sylow subgroup Q then prove that G has a p-sylow subgroup P. Also prove that $P = G \cap xQx^{-1}$ for some $x \in M$.

Unit: III

17. If G and G' are isomorphic abelian then prove that for any integer s, $G(s)$ and $G'(s)$ are isomorphic.
18. If G is an abelian group of order p^n and $G = A_1 \times A_2 \times \dots \times A_k$ where $A_i = (a_i)$ is cyclic of order p^{n_i} and m is any integer then prove that $G(p^m) = B_1 \times \dots \times B_t \times A_{t+1} \times \dots \times A_k$ where B_i is cyclic of order p^m . Also prove that the order of $G(p^m)$ is p^u , where $u = mt + \sum_{i=t+1}^k n_i$.
19. If G is an abelian group of order p^n and $G = A_1 \times A_2 \times \dots \times A_k$ where $A_i = (a_i)$ is cyclic of order p^{n_i} then prove that $o(G(p)) = p^k$.
20. If G is the internal direct product of N_1, N_2, \dots, N_n then prove that $N_i \cap N_j = (e)$ and if $a \in N_i, b \in N_j$ then $ab = ba$.
21. If G is the internal direct product of $N_1 \times N_2 \times \dots \times N_n$ and $T = N_1 \times N_2 \times \dots \times N_n$ then prove that G and T are isomorphic.

Unit: IV

22. If φ is a homomorphism of R into R' then prove that $\varphi(-a) = -\varphi(a)$ for every $a \in R$.
23. If φ is a homomorphism of R into R' with kernel $I(\varphi)$ then prove that
 - i) $I(\varphi)$ is a subgroup of R
 - ii) If $a \in I(\varphi)$ and $r \in R$ then both ar and ra are in $I(\varphi)$.
24. Prove that the homomorphism φ of R into R' is an isomorphism iff $I(\varphi) = (0)$.
25. If U is an ideal of the ring R then prove that R/U is a ring and is a homomorphic image of R.
26. If R is a commutative ring with unit element whose only ideals are (0) and R then prove that R is a field.

Unit: V

27. Prove that a euclidean ring possesses a unit element.
28. If R is an euclidean ring and A be an ideal of R then prove that there exists an element $a_0 \in A$ such that A consists exactly of all a_0x as x ranges over R .
29. If R is an euclidean ring then prove that any two elements a and b in R have a greatest common divisor d . Also prove that $d = \lambda a + \mu b$ for some $\lambda, \mu \in R$.
30. If R is an integral domain with unit element and suppose that for $a, b \in R$ both a/b and b/a are true then prove that $a = ub$ where u is a unit in R .
31. If R is an euclidean ring and $a, b \in R$. If $b \neq 0$ is not a unit in R then prove that $d(a) < d(ab)$.
32. If R is an euclidean ring then prove that every element in R is either a unit in R or can be written as the product of a finite number of prime elements of R .
33. If R is an euclidean ring suppose that for $a, b, c \in R$, a/bc but $(a, b) = 1$ then prove that a/c .
34. If π is a prime element in the euclidean ring R and π/ab then prove that π divides atleast one of a or b .
35. Prove that the ideal $A = (a_0)$ is maximal iff a_0 is a prime element of R .
36. If p is a prime integer and for some integer c relatively prime to p we can find x and y such that $x^2 + y^2 = cp$ then prove that p can be written as the sum of squares of two integers that is $p = a^2 + b^2$.
37. If p is a prime number of the form $4n+1$ then prove that $x^2 \equiv -1 \pmod{p}$.
38. If $f(x), g(x)$ are the two nonzero elements of $F[x]$ then prove that $\deg(f(x)g(x)) = \deg f(x) + \deg g(x)$.
39. If $f(x), g(x)$ are the two nonzero elements of $F[x]$ then prove that $\deg f(x) \leq \deg f(x)g(x)$.
40. Prove that $F[x]$ is an integral domain.
41. State and prove the division algorithm.
42. Prove that $F[x]$ is a principal ideal ring.
43. Prove that any polynomial in $F[x]$ can be written in a unique manner as a product of irreducible polynomials in $F[x]$.
44. Prove that the ideal $A = (p(x))$ in $F[x]$ is maximal iff $p(x)$ is irreducible over F .

45. Prove that the product of two primitive polynomials is a primitive polynomial.
46. If R is an integral domain then prove that $R[x]$ is also an integral domain.
47. If R is a unique factorization domain and if $a, b \in R$ are relatively prime and $a|bc$ then prove that $a|c$.
48. If $a \in R$ is an irreducible element and $a|bc$ then prove that $a|b$ or $a|c$.
49. If R is a unique factorization domain then prove that the product of two primitive polynomials is again a primitive polynomial in $R[x]$.
50. If R is a unique factorization domain and if $f(x)$ and $g(x) \in R[x]$ then, prove that $c(fg) = c(f)c(g)$.
51. If R is a unique factorization domain and if $p(x)$ is a primitive polynomial in $R[x]$ then prove that it can be factored in a unique way as the product of irreducible elements in $R[x]$.
52. If $f(x)$ in $R[x]$ is both primitive and irreducible as an element of $R[x]$ then prove that it is irreducible as an element of $F[x]$. Also prove the converse.

Section-D

Unit: I

1. State and prove Cayley's theorem.
2. Derive Class equation of G .
3. Prove that the number of elements conjugate to a in G is the index of the normalizer of a in G .
4. State and prove Cauchy theorem.
5. Prove that the number of conjugate classes is the number of partitions of n .

Unit: II

6. State and prove the first part of Sylow's theorem.
7. State and prove the second part of Sylow's theorem.
8. State and prove the third part of Sylow's theorem.
9. Prove that the number of p -Sylow subgroups in G equals $o(G)/o(N(P))$.

Unit: III

10. Prove that every finite abelian group is the direct product of cyclic groups.

11. Prove that two abelian groups of order p^n are isomorphic iff they have the same invariants.
12. Prove that the number of non isomorphic abelian groups of order p^n equals the number of partition of n .
13. Prove that G is the internal direct product of the normal subgroups of N_1, N_2, \dots, N_n iff
 - i) $G = N_1 N_2 \dots N_n$
 - ii) $N_i \cap (N_1 N_2 \dots N_{i-1} N_{i+1} \dots N_n) = (e)$

Unit:IV

14. If R and R' be rings and φ be a homomorphism of R onto R' with kernel U then prove that R' is isomorphic to R/U .
15. If R is a commutative ring with unit element and M is an ideal of R then prove that M is a maximal ideal of R iff R/M is a field.
16. Prove that every integral domain can be imbedded in a field.

Unit: V

17. If π is a prime element in the euclidean ring R and $\pi/a_1, a_2, \dots, a_n$ then prove that π divides atleast one of a_1, a_2, \dots, a_n .
18. State and prove Unique factorization theorem.
19. Prove that $J[i]$ is a euclidean ring.
20. State and prove Fermat's theorem.
21. Prove that $F[x]$ is Euclidean ring.
22. State and prove Gauss lemma.
23. State and prove the Eisenstein Criterion.
24. If R is an integral domain then prove that $R[x_1, x_2, \dots, x_n]$ is also an integral domain.
25. If R is a unique factorization domain then prove that $R[x]$ is also a unique factorization domain.
26. If R is a unique factorization domain then prove that $R[x_1, x_2, \dots, x_n]$ is also a unique factorization domain.

27. If F is a field then prove that $F[x_1, x_2, \dots, x_n]$ is also a unique factorization domain.

ST.MARY'S COLLEGE (Autonomous), THOOTHUKUDI-628001

QUESTION BANK

I M.Sc. Mathematics

Core II

Real analysis

Sub. Code: 21PMAC12

Semester I – (November)

SECTION – A

UNIT – I

1. A finite set has _____ limit points.
(a) Only one (b) infinite (c) finite (d) **no**
2. Closed subsets of compact sets are _____.
(a) **Compact** (b) closed (c) convex (d) perfect.
3. Every neighbourhood is a _____ set.
(a) Compact (b) closed (c) convex (d) **open.**
4. A set E is open iff its complement is _____.
(a) Compact (b) **closed** (c) convex (d) open.
5. Every finite set is _____.
(a) **Compact**(b)closed (c)convex (d)open.
6. $E = \bar{E}$ iff E is _____.
(a)**Closed** (b) bounded (c) unbounded (d) closed and bounded.
7. Compact subsets of metric spaces are _____.
(a)Compact (b) **closed** (c) convex (d) perfect.
8. [a,b] is _____.
(a)**Uncountable** (b) countable (c) disjoint (d) none
9. Open balls are _____.
(a)Compact (b) closed (c) **convex** (d) perfect.
10. Closed balls are _____.
(a)Compact (b) closed (c) **convex** (d) perfect.
11. Infinite union of open sets is _____.
(a) Compact (b) closed (c) convex (d) **open.**

12. Infinite intersection of closed sets is _____.

(a) Compact (b) **closed** (c) convex (d) open.

13. Finite union of closed sets is _____.

(a) Compact (b) **closed** (c) convex (d) open.

14. Finite intersection of open sets is _____.

(a) Compact (b) closed (c) convex (d) **open**.

15. If p is not a limit point of E then p is _____.

(a) **isolated point** (b) interior point (c) convex (d) closed.

16. If every limit point of E is a point of E then E is _____.

(a) Compact (b) **closed** (c) convex (d) open.

17. If every point of E is an interior point of E then E is _____.

(a) Compact (b) closed (c) convex (d) **open**.

18. If E is closed and if every point of E is a limit point of E then E is _____.

(a) Compact (b) closed (c) convex (d) **perfect**.

19. The set of all real numbers is _____.

(a) countable (b) **Uncountable** (c) disjoint (d) none

20. If P is a non empty perfect set in R^k then P is _____.

(a) **Uncountable** (b) countable (c) disjoint (d) none

21. The Cantor's set is _____.

(a) $P = \bigcup_{n=1}^k E_n$ (b) $P = \bigcup_{n=1}^{\infty} E_n$ (c) $P = \bigcap_{n=1}^k E_n$ (d) **$P = \bigcap_{n=1}^{\infty} E_n$**

22. The open ball B with centre at x and radius r is the set of all $y \in R^k$ such that

(a) **$|y - x| < r$** (b) $|y - x| \leq r$ (c) $|y - x| > r$ (d) $|y - x| \geq r$.

23. The closed ball B with centre at x and radius r is the set of all $y \in R^k$ such that

(a) $|y - x| < r$ (b) **$|y - x| \leq r$** (c) $|y - x| > r$ (d) $|y - x| \geq r$.

24. The set of all complex numbers is _____ .

(a) open (b) closed (c) perfect (d) **all of these**

25. The Cantor's set is _____.

- (a) **compact** (b) not compact (c) empty set (d) open

UNIT – II

26. $S_n = 1/n$ is a _____ sequence.

- (a) **Convergent** (b) divergent (c) subsequence (d) Cauchy

27. $S_n = 1 + \frac{(-1)^n}{n}$ is a _____ sequence.

- (a) **Convergent** (b) divergent (c) subsequence (d) Cauchy

28. $S_n = 1$ is a _____ sequence.

- (a) **Convergent** (b) divergent (c) subsequence (d) Cauchy

29. The range of the sequence $S_n = 1/n$ is _____.

- (a) finite (b) **bounded** (c) unbounded (d) none

30. The range of the sequence $S_n = 1 + \frac{(-1)^n}{n}$ is _____.

- (a) finite (b) **bounded** (c) unbounded (d) none

31. The range of the sequence $S_n = n^2$ is _____.

- (a) finite (b) bounded (c) **unbounded** (d) none

32. The range of the sequence $S_n = 1$ is _____.

- (a) infinite (b) **bounded** (c) unbounded (d) none

33. $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n =$ _____.

- (a) 1 (b) ∞ (c) n (d) **e**

34. $S_n = n^2$ is a _____ sequence.

- (a) Convergent (b) **divergent** (c) subsequence (d) Cauchy

35. If $p > 0$ then $\lim_{n \rightarrow \infty} \frac{1}{n^p} =$ _____.

- (a) 1 (b) ∞ (c) p (d) **0**

36. If $p > 0$ then $\lim_{n \rightarrow \infty} \sqrt[n]{p} = \underline{\hspace{2cm}}$.

- (a) **1** (b) ∞ (c) p (d) 0

37. $\lim_{n \rightarrow \infty} \sqrt[n]{n} = \underline{\hspace{2cm}}$.

- (a) **1** (b) ∞ (c) n (d) 0

38. If $p > 0$ and α is real, then $\lim_{n \rightarrow \infty} \frac{n^\alpha}{(1+p)^n} = \underline{\hspace{2cm}}$.

- (a) 1 (b) ∞ (c) np (d) **0**

39. If $\sum a_n$ converges then $\lim_{n \rightarrow \infty} a_n = \underline{\hspace{2cm}}$.

- (a) 1 (b) ∞ (c) np (d) **0**

40. If $|x| < 1$, then $\lim_{n \rightarrow \infty} x^n = \underline{\hspace{2cm}}$.

- (a) 1 (b) ∞ (c) np (d) **0**

41. If \bar{E} is the closure of a set E in a metric space X , then $\underline{\hspace{2cm}}$

- (a) $\text{diam } \bar{E} < \text{diam } E$ (b) **$\text{diam } \bar{E} = \text{diam } E$** (c) $\text{diam } \bar{E} > \text{diam } E$ (d) $\text{diam } \bar{E} \neq \text{diam } E$

42. A sequence $\{s_n\}$ of real numbers is said to be monotonically increasing if $\underline{\hspace{2cm}}$.

- (a) $s_n < s_{n+1}$ (b) **$s_n \leq s_{n+1}$** (c) $s_n > s_{n+1}$ (d) $s_n \geq s_{n+1}$

43. A sequence $\{s_n\}$ of real numbers is said to be monotonically decreasing if $\underline{\hspace{2cm}}$.

- (a) $s_n < s_{n+1}$ (b) $s_n \leq s_{n+1}$ (c) $s_n > s_{n+1}$ (d) **$s_n \geq s_{n+1}$**

44. The series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}$ converges if

- (a) **$p > 1$** (b) $p < 1$ (c) $p = 1$ (d) $p < 0$

45. The series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}$ diverges if

- (a) $p > 1$ (b) **$p \leq 1$** (c) $p > 2$ (d) $p = 2$

46. A sequence $\{s_n\}$ of real numbers is said to be strictly monotonically increasing if $\underline{\hspace{2cm}}$

- (a) **$s_n < s_{n+1}$** (b) $s_n \leq s_{n+1}$ (c) $s_n > s_{n+1}$ (d) $s_n \geq s_{n+1}$

47. A sequence $\{s_n\}$ of real numbers is said to be strictly monotonically decreasing if $\underline{\hspace{2cm}}$

- (a) $s_n < s_{n+1}$ (b) $s_n \leq s_{n+1}$ (c) $s_n > s_{n+1}$ (d) $s_n \geq s_{n+1}$

48. Closed subset of a complete metric spaces are **complete**

49. $\sum \frac{1}{n^p}$ converges if _____.

- (a) $p > 1$ (b) $p < 1$ (c) $p \leq 1$ (d) $p \geq 1$

50. $\sum \frac{1}{n^p}$ diverges if _____.

- (a) $p > 1$ (b) $p < 1$ (c) $p \leq 1$ (d) $p \geq 1$

UNIT - III

51. The radius of convergence of the series $\sum \frac{z^n}{n!}$ is _____.

- (a) 1 (b) ∞ (c) n (d) 0

52. If $\sum a_n = A$ and $\sum b_n = B$, then $\sum (a_n + b_n)$ is _____.

- (a) AB (b) A - B (c) A + B (d) $\frac{A}{B}$

53. The radius of convergence of the series $\sum n^n z^n$ is _____.

- (a) 1 (b) ∞ (c) n (d) 0

54. If the series $\sum a_n, \sum b_n, \sum c_n$ converge to A, B, C and $c_n = a_0 b_n + \dots + a_n b_0$

Then $c =$ _____.

- (a) AB (b) A - B (c) A + B (d) $\frac{A}{B}$

55. If $\sum a_n$ converges absolutely, then $\sum a_n$ _____.

- (a) Converges (b) diverges (c) uniform converges (d) oscillates

56. In Root test $\sum a_n$ converges if _____.

- (a) $\alpha \leq 1$ (b) $\alpha < 1$ (c) $\alpha = 1$ (d) $\alpha \geq 1$

57. In Root test $\sum a_n$ diverges if _____.

- (a) $\alpha \leq 1$ (b) $\alpha = 1$ (c) $\alpha > 1$ (d) $\alpha \geq 1$

58. Suppose

- (a) the partial sums A_n of $\sum a_n$ form a bounded sequence

(b) $b_0 \geq b_1 \geq b_2 \geq \dots$

(c) $\lim_{n \rightarrow \infty} b_n = 0$

Then of $\sum a_n b_n$ converges is known as _____ .

- (a) Leibnitz test (b) **Dirichlet test** (c) Merten's theorem (d) Abel' theorem

59. If $|z| = 1$, then the series $\sum z^n$

- (a) Converges (b) **diverges** (c) absolutely converges (d) has $R = \infty$

60. The series $\sum c_n z^n$ converges if z is in the **interior** of the circle.

61. The series $\sum c_n z^n$ diverges if z is in the **exterior** of the circle.

62. The series $\sum c_n z^n$ converges if _____

- (a) $|z| > R$ (b) **$|z| < R$** (c) $|z| \leq R$ (d) $|z| \geq R$

63. The series $\sum c_n z^n$ diverges if _____

- (a) **$|z| > R$** (b) $|z| < R$ (c) $|z| \leq R$ (d) $|z| \geq R$

UNIT - IV

64. $f(x) = \begin{cases} \sin \frac{1}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$ is continuous at

- (a) $x = 0$ (b) $x = 1$ (c) **$x \neq 0$** (d) $x \neq 1$

65. $f(x) = \begin{cases} x & \text{if } x \text{ is rational} \\ 0 & \text{if } x \text{ is irrational} \end{cases}$ is continuous at

- (a) **$x = 0$** (b) $x = 1$ (c) $x \neq 0$ (d) $x \neq 1$

66. $f(x, +)$ is known as _____ limit.

- (a) left hand (b) **right hand** (c) upper (d) lower

67. The composition of continuous function is _____.

- (a) **continuous** (b) discontinuous (c) uniformly continuous (d) local maxima

68. Continuous image of a compact set is _____.

- (a) **Compact** (b) closed (c) convex (d) open.

69. Inverse image of a closed set is _____.
- (a) Compact (b) **closed** (c) convex (d) open.
70. $f(x, -)$ is known as _____ limit.
- (a) **left hand** (b) right hand (c) upper (d) lower
71. Let f be monotonic on (a,b) , then the set of points of (a,b) at which f is discontinuous is _____.

(a) countable (b) uncountable (c) **atmost countable** (d) differentiable

72. For any real c , the set of real numbers x such that $x > c$ is called

(a) **neighborhood of $+\infty$** (b) neighborhood of $-\infty$

(c) neighborhood of $+c$ (d) neighborhood of $-c$

73. For any real c , the set of real numbers x such that $x < c$ is called

(a) neighborhood of $+\infty$ (b) **neighborhood of $-\infty$**

(c) neighborhood of $+c$ (d) neighborhood of $-c$

UNIT – V

74. Suppose f is a real differentiable function on $[a,b]$ and suppose $f'(a) < \lambda < f'(b)$. Then there is a point $x \in (a,b)$ such that $f'(x) =$ _____.

(a) 1 (b) λ' (c) **λ** (d) 0

75. Let f be defined on $[a,b]$; if f has a local maximum at a point $x \in (a,b)$, and if $f'(x)$ exists, then $f'(x) =$ _____.

(a) 1 (b) λ (c) b (d) **0**

76. Let f be defined on $[a,b]$. If f is differentiable at a point $x \in [a,b]$, then f is _____ at x .

(a) **continuous** (b) discontinuous (c) uniformly continuous (d) local maxima

77. If f and g are continuous real functions on $[a,b]$ which are differentiable in (a,b) , then there is a point $x \in (a,b)$ at which $[f(b) - f(a)] g'(x) = [g(b) - g(a)] f'(x)$ is known as

(a) Mean value theorem

(b) **Generalised mean value theorem**

(c) Taylor's theorem

(d) local maxima

78. If f is a continuous real function on $[a, b]$ which is differentiable in (a, b) , then there is a point $x \in (a, b)$ at which $[f(b) - f(a)] = (b - a) f'(x)$ is known as

- (a) **Mean value theorem** (b) Generalised mean value theorem
(c) Taylor's theorem (d) local maxima

79. If f is _____ on $[a, b]$, then f' cannot have any simple discontinuities on $[a, b]$.

- (a) continuous (b) uniformly continuous (c) **differentiable** (d) local maxima

80. Suppose f is differentiable in (a, b) , $f'(x) \geq 0$ and $x \in (a, b)$ then f is _____.

- (a) constant (b) **monotonically increasing**
(c) monotonically decreasing (d) differentiable

81. Suppose f is differentiable in (a, b) , $f'(x) = 0$ and $x \in (a, b)$ then f is _____.

- (a) **constant** (b) monotonically increasing
(c) monotonically decreasing (d) differentiable

82. Suppose f is differentiable in (a, b) , $f'(x) \leq 0$ and $x \in (a, b)$ then f is _____.

- (a) constant (b) monotonically increasing
(c) **monotonically decreasing** (d) differentiable

83. The derivative of any constant is _____.

- (a) **0** (b) 1 (c) 2 (d) constant

84. Let $f(x) = x \sin x$ then $f'(x) =$ _____.

- (a) $\cos x + x \sin x$ (b) $\cos x - x \sin x$ (c) $x \cos x - \sin x$ (d) **$x \cos x + \sin x$**

SECTION – B

UNIT - I

1. Define - Limit point
2. Define separated sets
3. Prove $d(x, y) = |x - y|$ is metric
4. Define - Neighbourhood of a set.
5. Define metric space.
6. Define - Interior point.
7. Define connected sets.

8. Prove $d(x,y) = |x^2 - y^2|$ is metric.
9. Define open ball.
10. Define closed ball.
11. Define convex.
12. Define isolated point.
13. Define closed set.
14. Define open set.
15. Define complement of a set.
16. Define perfect set.
17. Define bounded set.
18. Define dense set.
19. Define closure of E.
20. Define compact set.

UNIT - II

21. Define diameter of E.
22. Define convergent sequence.
23. Define Cauchy sequence.
24. How do you define a subsequence?
25. Define bounded sequence.
26. Suppose $\{s_n\}, \{t_n\}$ are complex sequences, and $\lim_{n \rightarrow \infty} s_n = s, \lim_{n \rightarrow \infty} t_n = t$. Then $\lim_{n \rightarrow \infty} (s_n + t_n) = s + t$.
27. Define subsequential limit.
28. Define range of sequence.
29. Define complete metric space and give examples.
30. Define the number e.
31. Define monotonic sequence.
32. Define series.

UNIT -III

33. If $\sum a_n = A$ and $\sum b_n = b$, then $\sum (a_n + b_n) = A + B$.

34. Define power series with example.
35. Define absolute convergence of a series and give a suitable example.
36. Write the partial summation formula.
37. Find the radius of convergence of the series $\sum n^n z^n$.
38. Find the radius of convergence of the series $\sum \frac{z^n}{n!}$.
39. Define the Cauchy's product of $\sum a_n$ and $\sum b_n$.
40. Define power series.
41. Define absolutely convergent.
42. Define rearrangement of $\sum a_n$.

UNIT - IV

43. Define continuity of a function at a point.
44. When is a function said to be bounded?
45. Define uniformly continuous.
46. Define discontinuity.

UNIT - V

47. Define local maximum.
48. If f is differentiable at x then f is continuous at x . Is the converse true? Justify.
49. Define n th derivative of f .
50. State generalized mean value theorem.
51. State mean value theorem.
52. Define local minimum.
53. State Roll's theorem.

SECTION - C

UNIT- I

1. A set E is open iff its complement is closed.

2. Prove that compact subsets of metric spaces are closed.
3. If E is an infinite subset of a compact set K , then E has a limit point in K .
4. Explain – The Cantor's set
5. Closed subsets of a compact sets are compact.
6. Let E be a non empty set of real numbers which is bounded above .Let $y = \sup E$.Then $y \in \bar{E}$. Hence $y \in E$ if E is closed.
7. Prove that if $\{K_\alpha\}$ is a collection of compact subsets of a metric space X such that the intersection of every finite sub collection of $\{K_\alpha\}$ is non empty then $\bigcap K_\alpha$ is nonempty.
8. Prove that R^k is a metric space with the metric $d(x, y) = |x - y|$ $(x, y) \in R^k$
9. Define neighbourhood and prove that every neighbourhood is an open set.
10. If p is a limit point of a set E , then every neighbourhood of p contains infinitely many points of E .
11. Prove that a finite set has no limit point.
12. A set F is closed iff its complement is open.
13. If F is closed and K is compact, then $F \cap K$ is compact.
14. If $\{K_n\}$ is a sequence of non empty compact sets such that $K_n \supset K_{n+1}$ ($n = 1, 2, 3, \dots$) then $\bigcap_{n=1}^{\infty} K_n$ is non empty.

UNIT – II

15. In any metric space X , every convergent sequence is a Cauchy sequence.
16. $\{P_n\}$ converge to $p \in X$ iff every neighbourhood of p contains all but finitely many of the terms of $\{P_n\}$.
17. $\sum \frac{1}{n^p}$ converges if $p > 1$ and Diverges if $p \leq 1$.
18. Show that e is irrational.
19. If \bar{E} is the closure of a set E in a metric space X , then $\text{diam } \bar{E} = \text{diam } E$.

20. Show that $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e$

21. Let $\{P_n\}$ be a sequence in a metric space X.

(a) If $p \in X, p' \in X$ and if $\{P_n\}$ converges to p and to p' then $p' = p$.

(b) If $\{P_n\}$ converges then $\{P_n\}$ is bounded.

22. State and prove the comparison test.

23. Every bounded sequence in R^k contains a convergent subsequence.

24. The subsequential limit of a seq $\{P_n\}$ in a metric space X form a closed subset of X.

25. If K_n is a sequence of compact sets in X such that $K_n \supset K_{n+1}$ ($n = 1, 2, 3, \dots$) and if $\lim_{n \rightarrow \infty} \text{diam} K_n = 0$ then $\bigcap_{n=1}^{\infty} K_n$ consists of exactly one point.

26. If $s_n \leq t_n$ for $n \geq N$, where N is fixed, then

$$\liminf_{n \rightarrow \infty} s_n \leq \liminf_{n \rightarrow \infty} t_n$$

$$\limsup_{n \rightarrow \infty} s_n \leq \limsup_{n \rightarrow \infty} t_n$$

27. $\sum a_n$ converges iff for every $\varepsilon > 0$ there is an integer N such that $|\sum_{k=n}^m a_k| \leq \varepsilon$ (1)

if $m \geq n \geq N$. In particular, by taking $m = n$ (1) becomes $|a_n| \leq \varepsilon$, $n \geq N$.

28. If $\sum a_n$ converges then $\lim_{n \rightarrow \infty} a_n = 0$.

29. If $0 \leq x < 1$ then $\sum_{n=0}^{\infty} x^n = \frac{1}{1-x}$. If $x \geq 1$, the series diverges.

30. If $p > 1, \sum_{n=2}^{\infty} \frac{1}{n(\log n)^p}$ converges and if $p \leq 1$, the series diverges.

UNIT -III

31. State and Prove Mertens theorem.

32. State and Prove Leibnitz theorem.

33. State and prove the Ratio Test.

34. State and prove the Root Test.

35. State and prove Dirichlet's Test

36. Give an example to show that the product of two convergent series may diverge.

37. Suppose the radius of convergence of $\sum c_n z^n$ is 1, and suppose

$c_0 \geq c_1 \geq c_2 \geq \dots$, $\lim_{n \rightarrow \infty} c_n = 0$. Then $\sum c_n z^n$ converges at every point on the circle $|z| = 1$, except possibly at $z = 1$.

38. If $\sum a_n$ converges absolutely, then $\sum a_n$ converges. Is the converse true? prove it.

39. If the series $\sum a_n, \sum b_n, \sum c_n$ converge to A, B, C and $c_n = a_0 b_n + \dots + a_n b_0$ then $C = AB$.

UNIT – IV

40. The composition of continuous function is continuous.

41. Suppose f is a continuous mapping of a compact metric space X into a metric space Y . Then prove that $f(X)$ is compact.

42. Prove that continuous function of a continuous function is continuous.

43. If f is a continuous mapping of a metric space X into a metric space Y , and if E is a connected subset of X , then prove that $f(E)$ is connected.

44. Let f and g be complex continuous functions on a metric space X . Then $f + g, fg$ and f/g are continuous on X .

45. Suppose $E \subset X$, a metric space, p is a limit point of E , f and g are complex functions on E

and $\lim_{x \rightarrow p} f(x) = A, \lim_{x \rightarrow p} g(x) = B$. Then

(a) $\lim_{x \rightarrow p} (f + g)(x) = A + B$

(b) $\lim_{x \rightarrow p} (fg)(x) = AB$

(c) $\lim_{x \rightarrow p} \frac{f}{g}(x) = \frac{A}{B}$ if $B \neq 0$.

46. If f is a continuous mapping of a compact metric space X into R^k , then $f(X)$ is closed and bounded. Thus f is bounded.

47. Let f be a continuous real function on the interval $[a, b]$. If $f(a) < f(b)$ and if c is a number such that $f(a) < c < f(b)$, then there exists a point $x \in (a, b)$ such that $f(x) = c$.

48. Let f be monotonic on (a, b) . Then the set of points of (a, b) at which f is discontinuous is at most countable.

UNIT V

49. Suppose f is a real differentiable function on $[a, b]$ and suppose $f'(a) < \lambda < f'(b)$. Then there is a point $x \in (a, b)$ such that $f'(x) = \lambda$.

50. State and prove mean value theorem.

51. Let f be defined on $[a, b]$. If f is differentiable at a point $x \in [a, b]$, then f is continuous at x .

52. Suppose f and g are defined on $[a, b]$ and are differentiable at a point $x \in [a, b]$. Then $f + g$,

$fg, \frac{f}{g}$ are differentiable at x , and

$$(a) (f+g)'(x) = f'(x) + g'(x)$$

$$(b) (fg)'(x) = f'(x)g(x) + f(x)g'(x)$$

$$(c) \left(\frac{f}{g}\right)'(x) = \frac{g(x)f'(x) - g'(x)f(x)}{g^2(x)}, \quad g(x) \neq 0$$

53. Let f be defined on $[a, b]$; if f has a local maximum at a point $x \in (a, b)$, and if $f'(x)$ exists, then $f'(x) = 0$.

SECTION -D

UNIT - I

1. Prove that every K -cell is compact.

2. State and prove Heine Borel theorem.

3. State and prove Weierstrass theorem.

4. Let P be a non empty perfect set in R^k . Then P is uncountable.

UNIT – II

5. Suppose $a_1 \geq a_2 \geq a_3 \geq \dots \geq 0$ then the series $\sum_{n=1}^{\infty} a_n$ converges iff the series

$$\sum_{k=0}^{\infty} 2^k a_{2k} = a_1 + 2a_2 + 4a_4 + 8a_8 + \dots \text{converges.}$$

6. Suppose $\{S_n\}$ is monotonic, then $\{S_n\}$ converges iff it is bounded.

7. State and prove Comparison test.

8.(a) If X is a compact metric space and if $\{P_n\}$ is a Cauchy sequence in X , then $\{P_n\}$ converges to some point of X .

(b) In \mathbb{R}^k , every Cauchy sequence converges.

9. Suppose $\{s_n\}, \{t_n\}$ are complex sequences and $\lim_{n \rightarrow \infty} s_n = s, \lim_{n \rightarrow \infty} t_n = t$. Then

(a) $\lim_{n \rightarrow \infty} (s_n + t_n) = s + t$;

(b) $\lim_{n \rightarrow \infty} c s_n = cs, \lim_{n \rightarrow \infty} (c + s_n) = c + s$, for any number c ;

(c) $\lim_{n \rightarrow \infty} s_n t_n = st$;

(d) $\lim_{n \rightarrow \infty} \frac{1}{s_n} = \frac{1}{s}$, provided $s_n \neq 0$ ($n = 1, 2, 3, \dots$), and $s \neq 0$.

10. (a) If $p > 0$, then $\lim_{n \rightarrow \infty} \frac{1}{n^p} = 0$

(b) If $p > 0$, then $\lim_{n \rightarrow \infty} \sqrt[n]{p} = 1$

(c) $\lim_{n \rightarrow \infty} \sqrt[n]{n} = 1$

(d) If $p > 0$ and α is real, then $\lim_{n \rightarrow \infty} \frac{n^\alpha}{(1+p)^n} = 0$

(e) If $|x| < 1$, then $\lim_{n \rightarrow \infty} x^n = 0$.

UNIT –III

11. State and Prove Riemann theorem.

12. For a sequence $\{c_n\}$ of positive numbers, prove that

i) $\liminf_{n \rightarrow \infty} \frac{C_{n+1}}{C_n} \leq \liminf_{n \rightarrow \infty} \sqrt[n]{C_n}$

ii) $\limsup_{n \rightarrow \infty} \sqrt[n]{C_n} \leq \limsup_{n \rightarrow \infty} \frac{C_{n+1}}{C_n}$

13. Let $\sum a_n$ be a series of real numbers which converges, but not absolutely. Suppose $-\infty \leq \alpha \leq \beta \leq \infty$. Then there exists a rearrangement $\sum a'_n$ with partial sums s'_n such that $\liminf_{n \rightarrow \infty} s'_n = \alpha$, $\limsup_{n \rightarrow \infty} s'_n = \beta$.

14. Suppose

i) $\sum_{n=0}^{\infty} a_n$ converges absolutely

ii) $\sum_{n=0}^{\infty} a_n = A$

iii) $\sum_{n=0}^{\infty} b_n = B$

iv) $C_n = \sum_{k=0}^n a_k b_{n-k}$, $(n=0,1,2,\dots)$

Then prove that $\sum_{n=0}^{\infty} c_n = AB$.

UNIT – IV

15. Let f be a continuous mapping of a compact metric space X into a metric space Y . Then f is uniformly continuous on X .

16. A mapping f of a metric space X into a metric space Y is continuous on X iff $f^{-1}(V)$ is open in X for every open set V in Y .

17. Let E be a non-compact set in \mathbb{R} . Then prove that

i) there exists a continuous function on E , which is not bounded.

ii) there exists a continuous and bounded function on E , which has no maximum.

iii) If, in addition, E is bounded, then prove that, there exists a continuous function on E , which is not uniformly continuous.

18. A mapping f of a metric space X into a metric space Y is continuous on X iff $f^{-1}(C)$ is closed in X for every closed set C in Y .

UNIT V

19. State and prove chain rule.

20. If f and g are continuous real functions on $[a,b]$ which are differentiable in (a,b) , then there is a point $x \in (a,b)$ at which $[f(b) - f(a)] g'(x) = [g(b) - g(a)] f'(x)$.

21. State and prove L'Hospital's Rule.

22. State and prove Taylor's theorem.

ST. MARY'S COLLEGE (AUTONOMOUS)-THOOTHUKUDI

Question Bank

I M. Sc., Mathematics

Core - III Ordinary Differential Equations

Sub Code: 21PMAC13

SECTION-A (One Marks):

UNIT-I

1. If $R(x)$ is identically zero then the equation $y'' + Py' + Qy = R(x)$ is called _____
a) non homogenous b) **homogenous** c) bessel equation d) independent
2. If $R(x)$ is not identically zero then the equation $y'' + Py' + Qy = R(x)$ _____
a)non homogenous b) homogenous c) bessel equation d) independent
3. If $f(x)$ is identically Zero then $f(x)$ & $g(x)$ are called _____
a)dependent b) **linearly dependent** c) linearly independent d) wronskian
4. $\omega = y_1y_2' - y_2y_1'$ is called _____ equation.
a)**wronskian** b) bessel c) legendric d) homogenous
5. The general solution $y =$ _____
a) $c_1y_1 + c_2y_2$ b) $vy_1 + vy_2$ c) $y_1 + y_2$ d) vy_1
6. Known solution to unknown solution general equation is $y_2 =$ _____
a) cy_1 b) vy_2 c) **vy_1** d) $y_1 + cy_2$
7. Variation of parameter general equation is $y =$ _____
a) $c_1y_1 + c_2y_2$ b) **$v_1y_1 + v_2y_2$** c) $y_1 + y_2$ d) v_1v_2
8. If $y'' + y = \tan x$ where $R(x)$ is _____
a)0 b) $\tan 2x$ c) **$\tan x$** d) 1
9. If the general solution is $y = c_1\cos x + c_2\sin x$ then the values of y_1 & y_2 value is _____
a) $\sin x, \cos x$ b) c_1, c_2 c) **$\cos x, \sin x$** d) 1,1

UNIT-II

10. Power series is of the form _____
a) $\sum_{n=0}^{\infty} a_n x^n$ b) $\sum_{n=1}^{\infty} a_n x^n$ c) $\sum_{n=0}^{\infty} a_n x^{m+n}$ d) $\sum_{n=0}^{\infty} a_n x^{n-1}$
11. If the power series is convergent then _____ exists
a) **$\lim_{m \rightarrow \infty} a_m x^m$** b) $\lim_{m \rightarrow \infty} a_m x^{m-1}$ c) $\lim_{m \rightarrow \infty} a_m x^{m+1}$
d) $\lim_{m \rightarrow 0} a_m x^m$

12. $\sum_{n=0}^{\infty} x^n$ converges for _____
 a) $|x| < 1$ b) $|x| > 1$ c) $|x| = 1$ d) $|x| = 0$
13. $\sum_{n=0}^{\infty} x^n$ diverges for _____
 a) $|x| > 1$ b) $|x| < 1$ c) $|x| = 1$ d) $|x| = 0$
14. The radius of converges is the power series is _____
 a) $|x| < R$ b) $|x| > R$ c) $|x| = R$ d) $|x| = 0$
15. The radius of diverges is the power series is _____
 a) $|x| < R$ b) $|x| > R$ c) $|x| = R$ d) $|x| = 0$
16. If $f(x) = f(0) + \frac{x}{1!}f'(0) + \frac{x^2}{2!}f''(0) + \dots$ is known as _____ series.
 a) **maclaurin's** b) power c) legendric d) convergent
17. The equation $(1-x^2)y'' - xy' + p^2y = 0$ is called _____ equation.
 a) maclaurin's b) tailor's c) **chebyshev's** d) picard's
18. Radius of converges formula is _____
 a) $R = \lim_{n \rightarrow \infty} \left| \frac{a_n}{a_{n+1}} \right|$ b) $\lim_{n \rightarrow \infty} \left(\frac{a_n}{a_{n+1}} \right)$ c) $R = \lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right|$ d) $\lim_{n \rightarrow \infty} \left(\frac{a_{n+1}}{a_n} \right)$
19. $(1-x^2)y'' - 2xy' + p(p+1)y = 0$ is known as _____ equation.
 a) maclaurin's b) tailor's c) **legendric** d) piccard's
20. If $x^2y'' + xy' + (x^2 - p^2)y = 0$ is called _____ equation
 a) hermit b) **bessel** c) legendric d) indicial
- UNIT-III**
21. Singular point is not an _____ point .
 a) irregular b) regular c) **ordinary** d) regular singular
22. If a point x_0 is a singular point and is not regular is called _____
 a) regular point b) singular point c) **irregular point** d) ordinary point
23. The series is of the form $y = \sum_{n=0}^{\infty} a^n x^{m+n}$ is called _____
 a) **frobenius series** b) hermit series c) bessel equation d) indicial equation.
24. If $(x-x_0)P(x)$ and $(x-x_0)^2Q(x)$ are analytic at point _____
 a) x_1 b) 0 c) x d) **x_0**
25. A point x_0 is a singular point which is not regular is called _____ point.
 a) **irregular** b) regular c) ordinary d) regular singular
26. If $m(m-1) + p_0 m + q_0 = 0$ is called _____ equation.
 a) hermit b) bessel c) legendric d) **indicial**
27. Then n^{th} legendric polynomial $a_n =$ _____

a) $\frac{(2n)!}{n!2^n}$ b) $\frac{(2n)!}{(n!)^2 2^n}$ c) $(2n)!$ d) $\frac{(2n)!}{2^n}$

28. The expression of the Rodrigues formula is _____

a) $P_n(x) = 1/n! d^2/dx^2(x-1)^n$ b) $P_n(x) = 1/2^n n! d^2/dx^2(x^2-1)^n$

c) $P_n(x) = d^2/dx^2(x-1)^n$ d) $P_n(x) = 1/n! d^2/dx^2(x+1)^n$

29. Generating Legendre polynomial is of the form _____

a) $\sum_{n=0}^{\infty} P_n(x) t^n$ b) $\sum_{n=0}^{\infty} P_n(t) x^n$

c) $\sum_{k=0}^{\infty} P_k(x) t^n$ d) $\sum_{k=0}^{\infty} P_k(x)$

30. If $J_p(x)$ is defined by _____

a) $\frac{\sum_{n=0}^{\infty} (-1)^n (x/2)^{2n+p}}{n!(n+p)!}$ b) $\sum_{n=0}^{\infty} (-1)^n (x/2)^{2n+p}$

c) $\frac{\sum_{n=0}^{\infty} (-1)^n (x/2)^{2n+p}}{(n+p)!}$ d) $\sum_{n=0}^{\infty} (-1)^n (x/2)^{2n+p}/n!$

31. If $d/dx (J_0(x)) =$ _____

a) $xJ_0(x)$ b) $-J_1(x)$ c) $J_{-1}(x)$ d) $J_0(x)$

32. Gamma function is defined by _____

a) $\Gamma(p) = \int_0^{\infty} e^{-t} t^{p-1} dt$ b) $\Gamma(p) = \int_0^{\infty} e^{-2t} t^{p-1} dt$

c) $\Gamma(p) = \int_0^{\infty} e^{-t} t^p dt$ d) $\Gamma(p) = \int_0^{\infty} e^{-t} t dt$

33. The value of $\Gamma(1/2)$ _____

a) $\sqrt{\pi}/2$ b) $\sqrt{\pi}$ c) $\sqrt{\pi}/4$ d) $1/2$.

37. If $P_0(1) =$ _____

a) 0 b) 2 c) 1 d) -1

34. . The Legendre function are orthogonal on _____

a) (-1, 1) b) [a, b] c) [-1, 1] d) (0, ∞)

35. . The Bessel equation first kind of order P is denoted by _____

a) $J_p(x)$ b) $J_{-p}(x)$ c) $J_{-1/2}(x)$ d) $J_{-3/2}(x)$

36. The Bessel equation second kind of order P is denoted by _____

a) $J_p(x)$ b) $J_{-p}(x)$ c) $J_{-1/2}(x)$ d) $J_{-3/2}(x)$

37. The value of $3 \sqrt{\frac{\pi}{4}} =$ _____

a) $(-1/2)!$ b) $(1/2)!$ c) $(3/2)!$ d) $(-3/2)!$

38. If $d/dx(x^p J_p(x)) =$ _____

a) $x^p J_0(x)$ b) $x^p J_{p-1}(x)$ c) $x^p J_1(x)$ d) $-x^p J_{p-1}(x)$

39. If $\sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x \right) =$ _____

- a) **J_{3/2}(x)** b) J_{-1/2}(x) c) J_{-3/2}(x) d) J_{5/2}(x)

UNIT-IV

40. Piccard's nth approximation y_n is.....

- a) $y_0 + \int_{x_0}^x f(t, y_n(t)) dx$ b) $y_0 + \int_{x_0}^x f(t, y_{n-1}(t)) dx$
 c) $y_0 + \int_{x_0}^x f(x, y_2) dx$ d) $y_0 + \int_{x_0}^x f(t, y_{n-2}(t)) dx$

41. Any linear combination of two solution of the homogeneous system is also a _____

- a) first order linear equation b) **solution** c) lineær d) homogeneous

42. $\frac{dx}{dt} = 4x - y$, $\frac{dy}{dt} = 2x + y$ this homogeneous linear system with constant

$x = e^{3t}, y = e^{3t}$ $x = e^{2t}, y = 2e^{2t}$ then w(t) is _____

- a) e^{6t} b) e^{5t} c) e^{-2t} d) e^{4t}

43. If w(t) is the wronskian of the two solution $x = x_1(t), y = y_1(t)$ and $x = x_2(t), y = y_2(t)$ then w(t) is either identically zero or _____

- a) Zero b) **never zero**
 c) not vanish d) solution

44. The two solutions are _____ if two constants c_1 and c_2 atleast one of which is not zero.

- a) **linearly independent** b) dependent c) independent d) constant

45. F(x,y)=xy , then F satisfies the _____ condition on any rectangle $a \leq x \leq b, c \leq y \leq d$.

- a) **lipschitz** b) linear c) wronskian d) piccards

UNIT V

46. Which of the following BVP is linear?

- b) $x'' + |x| = 0, 0 \leq t \leq \pi; x(0) = x(\pi) = 0$
 b) $x'' - 4x = e^t, 0 \leq t \leq 1; x(0).x(1) = x'(0), x'(1) = 0$
 c) $x'' + \sin x = 0, x(0) = x(2\pi) = 0$
 d) **$x'' + x = 0, x(0) = x(\pi), x'(0) = x'(\pi)$**

47. The BVP $2tx'' + x' + x = 0, x(-1) = 1, x(1) = 1$ is _____

- a) **singular** b) regular c) both singular and regular d) Neither singular nor regular

48. For the Sturm-Liouville problem $(1 + x^2)y'' + 2xy' + \lambda x^2 y = 0$ with $y'(1) = 0$ and $y'(10) = 0$, the eigen values, λ satisfies

- a) $\lambda \geq 0$ b) $\lambda < 0$ c) $\lambda \neq 0$ d) $\lambda \leq 0$

49. The eigen values for the BVP $x'' + \lambda x = 0 ; x(0) = 0 ; x(\pi) + x'(\pi) = 0$ satisfy

- a) $\lambda + \tan \lambda \pi = 0$ b) $\sqrt{\lambda} - \tan \lambda \pi = 0$ c) $\sqrt{\lambda} + \tan \pi \sqrt{\lambda} = 0$ d) $\lambda + \tan \sqrt{\lambda} \pi = 0$

SECTION – B (Two Marks):

UNIT-I

1. Define Second order linear equation.
2. Define Homogenous equation.
3. Define Wronskian.
4. By eliminating the constant c_1 & c_2 find the differential equation of $y = c_1 x + c_2 x^2$.
5. By eliminating the constant c_1 & c_2 find the differential equation of $y = c_1 \sin kx + c_2 \cos kx$.
6. Find the particular solution of $y'' - 2y = \sin x$.

UNIT-II

7. Define: Power series.
8. Define: Radius of convergence.
9. Define: Taylor's Formula (Series).
10. Define: Maclaurin's series.
11. Define: Ordinary & Singular point.
12. Use the Ratio test verify $R=0$ for $\sum_{n=0}^{\infty} n! x^n$
13. Use the Ratio test verify $R=1$ for $\sum_{n=0}^{\infty} x^n$
14. Use the Ratio test verify $R=\infty$ for $\sum_{n=0}^{\infty} \frac{(-1)^n x^{(2n+1)}}{(2n+1)!}$
15. Use the Ratio test verify $R=\infty$ for $\sum_{n=0}^{\infty} \frac{(-1)^n x^{(2n)}}{(2n)!}$

UNIT-III

16. Define regular singular point.
17. Define Irregular Singular point?
18. Find the singular point of order p of the Bessel equation $x^2y'' + xy' + (x^2 - p^2)y = 0$.
19. Define Frobenius series?
20. Define Hermits polynomial?
21. Define Hermits function?
22. Define Hermits Series?
23. Find the regular singular point of $x^2y'' + xy' + (x^2 - p^2)y = 0$.
24. Find the regular singular point of $x^2y'' + (2 - x)y' = 0$.
25. Find the indicial equation of $2x^2y'' + x(2x + 1)y' - y = 0$.
26. Determine the nature of point $x = 0$ for $y'' + (\sin x)y = 0$.
27. Determine the nature of point $x = 0$ for $xy'' + (\sin x)y = 0$.
28. Define n^{th} Legendric polynomial.
29. Define Legendric series.
30. Define Generating function of a Legendric polynomial.
31. Write Bessel equation of first kind of order p and second kind of order p .
32. Define Gamma function
33. Define Bessel functions.
34. Find $J_0(x)$
35. Find $(1/2)!$ and $(3/2)!$
36. Prove that $J_{3/2}(x) = \sqrt{\frac{2}{\pi x}} \left(\frac{\sin x}{x} - \cos x \right)$
37. Prove that $J_{-5/2}(x) = \sqrt{\frac{2}{\pi x}} \left(\frac{3 \cos x}{x^2} + \frac{3 \sin x}{x} - \cos x \right)$

UNIT-IV

38. State Piccards theorem.
39. State Lipschitz theorem.
40. State Paneo's theorem.
41. Define Non Homogeneous equation.
42. Show that $f(x, y) = xy^2$ satisfies a Lipschitz condition on any rectangle $a \leq x \leq b$ and $c \leq y \leq d$.
43. Define linear system.

44. $\frac{dx}{dt} = 4x - y$, $\frac{dy}{dt} = 2x + y$ this homogeneous linear system with constant

$x = e^{3t}, y = e^{3t}$ $x = e^{2t}, y = 2e^{2t}$ then find the general solution.

UNIT-V

45. Define Linear Homogeneous BVP.

46. Define Non Homogeneous BVP.

47. Define Periodic Boundary Condition.

48. Define singular linear BVP.

49. Define orthogonal function.

50. Define Green's function.

51. Is the BPV $x'' - 9x = 0$, $x(0) = 1$, $x(\infty) = 0$ regular? Give the reason.

52. Is the BPV $x'' + |x| = 0$, $0 \leq t \leq \pi$, $x(0) = x(\pi) = 0$ linear? Give the reason.

53. Is the BVP $2x'' - 3x' + 4x = 0$, $x(-\infty) = 0$, $x(0) = 1$ a regular linear BVP.

SECTION – C (Five Marks):

UNIT-I

1. Show that $y = c_1 \sin x + c_2 \cos x$ is the general solution of $y'' + y = 0$ and find particular solution for which $y(0) = 2$, $y'(0) = 3$
2. Show that e^x and e^{-x} are linearly independent solution of $y'' - y = 0$ on any interval.
3. Show that $y = c_1 x + c_2 x^2$ general solution of $x^2 y'' - 2xy' + 2y = 0$ on any interval not containing zero and find particular solution for which $y(1) = 3$, $y'(1) = 5$.
4. If $y_1 = \sin x$ is a solution of $y'' + y = 0$. Find the general solution.
5. Derive uses of known solution to unknown solution.
6. Derive the Method of Variation of Parameter.
7. If $y_1 = e^x$ is a solution of $y'' - y = 0$. Find the general solution.

UNIT-II

8. Find the power series solution of $y' = y$.
9. Find the power series solution of $xy' = y$ and verify the answer.
10. Find the general solution of the equation $y'' + y = 0$ in terms of power series in x . Can you express this solution as elementary function?
11. Find the general solution of $(1+x^2)y'' + 2xy' - 2y = 0$ by power series.

12. In differential equation $y' = 1 + y^2$ is a non-linear equation and it is easy to see that $y = \tan x$ is the particular solution of above equation for which $y(0)=0$.
13. Find the power series solution of $y' + y = 1$.

UNIT- III

14. Find indicial equation of the roots of the equation $4x^2y'' + (2x^4 - 5x)y' + (3x^2 + 2)y = 0$.
15. Bessel Equation of order $p = 1/2$ is $x^2 y'' + xy' + (x^2 - \frac{1}{4})y = 0$. Prove that $m_1 - m_2 = 1$, but show that it two independent frobenieus series solution.
16. Find the general solution of the Hermit equation or solve the hermit equation $y'' - 2xy' + 2py = 0$ (p is constant).
17. Find regular singular point of $x^2 (x^2 - 1)^2 y'' - x(1 - x)y' + 2y = 0$.
18. Find regular singular point of $(1 - x^2)y'' - 2xy' + p(p + 1)y = 0$.
19. Find indicial equation of the roots of the equation $x^3 y'' + (\cos 2x - 1)y' + 2xy = 0$.
20. Prove that $\int_{-\infty}^{\infty} W_n^2(x) dx = 2^n n! \sqrt{\pi}$
21. Prove that $\int_{-\infty}^{\infty} W_m(x) W_n(x) dx = 0$.
22. Find the general solution of the Hermit equation.
23. If $W_n(x)$ satisfies the equation then prove that $W_n'' + (2n + 1 - x^2) W_n = 0$.
24. Find the indicial equation of the roots of the equation $x^2 y'' + xy' + (x^2 - 1)y = 0$.
25. Find $P_0(x)$, $P_1(x)$, $P_2(x)$ and $P_3(x)$ for legendre's polynomial.
26. Prove that $(n + 1/2)! = (2n + 1)! / 2^{2n+1} n! \sqrt{\pi}$.
27. The legendric function are orthogonal on $[-1, 1]$.
28. Prove that any polynomial $P(x)$ can be expanded as a legender series $P(x) = \sum a_n P_n(x)$
29. Prove that
- $d/dx(J_0(x)) = -J_1(x)$
 - $d/dx(xJ_1(x)) = xJ_0(x)$
30. Prove that $\Gamma(p + 1) = p \Gamma(p)$
31. Prove that $\Gamma(1/2) = \sqrt{\pi}$ by using Gamma function.

UNIT-IV

32. Solve $\frac{dx}{dt} = 2x$; $\frac{dy}{dt} = 3y$.
33. Show that $x = e^{4t}, y = e^{4t}$ and $x = e^{-2t}, y = -e^{-2t}$ are linearly independent solution $\frac{dx}{dt} = x + 3y$, $\frac{dy}{dt} = 3x + y$. Write the general solution find the particular solution for which $x(0)=5$, $y(0)=1$.
34. If $F(x, y) = xy$
- F satisfies the Lipschitz condition on any rectangle $a \leq x \leq b, c \leq y \leq d$.
 - F satisfies the Lipschitz condition on any strip $a \leq x \leq b, -\infty < y < \infty$.
35. Show that $x = 2e^{4t}, y = 3e^{4t}$ and $x = e^{-t}, y = -e^{-t}$ are linearly independent solution $\frac{dx}{dt} = x + 2y$, $\frac{dy}{dt} = 3x + 2y$. Find the general solution.
36. Find the general solution of the linear system $\frac{dx}{dt} = x + 2y$, $\frac{dy}{dt} = 3x + 2y$ by differentiating the first equation w.r.to t and eliminating y and differentiating the second equation w.r.to t and eliminating x.
37. Prove that If w(t) is the wronskian of the two solution $x = x_1(t), y = y_1(t), x = x_2(t), y = y_2(t)$ of the homogeneous system. $x=c_1x_1(t) + c_2x_2(t); y=c_1y_1(t) + c_2y_2(t)$, then w(t) is either identically zero or never zero.
38. Find the exact solution of the initial value problem $y' = y, y(0) = 1$ starting with $y_0(x)=1$ apply Piccard's method to calculate $y_1(x), y_2(x)$ and $y_3(x)$.
39. Find the exact solution of the initial value problem $y' = y^2, y(0) = 1$ starting with $y_0(x)=1$ apply Piccard's method to calculate $y_1(x), y_2(x)$ and $y_3(x)$.

UNIT-V

40. Assume that A, B are finite real numbers, the function $p'(t), q(t)$ and $r(t)$ are real valued continuous functions on [A,B] m_1, m_2, m_3 and m_4 are real numbers and let x_m and x_n be two eigenfunctions of the BVP $(px')' + qx + \lambda rx = 0, A \leq t \leq B$, where λ is a real parameter corresponding to two distinct eigen values λ_m and λ_n then prove that $[p W(x, y)]_A^B = 0$.
41. Find the eigen values and eigen function of the strum-Liouville problem $x'' + \lambda x = 0, 0 < t \leq \pi; x'(0) = x'(\pi) = 0$.
42. Find the eigen values and eigen function of the strum-Liouville problem

$$x'' + \lambda x = 0, 0 < t \leq \pi; x(0) = 0, x'(\pi) = 0.$$

43. Find the eigen values and eigen function of the strum-Liouville problem

$$x'' + \lambda x = 0, 0 < t \leq \pi; x(0) = x(\pi) = 0.$$

44. Find the eigen values and eigen function of the strum-Liouville problem

$$x'' + \lambda x = 0, 0 < t \leq \pi; x'(0) = 0, x(\pi) = 0.$$

45. State with reasons whether the following BVPs are linear homogeneous, linear non-homogeneous or non-linear.

(i) $x'' + \sin x = 0, x(0) = x(2\pi) = 0.$

(ii) $x'' + x = \sin 2t, x(0) = x(\pi), x'(0) = x'(\pi).$

46. Construct Green's function for the boundary value problem $x'' = f(t);$

$$x(0) = x(1) = 0.$$

SECTION – D (10 Marks):

UNIT-I

- If $y_1(x)$ and $y_2(x)$ are linearly independent solution of the homogenous equation $y'' + P(x)y' + Q(x)y = 0$ on $[a, b]$. Then $c_1y_1 + c_2y_2$ is a general solution of the given equation on $[a, b]$.
- Find the particular solution of $y'' + y = \operatorname{cosec} x$ by Variation of Parameter.
- Find the particular solution of $y'' + y = \tan x$ by Variation of Parameter.
- Find the particular solution of $y'' - 2y' + y = 2x$ by Variation of Parameter.
- Find the particular solution of $y'' + 2y' + 5y = e^{-x} \sec 2x$ by Variation of Parameter.
- Find the particular solution of $y'' + 4y = \tan 2x$ by Variation of Parameter.
- Find the particular solution of $y'' + 2y' + y = e^{-x} \log x$ by Variation of Parameter.
- If $y_1 = x^2x^2$ is the solution of $x^2y'' + xy' - 4y = 0$. Find the general solution.
- Show that $y = c_1x + c_2x^2$ general solution of $x^2y'' - 2xy' + 2y = 0$ on any interval not containing zero and find particular solution for which $y(1) = 3, y'(1) = 5$.

UNIT-II

10. Express $y = \sin^{-1} x$ in the form of power series $\sum a_n x^n$ by solving the equation by

$$y' = (1 - x^2)^{-1/2} \text{ in two ways and using the result Prove that } \frac{\pi}{6} = \frac{1}{2} + \frac{1}{2} \left(\frac{1}{3}\right) \frac{1}{2^3} + \dots$$

11. Prove that $y = (1 + x)^p$ where p is the arbitrary constant in the particular solution of the differential equation $(1 + x)y' = py$ with $y(0) = 1$.

12. Find the power series solution of $y' + y = 1$.
13. Prove that Chebyshev's Equation, Find the linearly independent series is valid for $|x| < 1$.
14. Hermite's equation is $y'' - 2xy' + 2py = 0$.where p is a constant. Show that its general solution is $y(x) = a_0y_1(x) + a_1y_2(x)$, where $y_1(x) = 1 - \frac{2p}{2!}x^2 + \frac{2^2p(p-2)}{4!}x^4 - \dots$.. and $y_2(x) = x - \frac{2(p-1)}{3!}x^3 + \frac{2^2(p-1)(p-3)}{5!}x^5 - \dots$..

UNIT-III

15. Verify whether the following equations is a regular singular point at origin and calculate the two independent Frobenius series $2xy'' + (x + 1)y' + 3y = 0$.
16. The equation $2xy'' + (3 - x)y' - y = 0$ has only one frobenius solution and find the general solution.
17. Find the generating function of the Hermit polynomial.
18. Solve the differential equation $2x^2y'' + x(2x + 1)y' - y = 0$ by the method of frobenius series and also find the general solution and prove that $x = 0$ is a regular singular solution.
19. Prove that the equation $4x^2y'' - 8x^2y' + (4x^2 + 1)y = 0$ has only one Frobenius solution and find the general solution.
20. Prove that the equation $4xy'' + 2y' + y = 0$ has two Frobenius solution and find the general solution.
21. Find the particular solution of the Bessel function.
22. Prove that
- (i) $d/dx (x^p J_p(x)) = x^p J_{p-1}(x)$.
 - (ii) $d/dx (x^{-p} J_p(x)) = -x^{-p} J_{p+1}(x)$.
23. Prove that (i) $J_p'(x) = \frac{1}{2} (J_{p-1}(x) - J_{p+1}(x))$
(ii) $p/x J_p(x) = \frac{1}{2} (J_{p-1}(x) + J_{p+1}(x))$
24. Find the first three terms of the legendric series
- i. $f(x) = \begin{cases} 0 & \text{if } -1 \leq x \leq 0 \\ x & \text{if } 0 \leq x \leq 1 \end{cases}$
 - ii. $f(x) = e^x$
25. Prove that legendric polynomial form a sequence of orthogonal function in the interval $-1 \leq x \leq 1$. (or) Prove that $\int_{-1}^1 p_n^2(x) dx = \frac{2}{2n+1}$.

UNIT-IV

26. Solve $\frac{dx}{dt} = 3x - 4y$ $\frac{dy}{dt} = x - y$

27. Solve $\frac{dx}{dt} = 4x - 2y$ $\frac{dy}{dt} = 5x + 2y$

28. Find the general solution of the linear system.

$$\frac{dx}{dt} = x + y \quad \frac{dy}{dt} = 4x - 2y.$$

29. State and prove Piccard's theorem.

30. Find the exact solution of the initial value problem $y' = x + y, y(0)=1$ starting with

a) $y_0(x) = 1$ b) $y_0(x) = e^x$ c) $y_0(x) = \cos x$. Also apply Piccard's method to calculate $y_1(x), y_2(x)$ and $y_3(x)$.

31. Find the exact solution of the initial value problem $y' = 2x(1 + y), y(0) = 1$ starting with

$y_0(x) = 0$ apply Piccard's method to calculate $y_1(x), y_2(x)$ and $y_3(x)$.

UNIT-V

32. Show that the eigen values for the BVP $x'' + \lambda x = 0 ; x(0) = 0; x(\pi) + x'(\pi) = 0$ satisfy the equation $\sqrt{\lambda} = -\tan \pi\sqrt{\lambda}$. . Prove that the corresponding eigenfunctions are $\sin(t\sqrt{\lambda_n})$ where λ_n is an eigenvalue.

33. Let $G(t, s) = \begin{cases} -\frac{y(t)z(s)}{A} & \text{if } t \leq s \\ \frac{y(s)z(t)}{A} & \text{if } t \geq s \end{cases}$. Then prove that $x(t)$ is a solution of

$L(x) + f(t) = 0, a \leq t \leq b$ with $m_1x(a) + m_2x'(a) = 0, m_3x(b) + m_4x'(b) = 0$ with the usual assumption that at least one of m_1 and m_2 and one of m_3 and m_4 are non zero iff $x(t) = \int_a^b G(t, s)f(s)ds$.

34. Show that the Green's function for $L(x) = x'' = 0, x(1) = 0; x'(0) + x'(1) = 0$ is

$$G(s, t) = \begin{cases} 1 - s, & t \leq s \\ 1 - t, & t \geq s \end{cases} . \text{Hence solve the boundary value problem } x'' = f(t) ,$$

$x(0) + x(1) = 0, x'(0) + x'(1) = 0$, where

(i) $f(t) = \sin \pi t ;$

(ii) $f(t) = e^t ; 0 \leq t \leq 1.$ (iii) $f(t) = t.$

35. Consider the BVP $x'' + f(t, x, x') = 0, x(a) = 0, x(b) = 0$. Show that $x(t)$ is a solution of the above BVP if and only if $x(t) = \int_a^b G(t, s)f(s, x(s), x'(s))ds$ is the Green 's function given by

$$(b - s)G(t, s) = \begin{cases} (b - t)(s - a) & \text{if } a \leq s \leq t \leq b \\ (b - s)(t - a) & \text{if } a \leq t \leq s \leq b \end{cases}$$

ST.MARY'S COLLEGE (AUTONOMOUS) THOOTHUKUDI

I M.Sc Mathematics

SEMESTER I

CORE-IV Mathematical Statistics Sub. code: 21PMAC14
(for those who joined in July 2021 and after)

Question Bank

Section-A

Unit – I

- The conditional mean of Y ,given $X = x$ is _____
a) $E(Y|x) = \mu_2 + \rho \frac{\sigma_1}{\sigma_2} (x - \mu_1)$ b) $E(Y|x) = \mu_2 + \rho \frac{\sigma_1}{\sigma_2} (x + \mu_1)$
c) $E(Y|x) = \mu_2 + \rho \frac{\sigma_2}{\sigma_1} (x - \mu_1)$ d) $E(Y|x) = \mu_2 + \rho \frac{\sigma_1}{\sigma_2} (x - \mu_2)$
- The expected value of the product of two random variables is _____.
a) $\mu_1\mu_2 + cov(X, Y)$ b) $\mu_1\mu_2$ c) $cov(X, Y)$ d) $\mu_1\mu_2 - cov(X, Y)$
- When $u(x)$ is a linear function of x, then Y has _____.
a) Conditional pdf b) **linear conditional mean** c) conditional mean d) marginal pdf
- The random variables X_1 and X_2 are said to be independent if and only if _____.
a) $f(x_1, x_2) \equiv f_1(x_1)f_2(x_2)$ b) $f(x_1, x_2) \equiv f_1(x_1)+f_2(x_2)$
c) $f(x_1, x_2) \equiv f_1(x_1)-f_2(x_2)$ d) $f(x_1, x_2) \equiv f_1(x_1)/f_2(x_2)$
- The independence of X and Y, implies the correlation coefficient of X and Y equal to _____.
a) 1 b) **0** c) -1 d) infinite
- The conditional pdf of discrete type $f_{2|1}(x_2|x_1) =$ _____.
a) $f(x_1, x_2)$ b) $\mu_1\mu_2$ c) $\frac{f(x_1, x_2)}{f_2(x_2)}$ d) $\frac{f(x_1, x_2)}{f_1(x_2)}$
- The conditional probability of the event A_2 , given the event A_1 is $P(A_2|A_1)=$ _____.
a) $P(A_1)$ b) $P(A_1 \cup A_2)$ c) $\frac{P(A_1 \cup A_2)}{P(A_2)}$ d) $\frac{P(A_1 \cup A_2)}{P(A_1)}$
- The conditional mean of X_1 , given $X_2 = x_2$ is _____.
a) $E(X_1|x_1)$ b) $E(X_2|x_1)$ c) $E(X_1|x_2)$ d) $E(X_2|x_2)$
- The conditional expectation of $u(X_1)$, given $X_2 = x_2$ is given by _____.
a) $\int_0^\infty u(x_1) f_{2|1}(x_2|x_1)dx_1$ b) $\int_{-\infty}^\infty u(x_1) f_{1|2}(x_1|x_2)dx_1$
c) $\int_0^\infty u(x_2) f_{2|1}(x_2|x_1)dx_1$ d) $\int_{-\infty}^\infty u(x_1) f_{1|2}(x_1|x_2)dx_2$

Unit – III

21. A function of one or more random variable that does not depend upon any unknown parameter is called _____
- a) variance b) mean c) **statistic** d) independent
22. The statistics $\bar{X} = \underline{\hspace{2cm}}$ is called the mean of the random sample.
- a) $\frac{\sum X_i}{n}$ b) $(1 - \beta t)^{-1}$ c) $\sum X_i n$ d) $\sum \left(\frac{X_i}{n}\right)$
23. The Statistic $s^2 = \underline{\hspace{2cm}}$ is called the variance of the random sample.
- a) $\frac{\sum X_i}{n}$ b) $\frac{\sum (X_i - \bar{X})^2}{n}$ c) $\frac{\sum (X_i + \bar{X})^2}{n}$ d) $\frac{\sum (X_i * \bar{X})^2}{n}$
24. The p.d.f of a cauchy's distribution is _____
- a) $\frac{1}{(\pi(1+x^2))}$ b) $\frac{1}{(\pi(1-x^2))}$ c) $1 * (\pi(1+x^2))$ d) 0
25. The beta distribution has mean _____
- a) $\frac{\alpha}{(\alpha+\beta)}$ b) $\alpha(\alpha+\beta)$ c) $\alpha(\alpha - \beta)$ d) $\alpha(\alpha\beta)$
26. The p. d.f of double exponential is _____
- a) 0 b) $\frac{1}{2} e^{-(y_1)}$ c) $\frac{1}{2} e^{-y_1}$ d) none
27. The variance of beta distribution is _____
- a) $(\alpha\beta) \left(\frac{(\alpha+\beta)^2}{(\alpha+\beta+1)} \right)$ b) $(\alpha\beta) ((\alpha+\beta)^2(\alpha+\beta+1))$
- c) $\frac{(\alpha\beta)}{(\alpha+\beta)^2} (\alpha+\beta+1)$ d) $\frac{(\alpha\beta)}{((\alpha+\beta)^2(\alpha+\beta+1))}$

Unit – IV

28. The p.d.f of a cauchy's distribution is _____
- a) $\frac{1}{(\pi(1+x^2))}$ b) $\frac{1}{(\pi(1-x^2))}$ c) $1 * (\pi(1+x^2))$ d) 0
29. The Dirichlet distribution formula is _____
- a) $f(x) f(y)$ b) $\Gamma \frac{(\alpha_1 + \dots + \alpha_{(k+1)})}{(\Gamma(\alpha_1) + \dots + \Gamma(\alpha_{(k+1)}))}$ c) $\frac{(\Gamma(\alpha_1 + \dots + \alpha_{(k+1)}))}{(\Gamma(\alpha_1) \dots \Gamma(\alpha_{(k+1)}))}$ d) none
30. Weak law of large numbers is _____.
- a) $\lim_{n \rightarrow \infty} \Pr (| \bar{X}_n - \mu | \geq K\sigma / \sqrt{n}) \leq 0$ b) $\Pr (| X_n - \mu | \geq K\sigma / \sqrt{n}) \leq 1$
- c) $\Pr (| X_n - \sigma | \geq K\sigma / \sqrt{n}) \leq 0$ d) $\lim_{n \rightarrow \infty} \Pr (| X_n - \sigma | \geq K\sigma / \sqrt{n}) \leq 0$
31. The difference between two independent random variables, normally distributed has the mean equal to _____.
- a) **difference of mean** b) sum of means c) product of mean d) zero

32. The distribution function is $F(x) =$ _____

- a) $\int_a^b f(x)dx$ b) $\int_a^\infty f(x)dx$ c) $\int_{-\infty}^\infty f(x)dx$ d) $\int_a^x f(x)dx$

Unit – V

33. Mean and Variance of \bar{X}_n are ____ and ____.

- a) μ and σ b) μ^2 and σ^2 c) μ and σ^2 d) μ and σ^2/n

34. \bar{X}_n , $n = 1, 2, 3, \dots$, converges in probability to μ if σ^2 is _____

- a) infinite b) **finite** c) positive d) negative

35. A stronger type of convergence is given by _____

- a) $\lim_{n \rightarrow \infty} \Pr(|X_n - \sigma| < \epsilon) = 1$ b) $\Pr(|X_n - \mu| \geq K\sigma/\sqrt{n}) \leq 1$
c) $\Pr(|\bar{X}_n - \sigma| \geq K\sigma/\sqrt{n}) \leq 0$ d) **$\Pr(\lim_{n \rightarrow \infty} Y_n = c) = 1$**

36. \bar{X}_n , $n = 1, 2, 3, \dots$ of random sample converges with probability 1 to the mean μ of the distribution forms _____

- a) **$\lim_{n \rightarrow \infty} \Pr(|\bar{X}_n - \sigma| < \epsilon) = 1$** b) $\Pr(|X_n - \mu| \geq K\sigma/\sqrt{n}) \leq 1$
c) $\Pr(|\bar{X}_n - \sigma| \geq K\sigma/\sqrt{n}) \leq 0$ d) $\lim_{n \rightarrow \infty} \Pr(|X_n - \sigma| \geq K\sigma/\sqrt{n}) \leq 0$

37. $\lim_{n \rightarrow \infty} F(x) = F(x)$ and $F(x)$ is continuous then the distribution is called _____

- a) moment-generating distribution b) **limiting distribution**
c) generating distribution d) none

38. Y_n has a limiting poisson distribution with mean _____

- a) **m** b) a c) b d) a b

39. The random variable $Y_n = (Z_n - n)/\sqrt{2n}$ has a _____ distribution.

- a) **Limiting standard normal** b) standard normal c) normal d) limiting

40. The random variable $(\sqrt{n}(\bar{x} - \mu))/\sigma$ has an approximate mean and variance is ____

- (a) **0, 1** (b) 1,0 (c) 0, (d) 1,1

41. Moment generating function of central limit $M(t) =$ _____

- a) **$E(e^{t(X-\mu)})$** b) $1 + m''\left(\frac{t^2}{2}\right)$ c) 1,0 d) normal

Section B

Unit – I

1. Define conditional pdf.
2. Define covariance.
3. Define mutually independent variables.
4. Write the condition for independent random variables.

5. Define correlational coefficient.
6. Prove that pairwise independence does not implies mutually independence.
7. Prove that the independence of two random variables X and Y with means μ_1 and μ_2 and positive variances σ_1^2 and σ_2^2 implies that the correlational coefficient of X and Y is Zero.
8. Let the joint pdf of X_1 and X_2 be $f(x_1, x_2) = \begin{cases} x_1 + x_2, & 0 < x_1 < 1, 0 < x_2 < 1 \\ 0 & \text{elsewhere} \end{cases}$.
Prove that the random variables X_1 and X_2 are dependent.
9. Prove that $Pr(a < X_1 < b, c < X_2 < d) \neq Pr(a < X_1 < b) Pr(c < X_2 < d)$.
10. Let the joint pdf of X_1 and X_2 be $f(x_1, x_2) = \begin{cases} 8x_1x_2, & 0 < x_1 < x_2 < 1 \\ 0 & \text{elsewhere} \end{cases}$.

Unit II

11. Define Bernoulli's distribution.
12. Write the p.d.f of Binomial distribution.
13. If the m.g.f of a random variable X is $(t) = (\frac{2}{3} + \frac{1}{3} e^t)^5$. Find the mean and variance.
14. Write the m.g.f of trinomial distribution.
15. Write the mean of geometrical distribution.
16. Give the p.d.f and m.g.f for the poisson distribution.
17. What is meant by poisson process?
18. Let X be the $\chi^2(10)$. Find $pr(3.25 \leq X \leq 20.5)$.
19. Find the m.g.f of chi square distribution.
20. If X is $\chi^2(5)$ determine the constant c & d so that $pr(c < X < d) = 0.95$ and $pr(X < c) = 0.025$.
21. Define Normal Distribution.
22. Let X be $N(\mu, \sigma^2)$ find $pr(\mu - 2\sigma < x < \mu + 2\sigma)$.
23. Find the mean for normal distribution.
24. Find the variance for the normal distribution.

Unit – III

25. Define sample theory.
26. Define statistics.
27. Show that $S^2 = \sum \frac{X_i^2}{n} - \overline{X}^2$
28. Define stochastically independent random variable.
29. If X have the binomial p.d.f $X \sim (3, 2/3)$. Find the p.d.f $Y = X^2$.

- If X have the p.d.f $f(x) = \begin{cases} \frac{1}{3}, & x = 0,1,2, \dots \\ 0 & \text{elsewhere} \end{cases}$. Find the p.d.f of $Y = 2x+1$.
30. Let X have the p.d.f. $f(x) = \begin{cases} \frac{x^2}{9}, & 0 < x < 3 \\ 0 & \text{elsewhere} \end{cases}$.Find the p.d.f. of $Y = X^3$
31. What is the p.d.f of b – distribution?
32. What is the p.d.f of t - distribution?
33. What is the p.d.f of F - distribution?
34. Show that the t-distribution with $r = 1$ degrees of freedom and the cauchy's distribution are same.
35. Define Dirichlet distribution and give Dirichlet p.d.f.

Unit – IV

36. Define joint p.d.f of Y_n and the marginal p.d.f of Y_n .
37. Define moment generating function technique.
38. Define expectations of functions of random variable.
39. Let $X_1, X_2, \dots, \dots, X_n$ denote a random sample of size n from a distribution that is $N(\mu, \sigma^2)$. Derive a chi-square distribution with n degrees of freedom.
40. Let $X_1, X_2, \dots, \dots, X_n$ denote the outcomes on n Bernoulli trials. Show that the m.g.f of $X_i, i=1,2,3,\dots,n$ is $M(t) = 1 - p + pe^t$.
41. Let $X_1, X_2, \dots, \dots, X_n$ be independent variables with chi-square distribution $\chi^2(r_1), \chi^2(r_2), \dots, \dots, \chi^2(r_n)$. Show that the random variable $Y = X_1 + X_2 + \dots + X_n$ has a chi-square distribution with $r_1 + r_2 + \dots + r_n$ degrees of freedom (i.e) $Y \sim \chi^2(r_1 + \dots + r_n)$.
42. Write properties of \bar{X} and s^2 .
43. Let \bar{X} be the mean of a random sample of size 5 from a normal distribution with $\mu=0$ and $\sigma^2 = 125$. Determine c so that $\text{pr}(\bar{X} < c) = 0.90$
44. If \bar{X} is the mean of a random sample of size n from a normal distribution with mean μ and variance 100. Find n so that $\text{pr}(\mu - 5 < \bar{X} < \mu + 5) = 0.954$.
45. Let S^2 be the variance of a random sample of size 6 from the normal distribution $N(\mu, 12)$. Find $\text{pr}(2.30 < S^2 < 22.2)$.
46. Let X_1, X_2, \dots, X_n denote a random sample of size n from a normal distribution. Then the random variable $Y = \sum_{i=1}^n \frac{X_i - \mu}{\sigma}$ has a chi-square distribution with n degree of freedom.
47. Define the joint pdf of any two order statistics $Y_i < Y_j$ in terms of $F(x)$ and $f(x)$.
48. Let X_1 and X_2 be independent with normal distribution $N(6, 1)$ and $N(7, 1)$. Find Pr

($X_1 > X_2$)

49. Let X_1 and X_2 be independent random variable. Let X_1 and $Y = X_1 + X_2$ has chi- square distribution with r_1 and r degree of freedom respectively with $r_1 < r$. Show that X_2 has a chi – square distribution with $r – r_1$ degrees of freedom.

Unit – V

50. Let T_n have the t-distribution with n degrees of freedom $n=1, 2, 3, \dots$. Show that the distribution is a limiting standard normal distribution.
51. Define limiting moment generating functions.
52. Let $F_n(u)$ denote the distribution function of a random variable U_n whose distribution depends upon the positive integer n . Further, let U_n converge in probability to the positive constant c and let $\Pr (U_n < 0) = 0$ for every n . Then show that the random variable $\sqrt{U_n}$ Converges in probability to \sqrt{c} .
53. Let Y_n denote a random variable that is $b(n, p), 0 < p < 1$. Then show that $U_n = \frac{y_n - np}{\sqrt{np(1-p)}}$
54. Let \bar{X}_n denote the mean of a random sample of size n from a gamma distribution with parameters $\alpha = \mu > 0, \beta = 1$. Show that the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu) / \sqrt{\bar{X}_n}$ is $N(0, 1)$.
55. Let $x_1, x_2, \dots, \dots, \dots, x_{25}$ be a random a sample from a distribution with p.d.f.
- $$f(x) = \begin{cases} 6x(1-x), & x = 0, 1, 2, \dots \\ 0 & \text{elsewhere} \end{cases}$$
- Find the pr ($0.48 < \bar{X}_n < 0.52$) approximately.
56. Define convergence in probability.
57. Define the weak law of large numbers.
58. State central limit theorem.
59. Define limiting distribution.
60. Define mutually independent.

Section – C

Unit – I

1. Explain conditional distributions.
2. Let X_1 and X_2 have the joint p.d.f $f(x_1, x_2) = \begin{cases} 2, & 0 < x_1 < x_2 < 1 \\ 0 & \text{elsewhere} \end{cases}$. Find the conditional mean and conditional variance of X_1 , given $X_2 = x_2$.
3. Let X_1 and X_2 have the joint p.d.f $f(x_1, x_2) = \begin{cases} 6x_2, & 0 < x_1 < x_2 < 1 \\ 0 & \text{elsewhere} \end{cases}$. Find the conditional pdf of X_1 given $X_2 = x_2$. and conditional pdf of X_2 , given $X_1 = x_1$.

4. Let X_1 and X_2 have the joint p.d.f $f(x_1, x_2) = \begin{cases} x_1 + x_2, & 0 < x_1 < x_2 < 1 \\ 0 & \text{elsewhere} \end{cases}$. Find the correlation coefficient of X_1 and X_2 .
5. Derive conditional mean and conditional variance of Y , given $X = x$.
6. Calculate the mgf of the continuous type random variables with joint pdf
$$f(x, y) = \begin{cases} e^{-y}, & 0 < x < y < \infty \\ 0 & \text{elsewhere} \end{cases}$$
7. Let X_1 and X_2 have the joint p.d.f $f(x_1, x_2)$. Then prove that X_1 and X_2 are independent if and only if $f(x_1, x_2)$ can be written as the product of the non-negative function of x_1 alone and non-negative function of x_2 alone.

Unit-II

8. Let X be the number of heads in $n = 7$ independent toss of an unbiased coin. Find the p.d.f, m.g.f, mean, variance and $\Pr(0 \leq X \leq 1)$ and $\Pr(X = 5)$
9. If Y is $P(n, 1/3)$. Find the smallest value of n so that $\Pr(Y \geq 1) > 0.80$.
10. Derive the m.g.f of trinomial distribution.
11. Check the two random variables defined in a trinomial distribution stochastically independent.
12. Is the moment generating function of a random variable X is $(\frac{2}{3} + \frac{1}{3}e^t)^5$. Find $\Pr(X = 2 \text{ (or) } 3)$.
13. Suppose X has a poisson distribution with $\mu = 2$. Then find p.d.f, variance and $\Pr(1 \leq x)$.
14. If the m.g.f of random variable X is $M(t) = e^{4(e^t - 1)}$. Then find $\Pr(x = 3)$ and show that $\Pr(\mu - 2\sigma < x < \mu + 2\sigma) = 0.931$.
15. Find p.d.f and m.g.f of gamma distribution.
16. Let X have a gamma distribution with $\alpha = \frac{r}{2}$ where r is a positive integer and $\beta > 0$. If $Y = \frac{2x}{\beta}$. Find the p.d.f for Y .
17. If the random variable $N(\mu, \sigma^2)$, $\sigma^2 > 0$ then prove that the random variable $W = \frac{x - \mu}{\sigma}$ is $N(0, 1)$.
18. Let X be $N(2, 25)$ then find $\Pr(0 < x < 10)$ and $\Pr(-8 < x < 1)$
19. Let X be $N(\mu, \sigma^2)$ so that $\Pr(x < 89) = 0.90$ and $\Pr(x < 94) = 0.95$. Find μ & σ
20. Derive the m.g.f and variance of normal distribution.

Unit – III

21. If X_1, X_2 have the joint p.d.f $f(x_1, x_2) = \begin{cases} \frac{x_1 x_2}{36} & x_1 = 1, 2, 3 \text{ and } x_2 = 1, 2, 3 \\ 0 & \text{elsewhere} \end{cases}$

Find the joint p.d.f of $Y_1 = X_1 Y_2$ and $Y_2 = X_2$. Also find the marginal p.d.f of Y_1 .

22. If X have the p.d.f $f(x) = \begin{cases} \frac{1}{3}, & x = 0,1,2 \dots\dots \\ 0 & \text{elsewhere} \end{cases}$.Find the p.d.f of $Y = 2x+1$.
23. Let the random variable X have the p.d.f $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$ and let X_1, X_2 denote a random sample from this distribution. Then find the joint p.d.f. of X_1, X_2 .
24. Let T have a t-distribution of 10 degrees of freedom find $\text{pr} (| T | > 2.228)$.
25. Find mean and variance of beta distribution
26. Derive t-distribution.
27. Derive F – distribution
28. Let X have a pdf $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$.And $y = - 2 \ln X$. Prove that the pdf of Y is a chi-square distribution with 2 degree of freedom.
29. Derive Double Exponential p.d.f.

Unit – IV

30. Let $X_1, X_2, \dots \dots X_n$ be independent random variables having respectively the normal distribution $N(\mu_1, \sigma_1^2), N(\mu_2, \sigma_2^2) \dots \dots N(\mu_n, \sigma_n^2)$. The random variable $Y = k_1 X_1 + k_2 X_2 + \dots + k_n X_n$, where $k_1, k_2, \dots \dots k_n$ are real constants is normally distributed with mean $k_1 \mu_1 + \dots + k_n \mu_n$ and variance $k_1^2 \sigma_1^2 + \dots + k_n^2 \sigma_n^2$. Then prove that Y is $N(\sum_i^n k_i \mu_i, \sum_i^n k_i^2 \sigma_i^2)$.
31. Let X_1 and X_2 independent with normal distributions $N(\mu_1, \sigma_1^2)$ and $N(\mu_2, \sigma_2^2)$ respectively. Define the random variable Y by $Y = X_1 - X_2$. Find the p.d.f of Y.
32. Let $Y_i, i=1,2,\dots,n$ be the i^{th} order statistics of the random sample X_1, X_2, \dots, X_n then prove that the joint pdf of Y_1, Y_2, \dots, Y_n is given by
- $$g(y_1, y_2, \dots, y_n) = \begin{cases} n! (f(y_1) \dots f(y_n)), & a < y_1 < y_2 < \dots < y_n < b \\ 0 & \text{elsewhere} \end{cases}$$
33. Let X_1, X_2, X_3 be independent random variables with a distribution having pdf $f(x) = \begin{cases} e^{-x} & 0 < x < \infty \\ 0 & \text{elsewhere} \end{cases}$.Show that $Y_1 = \frac{X_1}{X_1 + X_2}$, $Y_2 = \frac{X_1 + X_2}{X_1 + X_2 + X_3}$, $Y_3 = X_1 + X_2 + X_3$ are mutually independent.
34. Let X_1, X_2, X_3 denote a random sample from the distribution and $Y_1 < Y_2 < Y_3$ denote the order statistics of the sample. Compute the probability that $Y_2 \leq m$.
(ie) $\text{Pr} (Y_2 \leq m)$
35. Find the mean and variance of S^2
36. Let \bar{X} and S^2 be the mean and the variance of a random sample of size 25 from a distribution that is $N(3,100)$. Then evaluate $\text{pr}(0 < \bar{X} < 6, 55.2 < S^2 < 145.6)$
37. Derive that the mean and variance of \bar{X}_n are μ and σ^2/n .
38. If $X_1, X_2, \dots \dots X_n$ are independent random variables with respective moment-generating functions $M_i(t), i=1,2,\dots,n$, then the moment generating function of

$Y = \sum_{i=1}^n a_i X_i$, where a_1, a_2, \dots, a_n are real constants, is $M_y(t) = \prod_{i=1}^n M_i(a_i t)$.

39. Let x_1, \dots, x_n denote the observations of random sample of size n from a distribution that has mean μ and variance σ^2 . Show that the mean and variance of $Y = \sum k_i X_i$ are respectively $\mu_y = (\sum_1^n k_i) \mu$ and $\sigma_y^2 = \sum_1^n k_i^2 \sigma_i^2$.
40. Let $(X_1, Y_1), (X_2, Y_2), \dots, (X_n, Y_n)$ denote a random sample of size n from a bivariate normal distribution with pdf $f(x, y)$ and parameters $\mu_1, \mu_2, \sigma_1^2, \sigma_2^2$. Find the joint pdf of 2 order statistics $X = \frac{1}{n} \sum X_i$ and $Y = \frac{1}{n} \sum Y_i$
41. Let the independent random variables X_1 and X_2 have the same pdf $f(x) = \begin{cases} \frac{1}{6}, & x = 1, 2, 3 \\ 0 & \text{elsewhere} \end{cases}$. Find the pdf of $Y = X_1 + X_2$ using mgf technique.
42. Let the independent random variable X_1 and X_2 have $b(n_1, \frac{1}{2})$ and $b(n_2, \frac{1}{2})$ respectively. Show that $Y = X_1 - X_2 + n_2$ has a binomial distribution with parameters $n = n_1 + n_2$ and $p = \frac{1}{2}$.

Unit - V

43. Let T_n have the t-distribution with n degrees of freedom $n=1, 2, 3, \dots$. Show that the distribution is a limiting standard normal distribution.
44. Derive limiting moment generating functions.
45. Let $F_n(u)$ denote the distribution function of a random variable U_n whose distribution depends upon the positive integer n . Further, let U_n converge in probability to the positive constant c and let $\Pr(U_n < 0) = 0$ for every n . The random variable $\sqrt{U_n}$ Converges in probability to \sqrt{c} .
46. Let Y_n denote a random variable that is $b(n, p)$, $0 < p < 1$. Then show that $U_n = \frac{Y_n - np}{\sqrt{np(1-p)}}$
47. Let \bar{X}_n denote the mean of a random sample of size n from gamma distribution with parameters $\alpha = \mu > 0, \beta = 1$. Derive that the limiting distribution of $\sqrt{n}(\bar{X}_n - \mu) \sqrt{\bar{X}_n}$ is $N(0, 1)$.
48. Let μ and σ^2 denote the mean and variance of the random variables X and $Y = C + bX$, where b and c are real constants. Show that the mean and variance of Y are $c + b\mu$ and $b^2 \sigma^2$
49. Let Y be $n(400, 1/5)$. Compute an approximate value of $\Pr(0.25 < Y/n)$
50. Give a brief note on the conditional expectations of continuous type & discrete type?
51. Let S_n^2 denote the variance of the random sample of size n from a distribution that is $N(\mu, \sigma^2)$. Prove that $nS_n^2 / (n - 1)$ converges in probability to σ^2 .

52. Compute an approximate probability that mean of a random sample of size 15 from a distribution having pdf $f(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$ is between $3/5$ and $4/5$
53. Let X and Y be independent random variable with mean μ_1 and μ_2 and variances σ_1^2 and σ_2^2 . determine the correlation coefficient of X and $Z = X - Y$ in terms of $\mu_1\mu_2$ and $\sigma_1^2\sigma_2^2$

Section – D

Unit – I

1. Let X_1, X_2, X_3 be three mutually independent random variables with the pdf $f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$. Calculate the joint pdf, the expected value of $5X_1X_2^3 + 3X_2X_3^4$ and compute $\Pr(Y \leq \frac{1}{2})$ when Y is the maximum of X_1, X_2, X_3 .
2. Let X_1 and X_2 denote a random variables that have the joint pdf $f(x_1, x_2)$ and the marginal pdf $f_1(x_1)$ and $f_2(x_2)$ respectively. Furthermore, $M(t_1, t_2)$ denote the mgf of the distribution, then prove that X_1 and X_2 are independent iff $M(t_1, t_2) = M(t_1, 0) M(0, t_2)$
3. Let the independent random variables X_1 and X_2 have the marginal pdf $f_1(x_1)$ and $f_2(x_2)$ respectively. Find the expected value of the product of a function $u(X_1)$ of X_1 alone and a function $v(X_2)$ of X_2 alone.
4. If X_1 and X_2 are independent random variables with marginal pdf $f_1(x_1)$ and $f_2(x_2)$ respectively, then $\Pr(a < X_1 < b, c < X_2 < d) = \Pr(a < X_1 < b) \Pr(c < X_2 < d)$ for every $a < b$ and $c < d$, where a, b, c and d are constants.
5. Let X_1 and X_2 denote a random variables that have the joint pdf $f(x_1, x_2)$. Then prove X_1 and X_2 are independent if and only if $f(x_1, x_2)$ can be written as a product of a non-negative function of x_1 alone and a non-negative function of x_2 alone.
6. Give a detailed note on conditional distributions.

Unit -II

7. If X is in $b(n, p_1)$ & Y is in $b(n, p_2)$
 - a) Find the conditional mean of Y given $X = x$
 - b) Prove that the conditional p.d.f is also a binomial p.d.f
8. Derive the p.d.f of poisson distribution,
9. Given that $g(x, 0) = 0$ and that $D_w [g(x, w)] = -\lambda g(x, w) + \lambda g(x - 1, w)$ where $x = 1, 2, \dots$ and $g(0, w) = e^{-\lambda w}$. Prove that $g(x, w) = e^{-\lambda w} (\lambda w)^x x!$
10. Find p.d.f, m.g.f, mean & variance of gamma distribution.
11. Find p.d.f, m.g.f, mean & variance of exponential distribution.
12. Find p.d.f, m.g.f, mean & variance of chi-square distribution
13. If the random variable X is $N(\mu, \sigma^2)$, $\sigma^2 > 0$ then the random variable $V = \left(\frac{x-\mu}{\sigma}\right)^2$ is $\chi^2(1)$.

14. (i) Derive the p.d.f of Normal Distribution .
(ii) If X is $N(75,100)$.find $Pr(x < 60)$ and $Pr(70 < x < 100)$.
15. Derive cauchy's distribution.

Unit - III

16. Let X_1 and X_2 two stochastically independent random variable that have poisson distribution which μ_1 and μ_2 . Find the p.d.f of $Y_1=X_1+X_2$.
17. Explain about the transformation of two variables of the discrete type.
18. Derive Cauchy distribution from standard normal distribution.
19. Derive f-distribution.
20. Explain about change of variable technique.
21. What is double exponential distribution. Derive Double Exponential p.d.f.
22. Derive bivariate normal distribution.
23. Derive beta – distribution.

Unit – IV

24. Let X_1, X_2, \dots, X_n denote a random sample of size $n \geq 2$ from a distribution $N(\mu, \sigma^2)$. Let \bar{X} and S^2 denote the mean and variance of this random sample, then prove that
- \bar{X} is $N(\mu, \frac{\sigma^2}{n})$.
 - $\frac{nS^2}{\sigma^2}$ is $\chi^2(n-1)$.
 - \bar{X} and S^2 are independent.
25. Let $Y_i, i=1,2,\dots,n$ be the i^{th} order statistics of the random sample X_1, X_2, \dots, X_n then the joint pdf of Y_1, Y_2, \dots, Y_n is given by

$$g(y_1, y_2, \dots, y_n) = \begin{cases} n! (f(y_1) \dots f(y_n)), & a < y_1 < y_2 < \dots < y_n < b \\ 0 & \text{elsewhere} \end{cases}$$

And also find the marginal pdf of Y_n

26. Let $Y_i, i=1,2,\dots,n$ be the i^{th} order statistics of the random sample X_1, X_2, \dots, X_n then the joint pdf of Y_1, Y_2, \dots, Y_n is given by

$$g(y_1, y_2, \dots, y_n) = \begin{cases} n! (f(y_1) \dots f(y_n)), & a < y_1 < y_2 < \dots < y_n < b \\ 0 & \text{elsewhere} \end{cases}$$

And also find the marginal pdf of Y_1

27. If X_1, X_2 is a random sample from a standard normal distribution find the joint p.d.f of $Y_1 = X_1^2 + X_2^2$ and $Y_2 = X_2$ and the marginal p.d.f. of Y_1 . Let X be the random sample of size 25 from a distribution that is $N(75,100)$. Thus \bar{X} is $N(75,4)$
28. Let X_1, X_2, X_3 denotes the random sample of size 3 from standard normal distribution. Let Y denote the statistic (i.e) the sum of the square of the sample observation. Find the

distribution and p.d.f of y.

29. Let x_i denote a random variable with mean μ_i and variance $\sigma_i^2 = 1, 2, \dots, n$. Let x_1, x_2, \dots, x_n be independent and let k_1, k_2, \dots, k_n denote real constants compute the mean and variance of a linear function $Y = k_1 X_1 + k_2 X_2 + \dots + k_n X_n$
30. If X_1, X_2, \dots, X_n are independent random variables with respective moment-generating functions $M_i(t)$, $i=1, 2, \dots, n$, then the moment generating function of $Y = \sum_{i=1}^n a_i X_i$, where a_1, a_2, \dots, a_n are real constants, then show that the moment generation function is $M_y(t) = \prod_{i=1}^n M_i(a_i t)$.

Unit – V

31. State and Prove Central Limit Theorem.
32. Let \bar{X}_n and s_n^2 denote respectively the mean and the variance of a random sample of n from a distribution that is $N(\mu, \sigma), \sigma^2 > 0$. Prove that \bar{X}_n converges in probability to μ
33. Let Y_n denote the n^{th} order of a random sample from the uniform distribution that has a p.d.f $f(x) = \begin{cases} \frac{1}{\theta}, & 0 < x < \theta \\ 0 & \text{elsewhere} \end{cases}$. Find the limiting distribution of $Z_n = n(\theta - Y_n)$
34. Let Z_n be $X^2(n)$. Then the m.g.f of Z_n is $(1-2t)^{-n/2}, t < 1/2$. The mean and the variance of Z_n are respectively, n and 2n. Then show that limiting distribution of the random variable is $Y_n = (Z_n - n) / \sqrt{2n}$
35. Let S_n^2 denote the variance of a random sample of size n from a distribution that is $N(\mu, \sigma^2)$. Prove that $nS_n^2 / (n-1)$ converges in probability to σ^2 .

ST.MARY'S COLLEGE (Autonomous) – THOOTHUKUDI

QUESTION BANK

I M.Sc Mathematics

Elective I - Combinatorics

Sub code: 21PMAE11

Semester I

(for those who joined in June 2021 and after)

Section – A

(1 Mark)

Choose the correct answer

Unit I

1. An _____ of n objects is defined as an ordered arrangement of r of these objects.
a)r- combination b)**r-permutation** c)sum and product d) none of these
2. If one even can occur in m ways and another even can occur in n ways hen there are _____ ways in which one these two events can occur.
a) mn b) **$m+n$** c) $m-n$ d) m/n
3. If one even can occur in m ways and another even can occur in n ways hen there are _____ ways in which these two events can occur simultaneously.
a) **mn** b) $m+n$ c) $m-n$ d) m/n
4. If there are 18 boys and 12 girls are in a class, then _____ways to select a class representative.
a) **30** b) 6 c) 20 d) 16.
5. A bookself contains 5 algebra books 3 analysis books. _____ways to choose 2 books one in each subject.
a) 30 b) **15** c) 8 d) 25
6. $C(n, r) =$ _____.
a) $C(n, r + 1)$ b) $C(n - r, r)$ c) **$C(n, n - r)$** d) $C(n + 1, r)$
7. $C(n - 1, r) + C(n - 1, r - 1) =$ _____.
a) $C(n, r + 1)$ b) $C(n - r, r)$ c) **$C(n, r)$** d) $C(n + 1, r)$
8. $P(n, r) =$ _____
a) $\frac{n!}{(r-n)!}$ b) $\frac{n!}{(n-1)!r!}$ c) **$\frac{n!}{(n-r)!}$** d) $\frac{n!}{(n-r)!r!}$

22. $\sum_{i=0}^t \binom{2i}{i} \binom{2t-2i}{t-i} =$ _____.
- a) 4^t b) 4^{2t} c) 4^{t-i} d) 4^{2t-2i}
23. $\binom{n}{0}^2 + \binom{n}{1}^2 + \binom{n}{2}^2 + \dots + \binom{n}{r}^2 + \dots + \binom{n}{n}^2 =$ _____.
- a) $\binom{n}{n}^{2n}$ b) $\binom{2n}{n}^2$ c) $\binom{2n}{n}^n$ d) $\binom{2n}{n}$
24. An exponential generating function that gives the number of combinations or permutations is called an _____.
- a) indicator function **(b)exponential enumerator**
c)ordinary enumerator (d)factorial function
25. The exponential enumerator for the permutations of a single object with no repetitions is _____.
- a) $1 + x$ b) $1 - x + x^2$ c) $1 + x + x^2$ d) $1 + x^2$
26. The exponential enumerator for the permutations of n distinct objects with no repetitions is _____.
- a) $(1 + x)^n$ b) $(1 - x)^n$ c) $(1 + x)^{-n}$ d) $1 + x$

Unit III

27. _____ is the recurrence relation for the Fibbanocci sequence with a boundary conditions $a_0 = a_1 = 1$
- a) $a_n = a_{n-1} + a_{n+2}$ b) $a_n = a_{n+1} + a_{n-2}$
c) $a_n = a_{n-1} + a_{n-2}$ d) $a_n = a_{n+1} + a_{n+2}$
28. A characteristic equation of the r^{th} degree has _____ characteristic roots.
- a) $r-1$ **b) r** c) $r+1$ d) r^2
29. Let b_{n-1} denote the number of (n-1) digit quaternary sequences that have an _____ number of 0's and _____ number of 1's.
- a) odd, odd b) even, odd c) odd, even **d) even, even**
30. A recurrence relation is also called a _____
- a) **difference equation** b) equivalence relation
c) reflexive relation d) linear equation

31. For the recurrence relation $a_n = 2a_{n-1} - a_{n-2}$, the characteristic roots are _____
 a) 1,-1 b) -1,-1 c) **1,1** d) -1,1
32. Let $\{a_n\}$ be a sequence that satisfies the recurrence relation $a_n = a_{n-1} - a_{n-2}$ for $n = 2,3,4$ and if $a_0 = 3, a_1 = 5$ then a_2 is _____
 a) 3 b) 7 c) 9 d) **2**
33. Let $\{a_n\}$ be a sequence that satisfies the recurrence relation $a_n = 2a_{n-1} - a_{n-2}$ for $n = 2,3,4, \dots$ and suppose $a_0 = 3$ and $a_1 = 5$ then $a_2 =$ _____
 a) 2 b) 3 c) 4 d) **7**
34. How many moves needed to solve the Tower of Hanoi problem with 7 disks?
 a) **127** b) 126 c) 128 d) 125
35. An equation relating a number a_n to some of its predecessors in a sequence for any n is called _____ relation.
 a) **recurrence** b) increasing c) binary d) equivalence
36. The homogeneous solution of a linear difference equation is of the form _____
 a) $a_n^{(p)} = A\alpha_1^n$ b) $a_n^{(h)} = A$ c) $a_n^{(h)} = A\alpha_1^n$ d) $a_n = A\alpha_1^n$
37. _____ denote the number of $(n - 1) -$ digit quaternary sequences that have an even number of 0's and an odd number of 1's.
 a) a_{n-1} b) **c_{n-1}** c) b_{n-1} d) d_{n-1}
38. _____ denote the number of $(n - 1) -$ digit quaternary sequences that have an odd number of 0's and an even number of 1's.
 a) a_{n-1} b) c_{n-1} c) b_{n-1} d) **d_{n-1}**

Unit IV

39. The counting theorem is called the _____
 a) **principle of inclusion and exclusion** b) permutation
 c) combination d) recurrence relation
40. Twelve balls are painted in the following way, "Two are painted red, one is painted blue, one is painted white, two are painted red and blue, one is painted red and white, three are painted red, blue, white, Two are unpainted". Then number of balls which are not painted red, white and blue _____
 a) 1 b) 3 c) **2** d) 4

41. A permutation of the integers $1, 2, \dots, n$ is said to be _____ if no integer appears in its natural position.
- a) permutation b) recurrence relation c) combination **d) derangement**
42. In a group of 10 girls, 6 have blond hair, 5 have blue eyes, and 3 have blond hair and blue eyes. How many girls are there in the groups who have neither blond hair nor blue eyes?
- a) 2** b) 3 c) 6 d) 5
43. $1 - \binom{n}{1} + \binom{n}{2} - \dots + (-1)^n \binom{n}{n} = \underline{\hspace{2cm}}$
- a) 1 **b) 0** c) n d) -1
44. $E(x) =$
- a) $\sum_{j=0}^n S_j (x-1)^{j+1}$ b) $\sum_{j=0}^n S_{j-1} (x-1)^j$
c) $\sum_{j=0}^n S_j (x-j)^j$ **d) $\sum_{j=0}^n S_j (x-1)^j$**
45. The _____ of a cycle is the number of elements in the cycle.
- a) cycle b) index **c) length** d) set
46. $E(1) =$
- a) S_1 **b) S_0** c) $S_0 + S_1$ d) $\sum_{j=0}^n S_j (-2)^j$
47. If $N(a_i)$ denote the number of objects that have the property a_i and $N(a_i')$ denote the number of objects that do not have the property a_i then $N(a_i) + N(a_i') = \underline{\hspace{2cm}}$
- a) 1 b) 0 **c) N** d) MN
48. The number of objects that do not have the property $a_1 a_2 a_3$ is _____
- a) $N(a_1 a_2 a_3)$ b) $N(a_1' a_2' a_3')$ c) $N(a_1)N(a_2)N(a_3)$ d) $N(a_1 a_3)$
49. $\frac{1}{2}[E(1) - E(-1)] =$
- a) $e_1 + e_2 + e_3 + \dots$ b) $e_0 + e_2 + e_4 + \dots$
c) $e_1 + e_3 + e_5 + \dots$ d) $e_1 - e_2 + e_3 - \dots$
50. $s_0 - s_1 + s_2 - \dots + (-1)^r s_r = \underline{\hspace{2cm}}$
- a) e_1 **b) e_0** c) e_r d) e_3

Unit V

51. A one-to-one function from a set S to itself is called a _____ of the set S.
- a) permutation** b) index c) combination d) length
52. Composition of permutation is _____

- a)commutative **b)non commutative** c)distributive d)non-distributive
53. An element is said to be invariant under a permutation or is called ____, if the permutation maps the element into itself.
- a)operator b)complement **c)invariance** d)inverse
54. A ____ is a collection of distinct elements.
- a)set** b)inventory c)intersection d) union
55. Composition of permutation is ____
- a) commutative **b) associative** c) identity d) invertible
56. If $\pi_1 = \begin{pmatrix} a & b & c & d \\ a & d & b & c \end{pmatrix}$ and $\pi_2 = \begin{pmatrix} a & b & c & d \\ b & a & c & d \end{pmatrix}$ then $\pi_1\pi_2$ is _____
- a) $\begin{pmatrix} a & b & c & d \\ b & a & c & d \end{pmatrix}$ b) $\begin{pmatrix} a & b & c & d \\ a & c & b & d \end{pmatrix}$ c) $\begin{pmatrix} a & b & c & d \\ b & d & a & c \end{pmatrix}$ **d) $\begin{pmatrix} a & b & c & d \\ d & a & b & c \end{pmatrix}$**
57. The inventory of a set of functions is defined as the sum of their _____
- a)cycle b) index **c) weight** d) length
58. A _____ in a permutation is a subset of elements that are cyclically permuted.
- a) cycle** b) index c) set d) function

Section -B

(2 Marks)

Unit I

1. State the sum rule and product rule
2. If there are 18 boys and 12 girls are in a class. How many ways are there to select the class representative?
3. A bookshelf contains 6 algebra books 8 analysis books and 10 mechanics books. Find the number of ways of choosing 3 books one in each subject?
4. A bookshelf contains 5 books in Latin and 7 books in Greek and 10 books in French. Find the number of ways of choosing two books in different language.
5. Define Permutation.
6. Define Combination.
7. Find the number of ways of arranging two or three distinct objects.
8. In how many ways 5 dashes and 8 dots can be permuted?
9. Show that $(k)!$ is divisible by $(k-1)!$ for any integer k.

10. Among the 10 billion numbers between 1 and 10,000,000,000. How many of them contain the digit 1? How many of them do not?
11. Out of a large number of pennies, dimes, nickels and quarters in how many ways can six coins be selected?
12. How many combinations are there when three distinct dices are rolled?
13. How many divisors does the number 1400 have?
14. Find the number of ways of arranging 7 flags on five masts when all the flags must be displayed but not all the masts have to be used?

Unit II

15. Define generating function.
16. Define indicator functions.
17. Find the ordinary generating function of the sequences (i)(1,3,7,0,0) (ii)(1,2,6,1,1)
18. Define ordinary enumerator
19. What is the co-efficient of the term x^{23} in $(1 + x^5 + x^9)^{100}$?
20. State the stirling number of the second kind.
21. Define exponential generating function.
22. Define exponential enumerator.
23. Define partition of an integer.
24. Find the number of r – permutations of n distinct objects with unlimited repetitions?

Unit III

25. Define recurrence relation
26. Explain boundary condition
27. Let $\{a_n\}$ be a sequence that satisfies the recurrence relation $a_n = a_{n-1} - a_{n-2}$ for $n = 2, 3, \dots$ and $a_0 = 3$, $a_1 = 5$, what are the values for a_2 and a_3 ?
28. Let $\{a_n\}$ be a sequence that satisfies the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 6$. Find a_3 and a_5 .
29. Define linear recurrence relations with constant coefficients
30. Define homogeneous and particular solution.

31. Define characteristic root and characteristic equation.
32. Define associated homogeneous recurrence relation.
33. Find the characteristic roots for $a_n + 6a_{n-1} + 12a_{n-2} + 8a_{n-3} = 0$
34. State the Tower of Hanoi problem.
35. Find the generating function $c(n, r)$'s ,

$$F_n(x) = C(n, 0) + C(n, 1)x + C(n, 2)x^2 + \dots + C(n, r)x^r + \dots$$

Unit IV

36. Define principle of inclusion and exclusion.
37. Out of 12 balls, two are painted red, one is painted blue, one is painted white, two are painted red and blue, one is painted red and white, three are painted red, blue, white. Find the number of balls which are not painted red, white and blue.
38. Define derangements.
39. Out of 12 balls, two are unpainted, two are painted red, one is painted blue, one is painted white, two are painted red and blue, one is painted red and white, three are painted red, blue, white. Find e_1
40. Find the value of $\frac{1}{2}[E(1) + E(-1)]$
41. 10 gentlemen check their hats at the coatroom, and later on the hats are returned to them randomly. In how many ways can the hats be returned to them such that no gentlemen will get his own hat back?
42. Let n books be distributed to n children. The books are returned and distributed to the children again later on. In how many ways can the books be distributed so that no child will get the same book twice?
43. Find the number of n -digit ternary sequences that have an even number of 0's.
44. Find the number of integers between 1 and 250 that are not divisible by 2 or by 7 but divisible by 5?
45. Find the number of r - digit quaternary sequences in which each of the three digits 1, 2 and 3 appears at least once.

Unit V

46. Define permutation.

47. Define composition.
48. Define permutation group.
49. Write homomorphism condition.
50. Define pattern.
51. Find $(\pi_1\pi_2)\pi_3$ if $\pi_1 = \begin{pmatrix} a & b & c & d \\ a & d & b & c \end{pmatrix}$, $\pi_2 = \begin{pmatrix} a & b & c & d \\ b & a & c & d \end{pmatrix}$ and $\pi_3 = \begin{pmatrix} a & b & c & d \\ b & d & a & c \end{pmatrix}$
52. Define store enumerator.
53. What is called the weight of the pattern?
54. Define invariant
55. Define inventory of a set of pattern.
56. Define pattern inventory.
57. Define the length of a cycle.
58. Define cycle index.
59. Show that the number of equivalence classes of functions from D to R is $P_G(|R|, |R|, \dots, |R|, \dots)$
60. State a fundamental theorem of Polya.

Section -C

(6 marks)

Unit I

1. Find the number of r -permutations of a collection of n objects.
2. Prove that $C(n, r) = C(n, n-r)$
3. In how many ways can n people stand to form a ring?
4. Give a combinatorial proof of $C(n, r) = C(n-1, r) + C(n-1, r-1)$
5. If no three diagonals of a convex decagon meet at the same point inside the decagon, into how many line segments are the diagonals divided by their intersections?
6. 11 scientists are working on a secret project. They wish to lock up the documents in a cabinet such that the cabinet can be opened iff six or more of the scientists are present.
 - (i) What is the smallest number of locks needed?
 - (ii) What is the smallest number of keys to the locks each scientist must carry?

7. Five distinct letters are to be transmitted through a communications channel .A total of 15 blanks are to be inserted between the letters with atleast three blanks between every two letters. In how many ways can the letters and blanks be arranged?
8. What is the number of n – digit binary sequences that contain an even number of 0's.(zero is considered as an even number)?
9. (i)For n given weight ,what is the greatest number of different amounts that can be made up by combinations of these weights?
(ii)What is the greatest number of different amounts that can be weighed by using a set of n weights and a balance?

Unit II

10. Prove the identity $\binom{n}{0}^2 + \binom{n}{1}^2 + \binom{n}{2}^2 + \cdots \binom{n}{r}^2 + \cdots \binom{n}{n}^2 = \binom{2n}{n}$
11. (i)Prove the identity

$$\binom{n}{1} + 2\binom{n}{2} + 3\binom{n}{3} + \cdots \cdots + r\binom{n}{r} + \cdots \cdots + n\binom{n}{n} = n2^{n-1}$$
 ii) Find the ordinary enumerator for the selection of r -objects out of n objects with the unlimited repetitions.
12. (i) Define ordinary enumerator
(ii) Find the ordinary enumerator for the selection of r objects out of n objects($r \geq n$), with unlimited repetitions but with each object included in each selection?
13. Find the number of r –digit quaternary sequences in which each of the digits 1, 2 and 3 appears atleast once?
14. Find the number of r –digit quaternary sequences that contain an even number of 0's?
15. Find the number of r –digit quaternary sequences that contain an even number of 0's and an even number of 1's?
16. Find the exponential enumerator for the number of ways to choose r or less objects from r distinct objects and distribute them into n distinct cells, with objects in the same well ordered?
17. (i) Prove that the number of partitions of an integer into distinct part is equal to the number of integer into odd parts.

- (ii) Find the number of r permutations of the n distinct cells with each cell included atleast once in a permutation?
18. Define partition of an integer. Prove that any integer can be expressed as a sum of selection of the integers $1, 2, 4, 8, \dots, 2^r, \dots$ (without repetitions) is exactly one way.
19. (i) Given two each of p kinds of objects and one each of q additional kinds of objects. In how many ways can r objects be selected?
- (ii) Find the ordinary enumerator for the selection of r objects out of n objects with unlimited repetitions?

Unit III

20. Let there be n ovals drawn on the plane. If an oval intersects each of the other ovals at exactly two points and no three ovals meet at the same point, into how many regions do these ovals divide the plane?
21. Find an explicit formula for the Fibonacci sequences.
22. Solve the difference equation $a_n + 6a_{n-1} + 12a_{n-2} + 8a_{n-3} = 0$ with the boundary conditions $a_0 = 1, a_1 = -2$ and $a_2 = 8$.
23. Solve the difference equation $a_n + 2a_{n-1} = n + 3$ with the boundary condition $a_0 = 3$.
24. Solve the difference equation $a_n + 2a_{n-1} + a_{n-2} = 2^n$.
25. Let a_n denote the number of moves needed to solve the Tower of Hanoi problem with n disks. Set up a recurrence relation for the sequence $\{a_n\}$
26. Solve the recurrence relation $a_n = a_{n-1} + 2(n - 1)$
27. Among the 4^n n -digit quaternary sequences, how many of them have an even number of 0's?
28. Find the number of r -combinations of n distinct objects with unlimited repetitions.

Unit IV

29. (i) Find the number of permutations of the letters a, b, c, d, e, f in which neither the pattern ace nor the pattern fd appears.
- (ii) Find the number of r -digit quaternary sequences in which each of the three digits 1, 2 and 3 appears at least once.

30. Find the number of integers between 1 and 250 that are not divisible by any of the integers 2, 3, 5 and 7
31. Consider a single ball that is painted with n colors. Find the condition if a ball is unpainted.
32. Prove that $e_m = s_m - \binom{m+1}{1} s_{m+1} + \binom{m+2}{2} s_{m+2} - \dots \dots \dots + (-1)^{r-m} \binom{r}{r-m} s_r$
33. 12 balls are painted in the following way were, two are unpainted, two are painted red, one is painted blue, one is painted white, two are painted red and blue, one is painted red and white, three are painted red, blue, white. Find e_1, e_2, e_3 and find the ordinary generating function of the sequence when $x=1$
34. Prove that $E(x) = \sum_{j=0}^r s_j (x-1)^j$
35. Find the number of r -digit ternary sequences that have an even number of 0's.
36. Using principle of inclusion and exclusion, find the number of derangements of n objects.
37. Discuss about permutations with restrictions on relative positions.
38. In how many ways can the letters $\alpha, \alpha, \alpha, \alpha, \beta, \beta, \beta, \gamma, \gamma$ be arranged so that all the letters of the same kind are not in a single book?

Unit V

39. Prove that the binary relation on a set induced by a permutation group of the set is an equivalence relation
40. Prove that the binary relation induced by Q is an equivalence relation.
41. Eight people are planning vacation trips. There are three cities they can visit. Three of these eight people are in one family, and two of them are in another family. If the people in the same family must go together, find the ways the eight people can plan their trips.
42. (i) Show that the function $\pi^{(i)}$ is a permutation of the set of functions F_i
(ii) Show that for any π_1 and π_2 in G, $(\pi_1 \pi_2)^{(i)} = \pi_1^{(i)} \pi_2^{(i)}$.
43. Using Polya theorem find the number of distinct strings of three beads.
44. Find the number of equivalence classes for the permutation group with $S = \{a, b, c, d\}$ and G be the permutation group consisting of $\pi_1 = \begin{pmatrix} a & b & c & d \\ a & b & c & d \end{pmatrix}, \pi_2 = \begin{pmatrix} a & b & c & d \\ b & a & c & d \end{pmatrix}$
 $\pi_3 = \begin{pmatrix} a & b & c & d \\ a & b & d & c \end{pmatrix}, \pi_4 = \begin{pmatrix} a & b & c & d \\ b & a & d & c \end{pmatrix}$

45. Find the number of ways of painting the four faces $a, b, c,$ and d of the pyramid with two colors of paints x and y

Section -D

(12 marks)

Unit I

1. (i) A binary sequence is a sequence of 0's and 1's. What is the number of r – digit binary sequences that contain an even number of 0's.(zero is considered as an even number)?
(ii) Find the number of quaternary sequences that contain an even number of 0's?
2. In how many ways can $2n + 1$ seats in a congress be divided among three parties so that the coalition of any two parties will ensure them of a majority?
3. In how many ways can three numbers be selected from the numbers 1, 2, ……………, 300 such that their sum is divisible by 3 ?
4. (i) If no three diagonals of a convex decagon meet at the same point inside the decagon , into how many line segments are the diagonals divided by their intersections?
(ii) Out of a large number of pennies, nickels, dimes and quarters in how many ways can six coins be selected?
5. a) Prove that $P(n, r) = \frac{n!}{(n-r)!}$
b) 11 scientists are working on a secret project. They wish to lock up the documents in a cabinet such that the cabinet can be opened iff six or more of the scientists are present.
(i) What is the smallest number of locks needed?
(ii) What is the smallest number of keys to the locks each scientist must carry?
6. Explain distribution of non distinct objects
7. Explain combinations and permutations with examples.
8. Explain distribution of distinct objects
9. a) In how many ways can n people stand to form a ring?
b) Five distinct letters are to be transmitted through a communications channel .A total of 15 blanks are to be inserted between the letters with atleast three blanks between every two letters. In how many ways can the letters and blanks be arranged?

Unit II

10. Show that the ordinary generating function of the sequence $\binom{0}{0}, \binom{2}{1}, \binom{4}{2}, \binom{6}{3}, \dots, \binom{2r}{r}, \dots$ is $(1 - 4x)^{-1/2}$. and Evaluate $\sum_{i=0}^t \binom{2i}{i} \binom{2t-2i}{t-i}$ for a given t .
11. Prove the identity $\binom{n}{0}^2 + \binom{n}{1}^2 + \binom{n}{2}^2 + \dots + \binom{n}{r}^2 + \dots + \binom{n}{n}^2 = \binom{2n}{n}$ with its application.
12. (i) Find the ordinary enumerator for the selection of r objects out of n objects $r \geq n$, with unlimited repetitions but with each object included in each selection?
(ii) Show that the number of ways in which r non distinct objects can be distributed into n distinct cells, with the condition that no cell contain less than q nor more than $q + z - 1$ objects, is the co-efficient of x^{r-qn} in the expansion of $\left[\frac{1-x^{z+1}}{1-x} \right]^n$
13. (i) Find the number of r -digit quaternary sequences that contain an even number of 0's?
(ii) Find the number of r -digit quaternary sequences that contain an even number of 0's and an even number of 1's?
14. (i) Explain exponential generating function
(ii) Find the number of r -digit quaternary sequences in which each of the digit 1, 2 and 3 appears atleast once?
15. Explain generating functions.
16. (i) Define ordinary enumerator
(ii) Find the ordinary enumerator for the selection of r objects out of n objects with unlimited repetitions?
(iii) Find the ordinary enumerator for the selection of r objects out of n objects ($r \geq n$), with unlimited repetitions but with each object included in each selection?
17. Explain the distribution of distinct objects into non-distinct objects.
18. (i) Find the exponential enumerator for the number of ways to choose r or less objects from r distinct objects and distribute them into n distinct cells, with objects in the same well ordered?
(ii) Find the number of r permutations of the n distinct cells with each cell included atleast once in a permutation?

Unit III

19. Evaluate the $n \times n$ determinant

$$\begin{vmatrix} 1 & 1 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ \dots & \dots \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 1 & 1 \end{vmatrix}$$

20. Evaluate the $n \times n$ determinant

$$\begin{vmatrix} 2 & 1 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 1 & 2 & 1 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 2 & 1 & 0 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 2 & 1 & 0 & \dots & 0 & 0 & 0 & 0 & 0 \\ \dots & \dots \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 1 & 2 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & \dots & 0 & 0 & 0 & 1 & 2 \end{vmatrix}$$

21. (i) Solve the difference equation $a_n = a_{n-1} + a_{n-2}$ with the boundary conditions $a_0 = 1$ and $a_1 = 1$

(ii) Solve the difference equation $a_n + 2a_{n-1} = n + 3$ with the boundary conditions $a_0 = 3$.

22. Explain Tower of Hanoi problem.

23. Among the 4^n n -digit quaternary sequences, how many of them have an even number of 0's and an even number of 1's?

24. Explain recurrence relations with two indices.

25. Find the number of n -digit binary sequences that have exactly r pairs of adjacent 1's and no adjacent 0's.

26. Explain linear recurrence relations with constant coefficients.

27. (i) Find the generating function $c(n, r)$'s ,

$$F_n(x) = C(n, 0) + C(n, 1)x + C(n, 2)x^2 + \dots + C(n, r)x^r + \dots$$

(ii) Find the number of r -combinations of n distinct objects with unlimited repetitions.

28. Show that the number of r -permutations of n distinct object $P(n, r)$ satisfies the recurrence relation $P(n, r) = P(n - 1, r) + rP(n - 1, r - 1), n \geq 1, r \geq 1$

Unit IV

29. Explain the principle of inclusion and exclusion and prove its identity.

30. (i) Find the number of integers between 1 and 250 that are not divisible by any of the integers 2, 3, 5, and 7.
- (ii) Find the number of integers between 1 and 250 that are not divisible by 2 or by 7 but divisible by 5?
31. (i) Out of 12 balls, two are unpainted, two are painted red, one is painted blue, one is painted white, two are painted red and blue, one is painted red and white, three are painted red, blue, white. Find e_1, e_2, e_3 find the ordinary generating function of the sequences when $x=1$
- (ii) Prove that $E(x) = \sum_{j=0}^r s_j (x - 1)^j$
32. Derive a more general formula for the number of objects that have exactly m of the r properties for $m=0, 1, 2, \dots, r$
33. Find the number of permutations in which no two adjacent integers are consecutive integers. In other words, the $n-1$ patterns $12, 23, 34, \dots, (n-1)n$ should not appear in the permutations.
34. In how many ways can the integers 1, 2, 3, 4, 5, 6, 7, 8 and 9 be permuted such that no odd integer will be in its natural position?
35. Explain Derangements
36. (i) Find the number of permutations of the letters a, b, c, d, e, f in which neither the pattern ace nor the pattern fd appears.
- (ii) Prove that $e_m = s_m - \binom{m+1}{1} s_{m+1} + \binom{m+2}{2} s_{m+2} - \dots + (-1)^{r-m} \binom{r}{r-m} s_r$

Unit V

37. State and prove Burnside's theorem.
38. Find the number of distinct strings of length 2 that are made up of blue beads and yellow beads. The two ends of a string are not marked, and two strings are indistinguishable if interchanging the ends of one will yield the other
39. Find the number of distinct bracelets of five beads made up of yellow, blue and white beads. Two bracelets are said to be indistinguishable if the rotation of one will yield another.

40. Find all the possible ways of painting three distinct balls in solid colors when there are three kinds of paint available, an expensive kind of red paint, a cheap kind of red paint, and blue paint.
41. State and prove a fundamental theorem of Polya.
42. Find the distinct ways of painting the eight vertices of a cube with two colors x and y .
43. Explain weights and inventories of functions.

QUESTION BANK

I M.Sc Mathematics Subject Code: 21PMAC21

Semester II

Core I – Linear Algebra

Section - A

Unit:I

1. If V is a vector space then its dual space is
a) **Hom(V , F)** b) Hom(V , V) c) Hom(F , F) d) Hom(F , V)
2. If $\dim V = m$ then $\dim \text{Hom} (V, V) = \dots\dots\dots$
a) m b) **m^2** c) m^3 d) m^4
3. If V is a vector space and $v \in V$ then $v.v \geq 0$ iff
a) $v > 0$ b) $v < 0$ c) **$v = 0$** d) $v \geq 0$
4. If R has a unit element 1 and $1.m = m \forall m \in M$ then M is called
a) R - Module b) Module c) **Unital R - Module** d) Unit Module
5. If V is a vector space and W is a subspace of V then $A(A(W)) = \dots\dots\dots$
a) annihilator of W b) dual space of $A(W)$ c) $\dim V - \dim W$ d) **W**
6. If V is a vector space and $u \in V$ then $\|\alpha u\| = \dots\dots\dots$
a) **$|\alpha| \|u\|$** b) $|\alpha| |u|$ c) $|\alpha u|$ d) $\|\alpha\| \|u\|$
7. $\dim A(W) = \dots\dots\dots$
a) $\dim V - \dim V$ b) **$\dim V - \dim W$** c) $\dim V - \dim A(W)$ d) $\dim W - \dim A(W)$
8. The orthogonal complement of W is a of V .
a) Complement b) **Subspace** c) Vector space d) Orthogonal

9. Any finitely generated R-Module M is the of a finite number of cyclic submodules.

- a) Module b) **direct sum** c) Vector space d) group

10. Any finite abelian group is the of cyclic groups.

- a) Subgroup b) dual space c) **direct product** d) group

Unit:II

11. The degree of K over F is the of K as a vector space over F.

- a) **dimension** b) Subspace c) Vector space d) same

12. If $a \in K$ is algebraic of degree n over F then $[F(a) : F] = \dots\dots\dots$

- a) m b) **n** c) mn d) n^2

13. A polynomial of degree n over a field can have roots in any extension field.

- a) n b) atleast n c) **atmost n** d) n^2

14. Any finite extension of a field of characteristic is a simple extension.

- a) **0** b) 1 c) n d) 1 and 0

15. If an element $a \in K$ is algebraic over F iff is a finite extension of F.

- a) K b) F c) **F(a)** d) F(a,b)

16. Anumber is said to be an algebraic if it is algebraic.

- a) Rational b) **Complex** c) algebraic d) Prime

17. If $p(x) \in F[x]$ then the root of p(x) is if $p(ab) = 0$.

- a) a b) **ab** c) b d) 0

18. Any finite extension of a field of characteristic 0 is not a extension.

- a) Normal b) Field c) **Simple** d) Complex

19. If the characteristic of F is 0 then $f(x)$ has no..... roots.

- a) simple b) **multiple** c) complex d) normal

20. A complex number which is not algebraic is called

- a) field b) roots c) **transcendental** d) group

Unit:III

21. The fixed field of G is a of K .

- a) field b) group c) subgroup d) **subfield**

22. $G(K, F)$ is a subgroup of of K .

- a) **group of all automorphism** b) group of all homomorphism
c) group of all field d) homomorphism

23. If K is a finite extension of F then $O(G(K, F)) \leq$

- a) $[F : F]$ b) $[F : K]$ c) **$[K : F]$** d) $[F : K]$

24. If F be a field and $F(x_1, x_2, \dots, x_n)$ be a field of rational function then $[F(x_1, x_2, \dots, x_n) : F] =$

- a) S_n b) $(n+1)!$ c) $(n-1)!$ d) **$n!$**

25. S_n is not solvable for $n \geq$

- a) 0 b) **5** c) 10 d) even

26. The general polynomial of degree $n \geq 5$ is by radicals.

- a) solvable b) **not solvable** c) prime d) even

27. If K is a normal extension of F iff K is the field over F .

- a) solvable b) not solvable c) prime d) **splitting**

28. If K is a splitting field over F then $G(K, K_H) =$

- a) K b) **H** c) K_H d) 0

29. The field of G is a subfield of K .
 a) splitting b) **fixed** c) extension d) normal extension

30. If T is a normal extension of F then $G(K, T)$ is a subgroup of.....
 a) **$G(K, F)$** b) $G(F, K)$ c) $G(K, K)$ d) $G(F, F)$

Unit:IV

31. A linear transformation on V over F is an element of
 a) **$A(V)$** b) $A(F)$ c) $A(V, V)$ d) $A(F, F)$

32. If V is finite dimensional over F then the rank of T is the of T .
 a) dimension of T b) dimension of F c) **dimension of VT** d) dimension of VF

33. If $T \in A(V)$ then the range of T is denoted as.....
 a) TV b) $A(V)$ c) VF d) **VT**

34. If $T \in A(V)$ and if $\dim V = n$ then T can have atmostcharacteristic roots in F .
 a) n b) **n distinct** c) n^2 d) n^2 distinct

35. If V is finite dimensional over F and if $T \in A(V)$ is right invertible then V is
 a) **invertible** b) singular c) regular d) algebra

36. If $T, S \in A(V)$ and if S is regular then T and have the same minimal polynomial.
 a) TS b) ST c) **STS^{-1}** d) TST^{-1}

37. The symbol $\lambda - T$ is equal to
 a) **$\lambda \mathbf{1} - T$** b) $\lambda - 1T$ c) λ d) λT

38. If $T \in A(V)$ and if $S \in A(v)$ is regular then $r(STS^{-1}) = \dots\dots\dots$
 a) STS^{-1} b) $r(S)$ c) **$r(T)$** d) $r(ST)$

39. If $T, S \in A(V)$ then $r(ST) \leq \dots$

- a) $r(S)$ b) $r(T)$ c) $r(S^2)$ d) $r(T^2)$

40. If v_1, v_2, \dots, v_k are the characteristic vector of T belonging to $\lambda_1, \dots, \lambda_k$ then v_1, v_2, \dots, v_k are.....

- a) **linearly independent** b) linearly dependent c) roots d) regular

Unit:V

41. The subspace W of V is invariant under $T \in A(V)$ if WT is a subspace of

- a) V b) T c) W d) A

42. If $T \in A(V)$ has all its characteristic roots in F then the basis of V form..... matrix.

- a) **triangular** b) zero c) real d) singular

43. If S and T are nilpotent linear transformation then ST and are nilpotent linear transformation.

- a) TS b) $S+T$ c) S/T d) $S - T$

44. Two nilpotent linear transformation are similar iff they have the

- a) different invariance b) invariance c) **same invariance** d) 0 invariance

45. The integers n_1, n_2, \dots, n_r are called of T .

- a) **invariants** b) dimension c) nilpotent d) cyclic

46. If the dimension of M is m then the dimension of MT^k is

- a) m b) $m - k$ c) $k - m$ d) k

47. If $T \in A(V)$ is nilpotent then k is called the index of nilpotent of T if $T^k = \dots$

- a) non zero b) 1 c) **0** d) k

48. If $A \in F_n$ is a matrix and there exists a matrix $C \in F_n$ then is a triangular matrix.

- a) CA b) CAC^{-1} c) $C^{-1}CA$ d) CAC

49. If $T \in A(V)$ is nilpotent then $\alpha_0 + \alpha_1 T + \dots + \alpha_m T^m$ is invertible then α_0 is.....

- a) $=0$ b) $\neq 0$ c) > 0 d) < 0

50. If two nilpotent linear transformation have same invariants then they are.....

- a) **similar** b) invertible c) different d) right invertible

Section B

Unit :I

1. Define dual space.
2. Define annihilator.
3. Define inner product space.
4. Define norm.
5. Define orthogonal.
6. Define orthogonal complement.
7. Define orthogonal set.
8. Define module.
9. Define sub module.
10. Define cyclic R-module.

Unit:II

11. Define extension field.
12. Define algebraic.
13. Define algebraic extension.
14. Define algebraic number.
15. Define simple extension.
16. Define characteristic 0.
17. Define splitting field.

Unit:III

18. Define fixed field.

19. Define the group of automorphism of K relative to F .
20. Define normal extension.
21. Define splitting field.
22. Define solvable.

Unit:IV

23. Define algebra of linear transformation.
24. Define invertible.
25. Define singular.
26. Define the range of T .
27. Define characteristic root.
28. Define characteristic vector.
29. Define matrix.

Unit:V

30. Define similar linear transformation.
31. Define triangular form.
32. Define minimal polynomial.
33. Define nilpotent transformation.
34. Define invariant form.
35. Define Jordan form.

Section - C

Unit:I

1. Prove that $\text{Hom}(V, W)$ is a vector space.
2. If V is finite dimensional and $v \neq 0 \in V$ then prove that there is an element $f \in \hat{V}$ such that $f(v) \neq 0$.
3. If V is finite dimensional then prove that ψ is an isomorphism of V onto $\text{Hom}(\hat{V}, F)$.
4. Prove that $A(A(W)) = W$.
5. State and prove Schwarz inequality.
6. Prove that the orthogonal complement of W is a subspace of V .
7. If $u, v \in V$ and $\alpha, \beta \in F$ then prove that $(\alpha u + \beta v, \alpha u + \beta v) = \alpha \bar{\alpha}(u, u) + \alpha \bar{\beta}(u, v) + \bar{\alpha} \beta(v, u) + \beta \bar{\beta}(v, v)$.

8. If a, b, c are real numbers such that $a > 0$ and $a\lambda^2 + 2b\lambda + c \geq 0$ then prove that $b^2 \leq ac$.
9. If $\{v_i\}$ is an orthonormal set then prove that the vectors in $\{v_i\}$ are linearly independent.
10. If V is a finite dimensional inner product space and W is a subspace of V then prove that the orthogonal complement of W^\perp is W .

Unit:II

11. If L is a finite extension of F and K is a subfield of L which contains F then prove that $[K:F]/[L:F]$.
12. If $a \in K$ is algebraic of degree n over F then prove that $[F(a) : F] = n$.
13. If a and b in K are algebraic over F of degrees m and n then prove that $a \pm b$, ab and a/b are algebraic over F of degree at most mn .
14. State and prove Remainder theorem.
15. State and prove Factor theorem.
16. Prove that any polynomial of degree n over a field can have at most n roots in any extension field.
17. Prove that the polynomial $f(x) \in F[x]$ has a multiple root iff $f(x)$ and $f'(x)$ have a nontrivial common factor.
18. For any polynomial $f(x), g(x) \in F[x]$ then prove that
 - a) $(f(x) + g(x))' = f'(x) + g'(x)$.
 - b) $(\alpha f(x))' = \alpha f'(x)$.
 - c) $(f(x)g(x))' = f'(x)g(x) + f(x)g'(x)$.
19. If $f(x) \in F[x]$ is irreducible then prove that
 - a) If the characteristic of F is 0 then $f(x)$ has no multiple roots.
 - b) If the characteristic of F is $p \neq 0$ then $f(x)$ has a multiple root only if it is of the form $f(x) = g(x^p)$.
20. Prove that any finite extension of a field of characteristic 0 is a simple extension.

Unit:III

21. Prove that $G(K, F)$ is a subgroup of the group of all automorphisms of K .
22. Prove that the fixed field of G is a subfield of K .
23. Prove that $o(G(K, F)) \leq [K : F]$.

24. If K be the splitting field of $f(x) \in F[x]$ and $p(x)$ be an irreducible factor of $f(x)$ and if $\alpha_1, \alpha_2, \dots, \alpha_n$ then prove that there exists an automorphism α_i in $G(K, F)$ such that $\alpha_i(\alpha_1) = \alpha_i$.
25. Prove that G is solvable iff $G^{(k)} = (e)$ for some integer k .
26. If $G = S_n, n \geq 5$ then prove that $G^{(k)}$ contains every 3-cycle of S_n .
27. Prove that S_n is not solvable for $n \geq 5$.

Unit:IV

28. If A is an algebra with unit element over F then prove that A is isomorphic to a subalgebra of $A(V)$ for some vector space V over F .
29. If V is finite dimensional over F and if $T \in A(V)$ is invertible then prove that T^{-1} is a polynomial in T .
30. If $T \in A(V)$ is right invertible then prove that it is invertible.
31. If λ is a characteristic root of $T \in A(V)$ then prove that for any polynomial $q(x) \in F[x]$, $q(\lambda)$ is a characteristic root of $q(T)$.
32. If $T, S \in A(V)$ and if S is regular then prove that T and STS^{-1} have the same minimal polynomial.
33. If $T \in A(V)$ and if $S \in A(V)$ is regular then prove that $r(T) = r(STS^{-1})$
34. If $T \in A(V)$ is singular then prove that $ST = TS = 0$.

Unit:V

35. If $V = V_1 \oplus V_2 \oplus \dots \oplus V_k$ where each subspace V_i is of dimension n_i and is invariant under T an element of $A(V)$ then prove that a basis of V can be found so that the matrix of T in this basis is of the form

$$\begin{pmatrix} A_1 & 0 & \dots & 0 \\ 0 & A_2 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & A_k \end{pmatrix}$$

where each A_i is an $n_i \times n_i$ and is the matrix of linear transformation induced by T on V_i .

36. If $T \in A(V)$ is nilpotent then prove that $\alpha_0 + \alpha_1 T + \dots + \alpha_m T^m$ where $\alpha_i \in F$ is invertible.
37. Prove that there exists a subspace W of V invariant under T such that $V = V_1 \oplus W$.
38. If M is of dimension m is cyclic with respect to T then prove that the dimension of MT^k is $m-k$ for all $k \leq m$.
39. If the minimal polynomial of T_1 over F is $P_1(x)$ and T_2 over F is $P_2(x)$ then prove that the minimal polynomial for T over F is the least common multiple of $P_1(x)$ and $P_2(x)$.

Section - D

Unit:I

1. If V and W are of dimensions m and n over F then prove that $\text{Hom}(V, W)$ is of dimension mn over F .
2. If V is finite dimensional and W is a subspace of V then prove that $\dim A(W) = \dim V - \dim W$.
3. If V is finite dimensional inner product space then prove that V has an orthonormal set as a basis.
4. If V is finite dimensional inner product space and if W is a subspace of V then prove that V is the direct sum of W and W^\perp .
5. State and prove the fundamental theorem on finitely generated modules.

Unit:II

6. If L is a finite extension of K and if K is a finite extension of F then prove that L is a finite extension of F .
7. Prove that the element $a \in K$ is algebraic over F iff $F(a)$ is a finite extension of F .
8. If L is an algebraic extension of K and K is an algebraic extension of F then prove that L is an algebraic extension of F .
9. If $p(x)$ is a polynomial in $F[x]$ of degree $n \geq 1$ and is irreducible over F then prove that there is an extension E of F such that $[E:F] = n$ in which $f(x)$ has a root.
10. If $f(x) \in F[x]$ be of degree $n \geq 1$ then prove that there is an extension E of F of degree at most $n!$ in which $f(x)$ has n roots.

11. Prove that any two splitting fields of the same polynomial over a given field F are isomorphic by an isomorphism leaving every element of F fixed.
12. If F is of characteristic 0 and if a, b are algebraic over F then prove that there exists an element $c \in F(a, b)$ such that $F(a, b) = F(c)$.

Unit:III

13. If K is a field and if $\sigma_1, \sigma_2, \sigma_3, \dots, \sigma_n$ are distinct automorphisms of K then prove that it is impossible to find elements a_1, a_2, \dots, a_n not all zero in K such that $a_1\sigma_1(u) + a_2\sigma_2(u) + a_3\sigma_3(u) + \dots + a_n\sigma_n(u) = 0$ for all $u \in K$.
14. Prove if K is a normal extension of F iff K is the splitting field of some polynomial over F .
15. State and prove the fundamental theorem of Galois theory.
16. Prove that $o(G(K, F)) \leq [K : F]$.
17. If $p(x) \in F[x]$ is solvable by radicals then prove that Galois group of $p(x)$ is a solvable group.
18. State and prove Abel's theorem.

Unit:IV

19. If V is finite dimensional over F then prove that $T \in A(V)$ is invertible iff the constant term of the minimal polynomial for T is not 0.
20. If V is finite dimensional over F then prove that $T \in A(V)$ is singular iff there exists $a \neq 0$ in V such that $vT = 0$.
21. Prove that $T \in A(V)$ is regular iff T maps V onto V .
22. Prove that $\lambda \in F$ is a characteristic root of $T \in A(V)$ iff for some $v \neq 0$ in V , $vT = \lambda v$.
23. Prove that $T \in A(V)$ has a finite number of characteristic roots in F .
24. If $\lambda_1, \lambda_2, \dots, \lambda_k$ in F are distinct characteristic roots of $T \in A(V)$ and if v_1, v_2, \dots, v_k are the characteristic roots of T belonging to the characteristic root then prove that the vectors are linearly independent over F .
25. If $T \in A(V)$ has the matrix $m_1(T)$ in the basis v_1, v_2, \dots, v_n and the matrix $m_2(T)$ in the basis w_1, w_2, \dots, w_n of V then prove that there is an element $C \in F_n$ such that $m_2(T) = C m_1(T) C^{-1}$.

Unit: V26. If $T \in A(V)$ has all its characteristic roots in F then prove that there is a basis of V in which the matrix of T is triangular.

27. If $T \in A(V)$ has all its characteristic roots in F then prove that T satisfies a polynomial of degree n over F .

28. If $T \in A(V)$ is nilpotent of index of nilpotence n_1 then prove that a basis of V can be found such that the matrix of T in this basis has the form

$$\begin{pmatrix} M_{n_1} & 0 & \dots\dots\dots & 0 \\ 0 & M_{n_2} & \dots\dots\dots & 0 \\ \dots & \dots & \dots\dots\dots & \dots \\ 0 & 0 & \dots\dots & M_{n_r} \end{pmatrix}$$

Where $n_1 \geq n_2 \geq \dots\dots\dots n_r$ and $n_1 + n_2 + \dots\dots\dots + n_r = \dim V$.

29. If $V = V_1 \oplus V_2 \oplus \dots\dots\dots \oplus V_k$ where each V_i is invariant under T and if $p_i(x)$ is the minimal polynomial over F of T_i then prove that the minimal polynomial of T over F is the least common multiple of $P_1(x), P_2(x), \dots\dots\dots P_k(x)$.

30. If $V = V_1 \oplus V_2 \oplus \dots\dots\dots \oplus V_k$ where each V_i is invariant under T then prove that the minimal polynomial of T_i is $q_i(x)^{l_i}$.

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ST.MARY'S COLLEGE (Autonomous), THOOTHUKUDI-628001

QUESTION BANK

I M.Sc. Mathematics

Core VI

Mathematical Analysis Sub. Code: 21PMAC22

Semester II – (April)

SECTION – A

UNIT – I

1. The term $U(P,f)$ is _____.

- (a) $\sum_{i=1}^n m_i \Delta x_i$ (b) $\sum_{i=1}^n m_i \Delta \alpha_i$ (c) $\sum_{i=1}^n M_i \Delta x_i$ (d) $\sum_{i=1}^n M_i \Delta \alpha_i$

2. The term $L(P,f)$ is _____.

- (a) $\sum_{i=1}^n m_i \Delta x_i$ (b) $\sum_{i=1}^n m_i \Delta \alpha_i$ (c) $\sum_{i=1}^n M_i \Delta x_i$ (d) $\sum_{i=1}^n M_i \Delta \alpha_i$

3. The term $U(P,f,\alpha)$ is _____.

- (a) $\sum_{i=1}^n m_i \Delta x_i$ (b) $\sum_{i=1}^n m_i \Delta \alpha_i$ (c) $\sum_{i=1}^n M_i \Delta x_i$ (d) $\sum_{i=1}^n M_i \Delta \alpha_i$

4. The term $L(P,f,\alpha)$ is _____.

- (a) $\sum_{i=1}^n m_i \Delta x_i$ (b) $\sum_{i=1}^n m_i \Delta \alpha_i$ (c) $\sum_{i=1}^n M_i \Delta x_i$ (d) $\sum_{i=1}^n M_i \Delta \alpha_i$

5. The $\inf U(P,f)$ is _____.

- (a) $\int_a^b f(x) dx$ (b) $\int_{-a}^b f(x) dx$ (c) $\int_a^{-b} f(x) dx$ (d) $\int_{-a}^{-b} f(x) dx$

6. The $\sup L(P,f)$ is _____.

- (a) $\int_a^b f(x) dx$ (b) $\int_{-a}^b f(x) dx$ (c) $\int_a^{-b} f(x) dx$ (d) $\int_{-a}^{-b} f(x) dx$

7. The $\inf U(P,f,\alpha)$ is _____.

- (a) $\int_a^b f d\alpha$ (b) $\int_{-a}^b f d\alpha$ (c) $\int_a^{-b} f d\alpha$ (d) $\int_{-a}^{-b} f d\alpha$

8. The $\sup L(P,f,\alpha)$ is _____.

- (a) $\int_a^b f d\alpha$ (b) $\int_{-a}^b f d\alpha$ (c) $\int_a^{-b} f d\alpha$ (d) $\int_{-a}^{-b} f d\alpha$

9. A partition P^* is said to be a refinement of the partition P if _____.

- (a) $P^* \supset P$ (b) $P^* \subset P$ (c) $P^* = P$ (d) $P^* \neq P$

10. P^* is said to be a common refinement of P_1 and P_2 if _____.

- (a) $P^* \supset (P_1 \cup P_2)$ (b) $P^* \subset (P_1 \cup P_2)$ (c) $P^* = P_1 \cup P_2$ (d) $P^* = P_1 \cap P_2$

11. If P^* is a refinement of P , then

- (a) $L(P,f,\alpha) \geq U(P^*,f,\alpha)$ (b) $L(P^*,f,\alpha) \leq L(P,f,\alpha)$

- (c) $U(P,f,\alpha) \geq L(P^*,f,\alpha)$ (d) $L(P,f,\alpha) \leq L(P^*,f,\alpha)$

12. If P^* is a refinement of P , then
 (a) $L(P, f, \alpha) \geq U(P^*, f, \alpha)$ (b) $L(P, f, \alpha) \leq U(P^*, f, \alpha)$
 (c) $U(P^*, f, \alpha) \geq U(P, f, \alpha)$ (d) $U(P^*, f, \alpha) \leq U(P, f, \alpha)$

UNIT – II

13. If $f \in R$ on $[a, b]$ and if there is a differentiable function F on $[a, b]$ such that $F' = f$, then $\int_a^b f(x) dx =$ _____.
- (a) $F'(b) - F'(a)$ (b) $F(b) - F(a)$ (c) $f'(b) - f'(a)$ (d) $f(b) - f(a)$
14. A continuous mapping γ of an interval $[a, b]$ into R^k is called a _____ in R^k .
 (a) **curve** (b) arc (c) closed curve (d) rectifiable curve
15. A continuous mapping γ of an interval $[a, b]$ into R^k is one-one then γ is called as _____.
 (a) curve (b) **arc** (c) closed curve (d) rectifiable curve
16. Let γ be a continuous mapping of an interval $[a, b]$ into R^k . If $\gamma(a) = \gamma(b)$ then γ is said to be a _____.
 (a) curve (b) arc (c) **closed curve** (d) rectifiable curve
17. The length of γ is defined as the _____.
 (a) $\max \Lambda(P, \gamma)$ (b) $\min \Lambda(P, \gamma)$ (c) **$\sup \Lambda(P, \gamma)$** (d) $\inf \Lambda(P, \gamma)$
18. If the length of the curve $\Lambda(\gamma) < \infty$ then the curve is known as _____.
 (a) open curve (b) arc (c) closed curve (d) **rectifiable curve**
19. If $\{f_n\}$ is a sequence of continuous function on E and if $\{f_n\} \rightarrow f$ uniformly on E then f is _____ on E .
 (a) **continuous** (b) pointwise continuous (c) uniformly continuous (d) discontinuous
20. If f is bounded then _____.
 (a) $\|f\| = \infty$ (b) $\|f\| < \infty$ (c) $\|f\| < 0$ (d) $\|f\| < 1$
21. Which one is true?
 (a) $\|f + g\| = \|f\| + \|g\|$ (b) $\|f + g\| \leq \|f\| - \|g\|$ (c) $\|f + g\| \geq \|f\| + \|g\|$ (d) $\|f + g\| \leq \|f\| + \|g\|$

UNIT – III

22. The set of all polynomials is a / an _____.

(a) algebra (b) uniformly closed algebra (c) uniformly closure (d) equicontinuous

23. Let **B** be the uniform closure of an algebra **A** of bounded functions. Then **B** is a _____.

(a) algebra (b) **uniformly closed algebra** (c) uniformly closure (d) equicontinuous

24. **A** is said to separate points on E if to every pair of distinct point $x_1, x_2 \in E$ there corresponds a function $f \in \mathbf{A}$ such that _____.

(a) $f(x_1) < f(x_2)$ (b) $f(x_1) > f(x_2)$ (c) $f(x_1) = f(x_2)$ (d) $f(x_1) \neq f(x_2)$

25. **A** vanishes at no point of E if to each $x \in E$ there corresponds a function $g \in \mathbf{A}$ such that _____.

(a) $g(x) < 0$ (b) $g(x) > 0$ (c) $g(x) = 0$ (d) $g(x) \neq 0$

26. If for every $f \in \mathbf{A}$, its complex conjugate \bar{f} is also an element of **A** then **A** is said to be _____.

(a) **self adjoint** (b) conjugate (c) separable (d) uniformly closed

UNIT – IV

26. Suppose $\sum c_n$ converges. Put $f(x) = \sum_{n=0}^{\infty} c_n x^n$ ($-1 < x < 1$).

Then $\lim_{x \rightarrow 1} f(x) = \sum_{n=0}^{\infty} c_n$ is known as _____.

(a) Riemann's theorem (b) **Abel's theorem**

(c) Taylor's theorem (d) Weiertrass theorem

27. Given a double sequence $\{a_{ij}\}, i = 1, 2, 3 \dots, j = 1, 2, 3, \dots$, suppose that

$\sum_{j=1}^{\infty} |a_{ij}| = b_i$ ($i = 1, 2, 3 \dots$) and $\sum b_i$ converges. Then $\sum_{i=1}^{\infty} \sum_{j=1}^{\infty} a_{ij} =$ _____.

(a) $\sum_{i=1}^{\infty} \sum_{j=1}^{\infty} b_{ij}$ (b) $\sum_{j=1}^{\infty} \sum_{i=1}^{\infty} b_{ij}$ (c) $\sum_{j=1}^{\infty} \sum_{i=1}^{\infty} a_{ij}$ (d) $\sum_{j=1}^{\infty} \sum_{i=1}^{\infty} |a_{ij}|$

28. By Taylor's theorem $f(x) =$ _____.

(a) $\sum_{n=0}^{\infty} \frac{f^{(n)}(a)(x-a)^n}{n!}$ (b) $\sum_{n=0}^{\infty} \frac{f^{(n)}(a)(x-a)^{n-1}}{n!}$

(c) $\sum_{n=0}^{\infty} \frac{f^{(n-1)}(a)(x-a)^n}{n!}$ (d) $\sum_{n=0}^{\infty} \frac{f^{(n-1)}(a)(x-a)^{n-1}}{n!}$

29. The exponential function $E(z) =$ _____.

(a) $\sum_{n=1}^{\infty} \frac{z^n}{n!}$ (b) $\sum_{n=0}^{\infty} \frac{z^n}{n!}$ (c) $\sum_{n=1}^{\infty} \frac{z^n}{(n-1)!}$ (d) $\sum_{n=0}^{\infty} \frac{z^n}{(n-1)!}$

30. $E(z)E(w) =$ _____ .

(a) $\frac{E(zw)}{E(z)E(w)}$ (b) $E(z)E(w)$ (c) $E(z) + E(w)$ (d) $E(z+w)$

31. If x is real then $|E(ix)| =$ _____ .

(a) **1** (b) -1 (c) i (d) $-i$

32. If x is real then $c(0) =$ _____ .

(a) 0 (b) **1** (c) -1 (d) i

33. If x is real then $s(0) =$ _____ .

(a) **0** (b) 1 (c) -1 (d) i

34. If x is real then $c\left(\frac{\pi}{2}\right) =$ _____ .

(a) **0** (b) 1 (c) -1 (d) i

35. If x is real then $s\left(\frac{\pi}{2}\right) =$ _____ .

(a) 0 (b) **1** (c) -1 (d) i

36. If x is real then $E\left(\frac{\pi i}{2}\right) =$ _____ .

(a) 1 (b) -1 (c) **i** (d) $-i$

37. If x is real then $E(\pi i) =$ _____ .

(a) 1 (b) **-1** (c) i (d) $-i$

38. If x is real then $E(2\pi i) =$ _____ .

(a) **1** (b) -1 (c) i (d) $-i$

39. If z is complex then $E(z + 2\pi i) =$ _____ .

(a) z (b) iz (c) **$E(z)$** (d) $E(iz)$

40. The function E is periodic, with period _____ .

(a) π (b) 2π (c) πi (d) **$2\pi i$**

41. The function C and S are periodic, with period _____ .

(a) π (b) **2π** (c) πi (d) $2\pi i$

UNIT – V

42. The sequence $\{\phi_n\}$ is said to be an orthogonal system of functions on $[a, b]$ if

$\int_a^b \phi_n(x)\overline{\phi_m(x)} dx =$ _____ .

(a) $\phi(b) - \phi(a)$ (b) $n - m$ (c) **0** (d) 1

43. The sequence $\{\phi_n\}$ is said to be an orthonormal system of functions on $[a, b]$ if

$$\int_a^b |\phi_n(x)|^2 dx = \underline{\hspace{2cm}} .$$

- (a) $\phi(b) - \phi(a)$ (b) $n - m$ (c) 0 **(d) 1**

44. The Bessel's inequality is $\underline{\hspace{2cm}}$.

(a) $\sum_{n=1}^{\infty} |c_n|^2 = \int_a^b |f(x)|^2 dx$ **(b) $\sum_{n=1}^{\infty} |c_n|^2 \leq \int_a^b |f(x)|^2 dx$**

(c) $\sum_{n=1}^{\infty} |c_n|^2 \geq \int_a^b |f(x)|^2 dx$ (d) $\sum_{n=1}^{\infty} |c_n|^2 \neq \int_a^b |f(x)|^2 dx$

45. $\sum_{n=1}^{\infty} |c_n|^2 \leq \int_a^b |f(x)|^2 dx$ is known as $\underline{\hspace{2cm}}$.

- (a) Holder's inequality (b) Minkoskiw's inequality

(c) Bessel's inequality (d) Schwarz's inequality

46. Dirichlet's kernel is $D_N(X) = \underline{\hspace{2cm}}$.

(a) $\sum_{n=1}^{\infty} e^{inx} = \frac{\sin(N + \frac{1}{2})X}{\sin(X/2)}$ (b) $\sum_{n=1}^N e^{inx} = \frac{\sin(N + \frac{1}{2})X}{\sin(X/2)}$

(c) $\sum_{n=-N}^{\infty} e^{inx} = \frac{\sin(N + \frac{1}{2})X}{\sin(X/2)}$ **(d) $\sum_{n=-N}^N e^{inx} = \frac{\sin(N + \frac{1}{2})X}{\sin(X/2)}$**

47. Gamma function is $\Gamma(x) = \underline{\hspace{2cm}}$.

(a) $\int_0^{\infty} t^{x-1} e^{-t} dt$ (b) $\int_0^{\infty} t^{x-1} e^t dt$ (c) $\int_0^{\infty} t^{1-x} e^{-t} dt$ (d) $\int_0^{\infty} t^{1-x} e^{1-t} dt$

48. $\Gamma(1/2) = \underline{\hspace{2cm}}$.

- (a) π **(b) $\sqrt{\pi}$** (c) 0 (d) 1

49. $\int_{-\infty}^{\infty} e^{-s^2} ds = \underline{\hspace{2cm}}$.

- a) π **(b) $\sqrt{\pi}$** (c) 0 (d) 1

50. Stirling's formula is $\underline{\hspace{2cm}}$.

(a) $\log_{x \rightarrow \infty} \frac{\Gamma(x+1)}{(x/e)^x \sqrt{2\pi x}} = 1$ (b) $\log_{x \rightarrow 1} \frac{\Gamma(x+1)}{(x/e)^x \sqrt{2\pi x}} = 1$

(c) $\log_{x \rightarrow e} \frac{\Gamma(x+1)}{(x/e)^x \sqrt{2\pi x}} = 1$ (d) $\log_{x \rightarrow \infty} \frac{\Gamma(x+1)}{(x/e)^{2x} \sqrt{2\pi x}} = 1$

SECTION – B

UNIT – I

1. Define Riemann – Stieltjes integral.
2. Define common refinement.
3. State any one of property of the integral.
4. Define $\int_a^{-b} f d\alpha$ and $\int_{-a}^b f d\alpha$
5. For any partition P of [a,b]. What is meant by refinement of P and if P_1 and P_2 are partitions.
What do you mean by common refinement of P_1 and P_2 .
6. Define upper and lower Riemann integrals of f over [a,b].
7. Define Riemann integrable function on [a,b].
8. Define refinement of the partition p.
9. Define unit step function.
10. Prove that if $f \in R(\alpha)$ and $g \in R(\alpha)$ on [a,b] then $fg \in R(\alpha)$
11. Prove that if $f \in R(\alpha)$ on [a,b] then $|f| \in R(\alpha)$
12. Prove that if $f \in R(\alpha)$ on [a,b] then $|\int_a^b f d\alpha| \leq \int_a^b |f| d\alpha$.
13. If $f_1(x) \leq f_2(x)$ on [a,b] then prove that $\int_a^b f_1 d\alpha \leq \int_a^b f_2 d\alpha$.
14. Prove that if $f \in R(\alpha)$ on [a,b] and if $|f(x)| \leq M$ on [a,b] then $|\int_a^b f d\alpha| \leq M [\alpha(b) - \alpha(a)]$.

UNIT – II

9. Define uniform convergence.
10. Prove: $\|f + g\| \leq \|f\| + \|g\|$.
11. Prove that the order of taking limits cannot be interchanged.
12. Define the term – Rectifiable curves.
13. Define uniform convergent sequence.
14. State fundamental theorem of calculus.
15. Define a curve in R^k .
16. Define the term arc.

17. Define closed curve.
18. Define length of a curve.
19. Define supremum norm and write its property.

UNIT – III

20. Define equicontinuous.
21. Define uniformly bounded.
22. Define algebra.
23. Define uniform closure of A.
24. Define separate points on a set E.
25. Define pointwise bounded functions.
26. Define uniformly closed algebra.
27. When will you say an algebra is self adjoint?

UNIT – IV

28. Define analytic functions.
29. Define exponential function.
30. Show that $[E(Z)]' = E(Z)$.
31. Prove that $E(z+w) = E(z)E(w)$.
32. Define logarithmic functions.
33. Define trigonometric functions.

UNIT – V

34. Define a Fourier series of an integrable function.
35. Show that $\Gamma(x+1) = \Gamma(x)$.
36. Define an orthonormal system of functions on $[a,b]$.
37. Define Dirichlet kernel.
38. Define Gamma function.
39. Define Beta function.
40. Write Stirling's formula.

SECTION – C

UNIT – I

1. If f is continuous on $[a,b]$ then prove that $f \in R(\alpha)$ on $[a,b]$.
2. If for a given $\epsilon > 0$, there is a partition $P = \{x_0, x_1, \dots, x_n\}$ such that $U(p, f, \alpha) - L(p, f, \alpha) < \epsilon$ and s_i, t_i are arbitrary points of $[x_{i-1}, x_i]$ prove that $\sum_{i=1}^n |f(s_i) - f(t_i)| \Delta \alpha_i < \epsilon$.
3. If f is monotonic on $[a,b]$ and if α is continuous on $[a,b]$, then $f \in R(\alpha)$.
4. If $a < s < b$, f is bounded on $[a,b]$, f is continuous at s and $\alpha(x) = I(x - s)$, then $\int_a^b f d\alpha = f(s)$.
5. Prove that $\int_{-a}^b f d\alpha \leq \int_a^{-b} f d\alpha$
6. State and prove any one of the properties of the integral.
7. If $f \in R(\alpha)$ and $g \in R(\alpha)$ on $[a,b]$ then
 - (i) $fg \in R(\alpha)$
 - (ii) $|f| \in R(\alpha)$ and $|\int_a^b f d\alpha| \leq \int_a^b |f| d\alpha$.
8. Suppose ϕ is a strictly increasing continuous function that maps an interval $[A,B]$ onto $[a,b]$. Suppose α is monotonically increasing on $[a,b]$ and $f \in R(\alpha)$ on $[a,b]$. Define β and g on $[A,B]$ by $\beta(y) = \alpha(\phi(y))$, $g(y) = f(\phi(y))$ then $g \in R(\beta)$ and $\int_A^B g d\beta = \int_a^b f d\alpha$.

UNIT – II

9. State and prove Weierstrass M - test.
10. State and prove the fundamental theorem of calculus.
11. Suppose $\{f_n\}$ is a sequence of functions defined on E , and suppose $|f_n(x)| \leq M_n$ ($x \in E, n = 1, 2, 3, \dots$) then prove that $\sum f_n$ converges uniformly on E if $\sum M_n$ converges.
12. Give an example for everywhere discontinuous limit functions which is not Riemann integrable.
13. Prove that $C(X)$ is a complete metric space.
14. If $\{f_n\}$ is a sequence of continuous function on E and if $\{f_n\} \rightarrow f$ uniformly on E then prove that f is continuous on E .
15. Suppose F and G are differentiable functions on $[a,b]$, $F' = f \in R$ and $G' = g \in R$. Then $\int_a^b F(x)g(x)dx = F(b)G(b) - F(a)G(a) - \int_a^b f(x)G(x)dx$.

16. Give an example to show that converges series of continuous function may have discontinuous summation.
17. Give an example for $\{f_n\} \rightarrow f$ need not imply that $\{f_n'\} \rightarrow f'$.
18. Prove that the limit of the integral of sequence of functions need not be equal to the integral of the limit of the sequence of functions.

UNIT – III

19. Give an example of uniformly bounded sequence on a compact set which has no uniformly convergent subsequence.
20. If $f_n \in R(\alpha)$ on $[a, b]$ and if $f(x) = \sum_{n=1}^{\infty} f_n(x)$ ($a \leq x \leq b$), the series converging uniformly on $[a, b]$ then $\int_a^b f d\alpha = \sum_{n=1}^{\infty} \int_a^b f_n d\alpha$.
21. Let α be monotonically increasing on $[a, b]$. Suppose $f_n \in R(\alpha)$ on $[a, b]$, for $n = 1, 2, 3, \dots$, and suppose $f_n \rightarrow f$ uniformly on $[a, b]$. Then $f \in R(\alpha)$ on $[a, b]$ and
- $$\int_a^b f d\alpha = \lim_{n \rightarrow \infty} \int_a^b f_n d\alpha$$
22. If $\{f_n\}$ is a pointwise bounded sequence of complex functions on a countable set E , then prove that $\{f_n\}$ has a subsequence $\{f_{n_k}\}$ such that $\{f_{n_k}(x)\}$ converges for every $x \in E$.
23. If K is compact metric space, if $f_n \in C(K)$ for $n = 1, 2, 3, \dots$ and if $\{f_n\}$ converges uniformly on K , then $\{f_n\}$ is equicontinuous on K .
24. Suppose A is an algebra of functions on a set E , A separates points on E , and A vanishes at no point of E . Suppose x_1, x_2 are distinct points of E , and c_1, c_2 are constants. Then A contains a function f such that $f(x_1) = c_1$, $f(x_2) = c_2$

UNIT – IV

25. Prove the following.
- (i) The function E is periodic, with period $2\pi i$.
 - (ii) The functions C and S are periodic, with period 2π .
26. Given a double sequence $\{a_{ij}\}, i = 1, 2, 3, \dots, j = 1, 2, 3, \dots$, suppose that $\sum_{j=1}^{\infty} |a_{ij}| = b_i$ ($i = 1, 2, 3, \dots$) and $\sum b_i$ converges. Then show that $\sum_{i=1}^{\infty} \sum_{j=1}^{\infty} a_{ij} = \sum_{j=1}^{\infty} \sum_{i=1}^{\infty} a_{ij}$.

27. Suppose a_0, \dots, a_n are complex numbers, $n \geq 1$, $a_n \neq 0$, $P(z) = \sum_0^n a_k z^k$.
Then $P(z) = 0$ for some complex number z .
28. Show that $E(Z)$ converges and $E(Z) E(W) = E(Z + W)$.
29. Define trigonometric functions and prove that $E(z + 2\pi i) = E(z)$ where z is a complex
Where E is the exponential function.
30. Let $f(x) = \sum_{n=0}^{\infty} c_n x^n$ converges in $|x| < R$. Let $-R < a < R$. Prove that f can be expanded in a
power series about the point $x = a$ which converges in $|x - a| < R - |a|$.

UNIT – V

31. Prove that $\Gamma(x) = \frac{2^{x-1}}{\sqrt{\pi}} \Gamma\left(\frac{x}{2}\right) \Gamma\left(\frac{x+1}{2}\right)$
32. If f is a positive function on $(0, \infty)$ such that
- $f(x+1) = x f(x)$,
 - $f(1) = 1$,
 - $\log f$ is convex, then $f(x) = \Gamma(x)$.
33. Prove the following:
- The functional equation $\Gamma(x + 1) = x\Gamma(x)$ holds if $0 < x < \infty$
 - $\Gamma(n + 1) = n!$ for $n = 1, 2, \dots$
 - $\log \Gamma$ is convex on $(0, \infty)$
34. Define Beta function and prove it.
35. If, for some x , there are constants $\delta > 0$ and $M < \infty$ such that $|f(x+t) - f(x)| \leq M|t|$ for all
 $t \in (-\delta, \delta)$, then $\lim_{N \rightarrow \infty} S_N(f; x) = f(x)$.

SECTION – D

UNIT – I

- $f \in R(\alpha)$ on $[a, b]$ iff for every $\varepsilon > 0$ there exists a partition P such that $U(P, f, \alpha) - L(P, f, \alpha) < \varepsilon$
- Suppose $f \in R(\alpha)$ on $[a, b]$, $m \leq f \leq M$, ϕ is continuous on $[m, M]$, and $h(x) = \phi(f(x))$
on $[a, b]$. Then $h \in R(\alpha)$ on $[a, b]$.
- If P^* is a refinement of P , then $L(P, f, \alpha) \leq L(P^*, f, \alpha)$ and $U(P^*, f, \alpha) \leq U(P, f, \alpha)$
- Suppose $c_n \geq 0$ for $1, 2, 3, \dots$, $\sum c_n$ converges, $\{s_n\}$ is a sequence of distinct points in (a, b)
and $\alpha(x) = \sum_{n=1}^{\infty} c_n I(x - s_n)$. Let f be continuous on $[a, b]$. Then $\int_a^b f d\alpha = \sum_{n=1}^{\infty} c_n f(s_n)$

UNIT – II

5. If γ' is continuous on $[a,b]$, then γ is rectifiable, and $\Lambda(\gamma) = \int_a^b |\gamma'(t)| dt$.
6. The sequence of functions $\{f_n\}$, defined on E converges uniformly on E iff for every $\epsilon > 0$ there exist an integer N such that $m \geq N, n \geq N, x \in E$ implies $|f_n(x) - f_m(x)| \leq \epsilon$.
7. Suppose $f_n \rightarrow f$ uniformly on E in a metric space. Let x be a limit point of E , and suppose that $\lim_{t \rightarrow x} f_n(t) = A_n, (n = 1, 2, 3, \dots)$. Then $\{A_n\}$ converges, and $\lim_{t \rightarrow x} f(t) = \lim_{n \rightarrow \infty} A_n$.
8. Suppose K is compact and $\{f_n\}$ is a sequence of continuous functions on K , $\{f_n\}$ converges pointwise to a continuous function f on K and $f_n(x) \geq f_{n+1}(x)$ for all $x \in K, n = 1, 2, 3, \dots$. Then prove that $f_n \rightarrow f$ uniformly on K .

UNIT – III

9. State and prove Stone Weierstrass theorem.
10. If K is compact if $f_n \in C(K)$ for $n = 1, 2, 3, \dots$ and if $\{f_n\}$ is pointwise bounded and equicontinuous on K then prove that
- $\{f_n\}$ is uniformly bounded on K .
 - $\{f_n\}$ contains a uniformly convergent subsequence.
11. Prove that there exists a real continuous function on the real line which is nowhere differentiable.
12. Let α be monotonically increasing on $[a,b]$. Suppose $f_n \in R(\alpha)$ on $[a,b]$, for $n = 1, 2, 3, \dots$ and suppose $f_n \rightarrow f$ uniformly on $[a,b]$. Then $f \in R(\alpha)$ on $[a,b]$ and $\int_a^b f d\alpha = \lim_{n \rightarrow \infty} \int_a^b f_n d\alpha$
13. Suppose $\{f_n\}$ is a sequence of functions, differentiable on $[a,b]$ and such that $\{f_n(x_0)\}$ converges for some point x_0 on $[a,b]$. If $\{f'_n\}$ converges uniformly on $[a,b]$, then prove $\{f_n\}$ converges uniformly on $[a,b]$, to a function f , and $f'(x) = \lim_{n \rightarrow \infty} f'_n(x), (a \leq x \leq b)$.
14. State and prove Stone's generalization of the Weierstrass theorem.

UNIT – IV

15. State and prove Abel's theorem.
16. State and prove Taylor's theorem.
17. Suppose $\sum c_n$ converges. Put $f(x) = \sum_{n=0}^{\infty} c_n x^n (-1 < x < 1)$.
Then $\lim_{x \rightarrow 1} f(x) = \sum_{n=0}^{\infty} c_n$.

18. Suppose a_0, \dots, a_n are complex numbers, $n \geq 1$, $a_n \neq 0$, $P(z) = \sum_0^n a_k z^k$.

Then $P(z) = 0$ for some complex number z .

19. Prove the following.

(i) The function E is periodic, with period $2\pi i$.

(ii) The functions C and S are periodic, with period 2π .

(iii) If $0 < t < 2\pi$, then $E(it) \neq 1$.

20. Suppose the series $\sum a_n x^n$ and $\sum b_n x^n$ converge in the segment $S = (-R, R)$. Let E be the set of all $x \in S$ at which $\sum_{n=0}^{\infty} a_n x^n = \sum_{n=0}^{\infty} b_n x^n$. If E has a limit point in S , then $a_n = b_n$ for $n = 0, 1, 2, 3, \dots$. Hence $\sum_{n=0}^{\infty} a_n x^n = \sum_{n=0}^{\infty} b_n x^n$ holds for all $x \in S$.

UNIT – V

21. Let $\{\phi_n\}$ be orthonormal on $[a, b]$. Let $s_n(x) = \sum_{m=1}^n c_m \phi_m(x)$ be the n th partial sum of the

Fourier series of f , and suppose $t_n(x) = \sum_{m=1}^n \gamma_m \phi_m(x)$. Then $\int_a^b |f - s_n|^2 \leq \int_a^b |f - t_n|^2$,.

and equality holds iff $\gamma_m = c_m$

22. If $x > 0$ and $y > 0$, then $\int_0^1 t^{x-1} (1-t)^{y-1} dt = \frac{\Gamma(x)\Gamma(y)}{\Gamma(x+y)}$.

23. Obtain the Stirling's formula.

24. State and prove Parseval's theorem.

25. Let $\{\phi_n\}$ be orthonormal on $[a, b]$. and if $f(x) \sim \sum_{n=1}^{\infty} c_n \phi_n(x)$, then $\sum_{n=1}^{\infty} |c_n|^2 \leq$

$$\int_a^b |f(x)|^2 dx.$$

Question Bank

SECTION-A (1 Marks):

UNIT –I

1. In a dynamical system, set of position of particles is known as its_____
a) dynamics b) degrees c) **configuration** d) constraint
2. The minimum number of coordinates required to describe the configuration of the dynamical system at any given time is called_____
a)**Generalized coordinate system** b) degrees of freedom c) configuration
d) constraint
3. The number of independent generalized coordinates required to describe the configuration of a system is called _____
a)Holonomic b) **degrees of freedom** c) configuration d) constraint
4. Any restriction on the motion of a system is known as _____
a)Dynamics b) degrees of freedom c) **constraint** d) configuration
5. In a simple dynamical system $T + V =$ _____
a)**constant** b) zero c) coordinate d) configuration
6. D'Alembert's principle is _____
a) $\sum_i (\mathbf{F}_i^{(a)} - \dot{\mathbf{p}}_i) \cdot \delta \mathbf{r}_i = 0$ b) $\sum_i (\mathbf{F}_i^{(a)} - \dot{\mathbf{Q}}_i) \cdot \delta \mathbf{r}_i = 0$
c) $\sum_i (\mathbf{F}_i^{(a)} - \mathbf{f}_i) \cdot \delta \mathbf{r}_i = 0$ d) $\sum_i (\mathbf{F}_i^{(a)} - \dot{\mathbf{p}}_i) \cdot \delta \mathbf{q}_i = 0$
7. The coefficients Q_1, Q_2, \dots, Q_n are called_____
a) **components of generalised force** b) virtual displacement
c) generalized force d) principle work
8. If virtual work of the force of constraint is_____
a)constant b) **zero** c) coordinate d) configuration
9. Principle of virtual work equation is_____
a) $\sum_i \mathbf{F}_i^{(a)} \cdot \delta \mathbf{r}_i = 0$ b) $\sum_i \mathbf{F}_i^{(a)} \cdot \delta \mathbf{p}_i = 0$
c) $\sum_i \mathbf{F}_i^{(a)} \cdot \delta \mathbf{q}_i = 0$ d) $\sum_i \mathbf{p}_i^{(a)} \cdot \delta \mathbf{r}_i = 0$

UNIT –II

10. Hamilton's principle is _____

a) $\delta \int_{t_0}^{t_1} L dt = 0$ b) $\int_{t_0}^{t_1} L dt = 0$ c) $\delta \int_{t_1}^{t_0} L dt = 0$ d) $\int_{t_1}^{t_0} L dt = 0$

11. Conjugate momentum is _____

a) $\frac{\partial L}{\partial \dot{q}_i} = q_i$ b) $\frac{\partial L}{\partial \dot{p}_i} = q_i$ c) $\frac{\partial L}{\partial \dot{q}_i} = p_i$ d) $\frac{\partial L}{\partial \dot{Q}_i} = P_i$

12. Hamilton's principle for non conservative, Holonomic system $\delta I =$ _____

a) constant b) **zero** c) coordinate d) configuration

13. I stands for _____

a) principle b) integral principle c) **stationary** d) path

14. The Lagrangian equation $L =$ _____

a) $T+V$ b) **$T-V$** c) $H+V$ d) $H+T$

15. cyclic coordinates are defined by _____

a) $\frac{\partial L}{\partial \dot{Q}_i} = q_i$ b) $\frac{\partial L}{\partial \dot{p}_i} = q_i$ c) $\frac{\partial L}{\partial \dot{q}_i} = p_i$ d) $\frac{\partial L}{\partial \dot{Q}_i} = P_i$

16. The conservation of total angular momentum is $p_j =$ _____

a) $\mathbf{n} \cdot \mathbf{L}$ b) $\mathbf{n} \times \mathbf{L}$ c) $\mathbf{n} \cdot \mathbf{N}$ d) \mathbf{n} / L

17. Conservation of energy in Lagrangian formulation is _____

a) $H=L-V$ b) $H=L+V$ c) **$H=T+V$** d) $H=T-V$

UNIT –III

18. A line through the point O in fixed direction of L is called _____.

a) **invariable line** b) invariable plane

c) point ellipsoid d) herpolhode

19. The curve traces out by the point of contact on the ellipsoid is called _____.

a) invariable line b) invariable plane

c) point ellipsoid d) **herpolhode**

20. Coriolis force is _____.

a) **$2m(\boldsymbol{\omega} \times \mathbf{v})$** b) $m\boldsymbol{\omega} \times (\boldsymbol{\omega} \times \mathbf{r})$

c) $2m(\boldsymbol{\omega} \times \mathbf{r})$ d) $m(\boldsymbol{\omega} \times \boldsymbol{\omega})$

21. The fixed plane is called the _____
 a) invariable line b) **invariable plane** c) point ellipsoid d) herpolhode
22. A _____ is rigid body which is a solid of revolution about its axis of symmetry.
 a) steady of motion b) **symmetrical top**
 c) top is vertical d) top is not vertical
23. The eulerian angles are rotating about _____ direction.
 a) **counter clockwise** b) anti-clockwise c) about axis d) angle
24. The _____ are defined as the three successive angles of rotation of a rigid body.
 a) angles b) node c) **Eulerian angles** d) projections
25. The motion of a symmetrical top is said to be steady if $\theta =$ _____
 a) Parallel b) perpendicular c) **constant** d) None
26. The motion due to change in θ is called _____
 a) precession b) **nutation** c) invariable d) fixed line
27. The motion due to change in ϕ is called _____
 b) **precession** b) nutation c) invariable d) fixed line

UNIT –IV

28. If H is not an explicit function of t, then H is _____
 a) Zero b) **constant** c) energy d) canonical
29. Hamiltonian coordinate is defined by $H =$ _____
 a) $H(q_i, p_i, t)$ b) **$H(p_i, q_i, t)$** c) $H(q_i, \dot{p}_i, t)$ d) $H(q_i, \dot{q}_i, t)$
30. $H = T + V =$ _____.
 a) **constant** b) zero c) coordinate d) configuration
31. $H = H(q_1, q_2, \dots, q_n, p_1, p_2, \dots, p_n, t)$ is _____
 a) **Hamiltonian** b) Lagrangian c) potential d) principle of least action
32. The action A of a dynamical system over the interval is _____
 a) $t_1 < t < t_2$ b) $t_1 < t < t_0$ c) $t_2 < t < t_1$ d) **$t_0 < t < t_1$**

33. $\frac{\partial H}{\partial t} = \frac{-\partial L}{\partial t}$ is called _____

- a) Hamiltonian b) **Hamilton's canonical** c) Lagrange's equation
d) Principle action

34. Principle of least action equation A is=_____

- a) $\delta \int_{t_0}^{t_1} L dt$ b) $\int_{t_0}^{t_1} 2T dt$ c) $\delta \int_{t_1}^{t_0} 2T dt$ d) $\int_{t_0}^{t_1} T dt$

UNIT –V

35. Canonical coordinates are_____

- a) **Q_i & P_i** b) q_i & P_i c) q_i & p_i d) Q_i & \dot{P}_i

36. The function F is called_____ function.

- a) **generating** b) canonical c) Hamiltonian d) Lagrangian

37. If $q_i \rightarrow Q_i$ and $p_i \rightarrow P_i$ these are called _____

- a) **canonical transformation** b) canonical coordinates
c) generating function d) Hamiltonian

38. In canonical transformation, K plays the role of _____

- a) Principle b) generating function c) **Hamiltonian** d) coordinates

39. $F_1(q, Q, t)$, Provided that only q_i, Q_i are treated as _____

- a) dependent b) zero c) **independent** d) Legendre transformation

40. $F_2(q, P, t)$, Provided that only q_i, P_i are treated as _____

- a) dependent b) zero c) **independent** d) Legendre transformation

41. $F_3(p, Q, t)$, Provided that only p_i, Q_i are treated as _____

- a) dependent b) zero c) **independent** d) Legendre transformation

42. Poisson bracket is defined by _____

- a) **$[u, v]_{q,p}$** b) $[u, v]_{p,q}$ c) $(u, v)_{q,p}$ d) $\{u, v\}_{q,p}$

SECTION –B (2 Marks):

UNIT –I

1. Define Holonomic.
2. Define constraint and degrees of freedom.
3. Define Non-holonomic.

4. Define Scleronomic and rheonomic system.
5. Define Virtual displacement and virtual work.
6. Derive D'Alembert's principle.
7. Define Velocity Potential energy.
8. Define Harmonic Oscillator and write its Langrange's equation.

UNIT-II

9. Define Hamilton's principle.
10. Show that Hamilton's principle is both a necessary and sufficient conditions for Langrange's equation.
11. Define Hamilton's principle for Non-conservative, Non-holonomic system.
12. Derive Generalised force.
13. Define cyclic Coordinates.
14. Define conjugate momentum.

UNIT-III

15. Define Eulerian Angles.
16. State the Euler's theorem.
17. Define Polhole and herpolhole.
18. State the chasle's Theorem.
19. Define invariable line.
20. Define invariable plane.
21. Define poincot ellipsoid.
22. Define polhode and herpolhode.
23. Prove that the kinetic energy is a constant throughout the motion.
24. Prove that the angular momentum is a constant throughout the motion.

UNIT-IV

25. Write Hamilton canonical equation.
26. Prove that if H is not an explicit function of t, then h is a constant of the motion
27. Define the principle of least action.
28. Define distinction between Hamilton's principle and Principle of Least action.
29. Prove that $\frac{dH}{dt} = \frac{\partial H}{\partial t}$ where H is the Hamiltonian function.
30. State the principle of least action theorem.

UNIT-V

31. Show that the necessary and sufficient condition for a transformation to be canonical.
32. State the Poincare theorem.
33. Show that Lagrange's bracket is canonical invariant.
34. Derive Hamilton's equations of motion in Poisson's Bracket.
35. Prove that (i). $[u,u]=0$
(ii) $[u,c]=0$, where c is a constant not depending on q and p explicitly.
36. Define Poisson brackets.
37. State the Jacobi's identity for Poisson's bracket.
38. Prove that $[u,v] = -[v, u]$.

SECTION-C (5 Marks):

UNIT-I

1. Derive Generalised Force in Holonomic System.
2. Prove that in a simple dynamic system $T+V = \text{Constant}$.
3. A particle of mass m moves in a plane. Find its equation in Cartesian coordinates.
4. Find the motion of a particle in space using Cartesian coordinates.

5. A Particle of mass m moves in a plane. Find its equation of motion in plane polar co ordinates.
6. Derive equation of motion for a simple pendulum of length l and mass of bob m by using Lagrange's equations.
7. A bead sliding on a uniformly rotating wire in a force-free space. Find the equations of motion.

UNIT-II

8. Derive Generalised force in Dynamic System.
9. Derive Hamilton's principle from Lagrange's equation.
10. Derive Hamilton's principle for conservative Non-holonomic system.
11. Derive Conservation of energy in Lagrangian Formulation.
12. Show that the shortest curve between two points in a plane is a straight line.
13. Find the curve for which the surface of revolution is minimum.
14. Use Hamilton's principle to find the equations of motion of particle of unit mass moving on a plane in a conservative field.
15. A uniform hoop is rolling down on an inclined plane without slipping. Find its motion.

UNIT-III

16. Derive representation of coordinates X', Y', Z' in terms of X, Y, Z .
17. Derive Components of Angular Velocity Along the body set of axes.
18. State and prove Euler's Theorem.
19. Prove that Rate of change of vector.
20. Solutions to Euler's Equations for force –free motion on symmetrical body.
21. Prove that (i) the kinetic energy (T), (ii) the angular momentum (L) and (iii) the magnitude of the angular momentum (L^2) of force free motion of a rigid body are constant throughout the motion.

22. A solid cube is in motion about an angular point which is fixed. If there are no external forces and $\omega_1, \omega_2, \omega_3$ are the angular velocities about the edges through the fixed point, prove that $\omega_1 + \omega_2 + \omega_3 = \text{constant}$ and $\omega_1^2 + \omega_2^2 + \omega_3^2 = \text{constant}$.
23. If a rectangular parallelepiped with its edges $2a, 2a, 2b$ rotates about its centre of gravity under no forces. Prove that, its angular velocity about one principal axis is constant and about the other axis it is periodic.

UNIT-IV

24. Derive Hamilton's equations of motion using Lagrange's equations.
25. If the equations of transformations do not depend explicitly on time and if the potential energy is velocity independent then H is the total energy of the system.
26. Derive Hamilton's equations of motion for a simple pendulum.
27. Prove that Hamilton's equations from Hamilton's principle.
28. Using cylindrical coordinates (ρ, ϕ, z) write the Hamilton's equation of motion for a particle of mass m moving in a force field of potential $V(\rho, \phi, z)$.
29. Prove that $\frac{dH}{dt} = \frac{\partial H}{\partial t}$ Where it is the Hamiltonian function.
30. Write Hamilton's equations of motion for a compound pendulum.

UNIT-V

31. Prove that the following results
- i. $[u, u] = 0$
 - ii. $[u, c] = 0$, where c is a constant not depending on q and p explicitly
 - iii. $[u+v, w] = [u, w] + [v, w]$
32. Show that the following results
- i. $[u, v] = -[v, u]$
 - ii. $\sum_{i=1}^{2n} \{u_i, u_i\} [u_i, u_j] = \delta_{ij}$

33. Prove that the Poisson's bracket is Invariant under canonical Transformation.
34. Show that the transformation $Q = \log \left(\frac{1}{q} \sin p \right), P = q \cot p$ is canonical.
35. If u, v are constants of motion Show that $[u, v]$ is also a constant of motion.
36. Consider the generating function $F_1 = \frac{m}{2} w q^2 \cot Q$, where m & w are constant then prove that solution of harmonic oscillator.
37. State and prove momentum conservation theorem.
38. Derive Hamilton- Jacobi Equation for Hamilton,s principal Function.

SECTION-D (10 Marks):

UNIT-I

1. Derive Lagrange's equations for a Holonomic system.
2. Derive Lagrange's equations of Motion for Conservative Non-Holonomic System.
3. Use Lagrange's equations to find the differential equation for a compound pendulum which Oscillates in a vertical plane about a fixed horizontal axis.
4. A Particle of mass m moves in a plane. Find its equation of motion in plane polar co ordinates.
5. A particle of mass m moves OA in a Conervative force field the Lagrangian and the equations of motion in cylindrical coordinates (ρ, ϕ, z) .
6. Find the equation of motion of a particle in spherical polar coordinates from Lagrange's equations.

UNIT-II

7. Derive Lagrange's Equations from Hamilton's Principle.
8. Derive Lagrange's Equations For Non- Conservative Holonomic System.
9. Derive Conservation of Linear Momentum in Lagrangian Formulation.

10. Derive Conservation of angular Momentum.
11. Prove that the curve for which the surface of revolution is minimum
12. A heavy particle is placed at the top of a vertical hoop. Calculate the reaction of the hoop on the particle by means of Lagrange's undetermined multiplier and Lagrange's equation. Find the height at which the particle will fall off.

UNIT –III

13. Derive Coriolis force.
14. State and Prove Chasle's Theorem.
15. Derive Euler's equations of motion for a Rigid body.
16. Derive motion of a heavy symmetrical top.
17. Derive stability of steady motion of a symmetrical top.
18. Derive stability of steady motion when the axis of the top is vertical.
19. A uniform right circular cone of vertical angle 2α moves, under no forces, about its fixed vertex. It is set rotating about a generator. Show that its axis describes a reged cone of angle 2β in space, where

$$\tan \beta = \frac{1}{2} \tan \alpha + 2 \cot \alpha$$

UNIT-IV

20. Derive Routh's Procedure – Equations of motion.
21. Derive Hamilton's equations from Hamilton's principle.
22. The Principle of least action show that $\Delta A = 0$ on the actual path as compared with some neighbouring paths. Here Δ denotes a variation in A with time.
23. Using Hamilton's equations find the equations of motion of a projectile in space.
24. A particle of mass m moves in a force field of potential V. Write the Hamilton's equations of motion in spherical polar coordinates.

25. Find the Hamiltonian at a dynamical system is given by

$$H=q_1p_1-q_2p_2-aq_1^2+bq_2^2 \text{ where } a, b \text{ are constants.}$$

UNIT-V

26. State and prove Poincare theorem.

27. Prove the following results:

$$\text{i) } \{u, v\}_{q,p} = -\{v, u\}_{q,p}$$

$$\text{ii) } \{q_i, q_j\}_{q,p} = 0 = \{p_i, p_j\}_{q,p}$$

$$\text{iii) } \{q_i, p_j\} = \begin{cases} 1 & \text{if } i = j \\ 0 & \text{if } i \neq j \end{cases}$$

28. Prove the following results

$$\text{iii. } [u, v] = -[v, u]$$

$$\text{iv. } \sum_{l=1}^{2n} \{u_l, u_i\}[u_l, u_j] = \delta_{ij}$$

$$\text{v. } [q_i, q_j] = 0 = [p_i, p_j]$$

$$\text{vi. } [q_i, p_j] = \delta_{ij}$$

29. Derive Poisson's bracket is Invariant under canonical Transformation.

30. State and prove Jacobi's identify for Poisson's brackets.

31. For what values of α and β do the equation is $Q = q^\alpha \cos \beta p, P = q^\alpha \sin \beta p$

Represent a canonical transformation? What is the form of the generating function F_3 for this case?

32. Show that the transformation $Q = \log(1/q \sin p), P = q \cot p$ is canonical.

ST. MARY'S COLLEGE (Autonomous), THOOTHUKUDI

I M.Sc. Mathematics

Semester II

Core IV – Calculus of variation and Integral equation

Subject Code: 21PMAC24

Question Bank

Section-A

(1x10=10)

UNIT-I

1.If $f(x)$ has a continuous derivative in (a,b) , a necessary condition for the existence of the maximum or minimum at x_0 in (a,b) is that _____

- (a) $\left(\frac{dy}{dx}\right)_{x=x_0} > 0$ (b) $\left(\frac{d^2y}{dx^2}\right)_{x=x_0} > 0$ (c) $\left(\frac{dy}{dx}\right)_{x=x_0} < 0$ (d) $\left(\frac{dy}{dx}\right)_{x=x_0} = 0$

2. Solution of Euler's equation is the _____ of the problem.

- (a) Integrand (b) **extremals** (c) stationary value (d) a and c

3. Which of the following is the condition for Natural boundary condition _____

- (a) $[\partial F / \partial y']_{x=x_1} = 0$ (b) $[\partial F / \partial y']_{x=x_2} = 0$ (c) a or b (d) **a and b**

4.Any quantity which takes on a specific numerical value in $[a,b]$ corresponding to each function on the set S is called _____

- (a) constant functionals (b) **functionals**
(c) variate functionals (d) none of the above

5. _____ is a first order approximation to the change in that function along a particular curve.

- (a) variation of the functionals (b) variation
(c) **differential of function** (d) functionals

6. Derivative of the variation with respect to an independent variable is _____ to the variation of the derivative.

- (a) equal and opposite (b) opposite
(c) **equal** (d) inversely proportional

7. The stationary function for an integral functional is _____ for which that variation of that integral is zero.

- (a) **1** (b) 0
(c) ∞ (d) depends upon the integrand

8. $y(c^+) = y(c^-)$ is one of the natural transition condition where y is _____ at c .
 (a) **continuous** (b) discontinuous (c) differentiable (d) a and c.

UNIT-II

9. If the constraint is prescribed directly in the variational form $f\delta u + g\delta v = 0$ then the necessary conditions are given by _____ .
 (a) $g\left[\frac{d}{dx}\left(\frac{\partial F}{\partial u_x}\right) - \frac{\partial F}{\partial u}\right] - f\left[\frac{d}{dx}\left(\frac{\partial F}{\partial v_x}\right) - \frac{\partial F}{\partial v}\right] = 0$
 (b) $f\left[\frac{d}{dx}\left(\frac{\partial F}{\partial u_x}\right) - \frac{\partial F}{\partial u}\right] - g\left[\frac{d}{dx}\left(\frac{\partial F}{\partial v_x}\right) - \frac{\partial F}{\partial v}\right] = k$
 (c) $g\left[\frac{d}{dx}\left(\frac{\partial F}{\partial u_x}\right) - \frac{\partial F}{\partial u}\right] - f\left[\frac{d}{dx}\left(\frac{\partial F}{\partial v_x}\right) - \frac{\partial F}{\partial v}\right] \neq 0$
 (d) $g\left[\frac{d}{dx}\left(\frac{\partial F}{\partial u_x}\right) - \frac{\partial F}{\partial u}\right] - f\left[\frac{d}{dx}\left(\frac{\partial F}{\partial v_x}\right) - \frac{\partial F}{\partial v}\right] < 0$
10. If the normalizing condition is dropped, the problem $\delta \int_a^b (py'^2 - qy^2) dx$ determines only one stationary function _____
 (a) $y \equiv 0$ (b) $y \equiv \alpha(x)$ (c) $y \equiv k$ (d) $y \neq 0$
11. The energy difference $L = T - V$ is sometimes called _____
 (a) Lagrangian function (b) **kinetic potential**
 (c) generalized equation for energy difference (d) both a and b
12. The normalizing function is added to the variational problem which has _____ stationary functions.
 (a) infinite (b) countable (c) uncountable (d) finite .
13. The general solution of $\frac{d}{dx} \left\{ \frac{\partial}{\partial y'} (F + \lambda G) \right\} - \frac{\partial}{\partial y} (F + \lambda G) = 0$ will involve the _____
 (a) Constant parameter (b) constants of integration
 (c) single variable (d) **both a and b**
14. $\phi(u, v) = 0$ then the variation of ϕ _____
 (a) constant (b) **zero** (c) decreases (d) increases
15. In a conservative system the total potential energy does not depend on _____
 (a) velocities (b) position (c) lagrangian function (d) kinetic

UNIT-III

16. If $\alpha=1$ in $\alpha(x) y(x) = \lambda \int_0^1 K(x, \xi) y(\xi) d\xi + F(x)$ then the equation is known as _____.
- (a) Fredholm equation (b) Volterra equation of the first kind
(c) **Volterra equation of the second kind** (d) Volterra equation of the third kind
17. If $\alpha=0$ in $\alpha(x) y(x) = \lambda \int_0^1 K(x, \xi) y(\xi) d\xi + F(x)$ then the equation is known as _____.
- (a) Fredholm equation (b) **Volterra equation of the first kind**
(c) Volterra equation of the second kind (d) Volterra equation of the third kind
18. If α is not a constant in $\alpha(x) y(x) = \lambda \int_0^1 K(x, \xi) y(\xi) d\xi + F(x)$ then the equation is known as _____.
- (a) Fredholm equation (b) Volterra equation of the first kind
(c) Volterra equation of the second kind (d) **Volterra equation of the third kind**
19. Which one of the following is the homogeneous boundary condition?
- (a) $\alpha y + \beta y' = 0$ (b) $\alpha y'' + \beta y' = 0$
(c) $\alpha y' + \beta y'' = 0$ (d) $\alpha y + \beta y' + \gamma = 0$
20. If the wronskian value is zero, then the corresponding functions are
- (a) independent (b) dependent (c) zero (d) continuous
21. Green's function G is continuous at $x = \xi$ then _____.
- (a) $G_1(\xi) > G_2(\xi)$ (b) $G_1(\xi) < G_2(\xi)$ (c) **$G_1(\xi) = G_2(\xi)$** (d) $G(\xi) = 0$.
22. Suppose $\mathcal{L}y$ is the differential operator of order n . Then the Green's function satisfies _____
- (a) homogeneous boundary condition (b) $\mathcal{L}G = 0$
(c) G and 1^{st} $(n-2)$ derivatives are continuous (d) **all the above.**

UNIT-IV

23. Any polynomial in x and ξ is _____
- (a) relevant kernel (b) **seperable** (c) simple kernel (d) none of the above.
24. $K(x, \xi) =$ _____ is the seperable kernel
- (a) $\sum_{n=1}^N f_n(x) g_n(x)$ (b) $\sum_{n=1}^N f_n(x) g_n(\xi)$
(c) $\sum_{n=1}^N f_n(\xi) g_n(x)$ (d) $\sum_{n=1}^N f_n(\xi) g_n(\xi)$
25. $y(x) = \lambda \int_0^1 (1 - 3x\xi) y(\xi) d\xi + F(x)$ is non-homogeneous if _____
- (a) $F(x)$ is equal to zero (b) **$F(x)$ is not equal to zero**
(c) $F(x)$ is continuous (d) $F(x)$ is constant.
26. $y(x) = \lambda \int_0^1 (1 - 3x\xi) y(\xi) d\xi + F(x)$ where $y(x)=0$ is the only solution if _____

- (a) **F(x) is equal to zero** (b) F(x) is not equal to zero
 (c) F(x) is continuous (d) F(x) is constant.

27. $e(x) = \int G(x, \xi)c(\xi)d\xi$ represents a Fredholm integral equation of the first kind for its determination of c. Then the kernel is _____ .

- (a) relevant (b) separable
 (c) **influence function** (d) none of the above.

UNIT-V

28. The constant f_n are the _____ in the expansion $F(x) = \sum f_n \phi_n(x)$

- (a) Continuous (b) **Co efficient** (c) Characteristic function (d) none of the above.

29. The kernel in the basic expansion theorem is _____

- (a) Continuous (b) real (c) symmetric (d) **all the above.**

30. _____ in x and ξ is separable.

- (a) polynomial with finite degree (b) onto function
 (c) **any polynomial** (d) continuous function.

31. When the set of characteristic functions is infinite, the resultant infinite series converges _____ in the interval (a,b).

- (a) absolutely (b) uniformly (c) at a particular point (d) **both a and b.**

32. A Fredholm equation with a non symmetric kernel may possess _____

- (a) continuity (b) discontinuity at some points
 (c) **complex characteristic numbers** (d) real characteristic numbers

33. If $\lambda = \lambda_k$, for some k, _____ exists unless F(x) is orthogonal to the corresponding characteristic function.

- (a) Unique solution (b) **No solution** (c) distinct solution (d) infinite solution

Section-B

(5x2=10)

UNIT-I

1. Give the necessary and sufficient condition for the function $z = f(x,y)$ to have relative maximum.
2. State the Euler's equation for the given function F.
3. What will be the reduced form of the solution of Euler's equation if F does not involve x explicitly?
4. State the natural transition condition.
5. Define functionals.

6. Define variation of y .
7. What do you mean by a stationary function?

UNIT-II

8. State the normalizing condition.
9. State the transversability condition.
10. State sturm- Liouville problem.
11. State Hamilton's principle.
12. What is called kinetic potential?
13. Define generalized co ordinates.
14. Define generalized velocities

UNIT-III

15. Write the types of Integral equations.
16. Write Leibnitz formula.
17. Define Fredholm equation.
18. What is called volterra equation.
19. Solve $y'' = f(x)$, $y(0) = y(1) = 0$
20. State Dirac delta function.

UNIT-IV

21. Define a separable Kernel.
22. Give one example for separable kenel.
23. What is called influence function?.
24. Write the function of effect at x .

UNIT-V

25. Define resolvent kernel.
26. State basic expansion theorem.
27. Solve $F(x) = \int_0^{2\pi} \sin(x + \xi)y(\xi)d\xi$.
28. Obtain an approximate solution of the integral equation $\int_0^1 \sin(x, \xi)y(\xi)d\xi + x^2$

Section-C

(5x4=20)

UNIT-I

1. Explain – Lagrange's Multiplier's method.
2. Elucidate the Natural boundary condition.
3. Find the minimal surface of revolution passing through two points.
4. Show that the integral $I = \int_{x_1}^{x_2} F(x, y, y')dx$ is stationary iff its first variation vanishes.
5. Prove that the derivative of the variation and variation of the derivative are same with

respect to an independent variable.

6. If $I = \int_0^1 (x^2 - y^2 + y'^2) dx$, Calculate both ΔI and δI when $y = x$ and $\delta y = \epsilon x^2$.

UNIT-II

7. Summarize the steps followed to maximizing or minimizing an integral using constraints and lagrange multipliers.

8. Determine $y(x)$ such that $\delta I = 0$, $y(x_1) = y_1$ and $y(x_2) = g(x_2)$ for a given

$$I = \int_{x_1}^{x_2} F(x, y, y') dx.$$

9. Determine the curve of length l which passes through the points $(0,0)$ and $(1,0)$ and for which the area I between the curve and the x axis is a maximum.

10. Find the extremals of $I = \int_{x_1}^{x_2} F(x, y, y') dx$, $y(x_1) = y_1$, $y(x_2) = y_2$ subject to the

$$\text{constraint } J = \int_{x_1}^{x_2} G(x, y, y') dx = k(\text{constant}).$$

11. Solve $I = \int_{x_1}^{x_2} (1 + y')^{1/2} dx$, $y(x_1) = y_1$, $y(x_2) = g(x_2)$ where $g(x) = mx + b$ and m, b are constants.

UNIT-III

12. Obtain the volterra equation of the second kind.

13. Transform $y'' + xy = 1$, $y(0) = 0$, $y(1) = 1$ into an integral equation.

14. Transform $y'' + y = x$, $y(0) = 0$, $y(1) = 1$ into a Fredholm integral equation.

15. If n is a positive integer, a is a constant and $I_n(x)$ is defined by the equation

$$I_n(x) = \int_a^x (x - \xi)^{n-1} f(\xi) d\xi \quad \text{prove that}$$

$$\int_a^x \int_a^{x_n} \dots \int_a^{x_2} f(x_1) dx_1 dx_2 \dots dx_{n-1} dx_n = I_n(x) / (n-1)!$$

16. Explain the Types of Integral equation.

17. Explain about Green's function.

UNIT-IV

18. Suppose the string is rotating uniformly about the x - axis with angular velocity ω .

Show that the influence function is the Green's function of the problem.

19. Show that the characteristic values of λ for the equation

$$y(x) = \lambda \int_0^{2\pi} \sin(x + \xi) y(\xi) d\xi \quad \text{are } \lambda_1 = \frac{1}{\pi}, \lambda_2 = -\frac{1}{\pi} \quad \text{with corresponding characteristic functions } y_1(x) = \sin x + \cos x, y_2(x) = \sin x - \cos x.$$

20. Prove that the equation $y(x) = 1/\pi \int_0^{2\pi} \sin(x + \xi) y(\xi) d\xi + F(x)$ possess no solution when $F(x) = x$ but it possess indefinitely many solutions when $F(x) = 1$. Determine all such solutions.

21. Derive the Integral equation for the determination of small deflections of a string due to a loading distribution.

UNIT-V

22. Show that the characteristic numbers of a Fredholm equation with a real symmetric kernel are all real.
23. Discuss briefly the method of finding resolvent kernel specified by Fredholm Theory.
24. If $y_m(x)$ and $y_n(x)$ are characteristic functions of the homogeneous Fredholm equation $y(x) = \lambda \int_a^b K(x, \xi)y(\xi)d\xi$ corresponding to distinct characteristic numbers, prove that $y_m(x)$ and $y_n(x)$ are orthogonal over the interval (a,b).
25. Generate characteristic functions for the case when $K(x,\xi) = \sin (x+\xi)$ and $(a,b)= (0,2\pi)$ of $\int_a^b K(x, \xi)\varphi(\xi)d\xi$.
26. Show that if $F(x) = \int_a^b K(x, \xi)y(\xi)d\xi$ possesses a continuous solution then it is of the form $y(x) = \sum_n \lambda_n f_n \varphi_n(x) + \varphi(x)$.
27. Solve $y(x)= 1 + \int_0^1(1 - 3x\xi)y(\xi)d\xi$ by iterative methods.

Section-D

(2x10=20)

UNIT-I

1. Determine a continuously differentiable function $y(x)$ for which the integral $I = \int_{x_1}^{x_2} F(x, y, y')dx$ takes a maximum or minimum value and which satisfies $y(x_1)=y_1$, $y(x_2)=y_2$.
2. Find the stationary function associated with the integral $I = \int_0^1 (T y'^2 - \rho \omega^2 y^2)dx$, where T, ρ and ω are given constants or functions of x.
3. Explain the steps involved in maximizing or minimizing the integral of the form $I = \iint F(x, y, u, v, u_x, u_y, v_x, v_y)dxdy$.
4. Illustrate the Dirichlet problem.

UNIT-II

5. Explain the Sturn- Liouville problem.
6. (i) Find the extremals of $I = \int_{x_1}^{x_2} F(x, y, y')dx$, $y(x_1)= y_1$, $y(x_2)= y_2$ subject to the constraint $J = \int_{x_1}^{x_2} G(x, y, y')dx = k(\text{constant})$.

(ii) Solve $I = \int_{x_1}^{x_2} (1 + y')^{1/2} dx$, $y(x_1) = y_1$, $y(x_2) = g(x_2)$ where $g(x) = mx + b$ and m, b are constants.

7. Derive the equation of motion of the pendulum consisting of a point mass m suspended by an inextensible string of length l .

UNIT-III

8. Show that the integral equation corresponding to the boundary value problem is a Fredholm equation of the second kind.
9. Transform the Bessel equation $x^2 y'' + xy' + (\lambda x^2 - 1)y = 0$ when $y(0) = 0$, $y(1) = 0$ into an integral equation.
10. (i) If $y''(x) = F(x)$ and y satisfies the initial conditions $y(0) = y_0$ and $y'(0) = y_0'$ show that
$$y(x) = \int_0^x (x - \xi) F(\xi) d\xi + y_0' x + y_0$$
- (ii) Verify that this expression satisfies the prescribed differential equation and initial conditions.
11. Show that $y'' + \lambda y = f(x)$, $y(0) = 1$, $y'(0) = 0$ transformed into the integral equation
$$y(x) = \int_0^x (\xi - x) y(\xi) d\xi + 1 - \int_0^x (\xi - x) y(\xi) d\xi$$
. Prove also the converse.
12. Show that, when $G(x, \xi)$ exists, $y(x) = \int_0^x G(x, \xi) \varphi(\xi) d\xi$ is a solution of the differential equation $Ly + \varphi(x) = 0$ with homogeneous boundary conditions. Prove also the converse.

UNIT-IV

13. Determine the characteristic value of the integral equation
$$y(x) = \lambda \int_0^1 (1 - 3x\xi) y(\xi) d\xi + F(x)$$
 and the corresponding characteristic functions.
14. Explain the procedure to solve Fredholm equation of second kind with separable kernels.
15. Show that the influence function is the Green's function of the problem.

UNIT-V

16. Explain an iterative method for solving a Volterra equation.
17. Let $y_n(x)$ be the characteristic function corresponding to the characteristic number λ_n of the homogeneous equation
$$y(x) = \lambda \int_a^b K(x, \xi) y(\xi) d\xi$$
 where $K(x, \xi)$ is continuous, real and symmetric. Show that these functions and constants determine a continuous solution of the non-homogeneous Fredholm equation of the II kind
$$y(x) = \lambda \int_a^b K(x, \xi) y(\xi) d\xi + F(x).$$

18. Explain an iterative method for solving a Fredholm equation of the second kind.

ST.MARY'S COLLEGE (Autonomous) - THOOTHUKUDI

Question Bank

I M.Sc. Mathematics – Semester II

Core V – Stochastic Process

Sub.Code:21PMAC25

Section –A (1 Mark)

UNIT-I

- The value of a_k in the generating function $A(s) = \sum_{k=0}^{\infty} a_k s^k$ is _____
(a) $\frac{1}{k!} \left[\frac{d^k A}{ds^k} \right]_{s=1}$ (b) $\frac{1}{k!} \left[\frac{d^k A}{ds^k} \right]_{s=0}$
(c) $\frac{1}{k} \left[\frac{d^k A}{ds^k} \right]_{s=0}$ (d) $\frac{1}{k} \left[\frac{d^k A}{ds^k} \right]_{s=1}$
- The expectation $E(X)$ is _____
(a) $P(1)$ (b) $P'(1)$ (c) $P'(X)$ (d) $P(X)$
- The variance of X is _____
(a) $E(X^2) - [E(X)]^2$ (b) $E(X) + [E(X)]^2$
(c) $[E(X)]^2 - E(X)$ (d) $E(X) - [E(X^2)]$
- The probability generating function of Poisson distribution is given by _____
(a) $\exp\{\lambda(s - 1)\}$ (b) $\exp\{\lambda(s + 1)\}$ (c) $\exp\{(\lambda + 1)s\}$ (d) $\exp\{(\lambda - 1)s\}$
- The probability generating function of Geometric distribution is given by _____
(a) $p/(1 + qs)$ (b) $p^2/(1 + qs)$ (c) $p/(1 - qs)$ (d) $p^2/(1 - qs)$
- The mean of Geometric distribution is given by _____
(a) $p/(1 + qs)$ (b) $p^2/(1 + qs)$ (c) p/q (d) q/p
- The variance of Geometric distribution is given by _____
(a) q/p^2 (b) p/q (c) $2p/q$ (d) q/p
- The mean of Binomial distribution is given by _____
(a) npq (b) nq (c) $p + q$ (d) np
- The variance of Binomial distribution is given by _____
(a) npq (b) nq (c) $p + q$ (d) np
- If X, Y are independent random variable's with generating function $A(s), B(s)$ respectively, then the generating function $D(s)$ of $W = X - Y$ is _____
(a) $A(s)B(1/s)$ (b) $A(s)B(s)$ (c) $A(s)/B(s)$ (d) $B(s)/A(s)$
- The probability generating function $P_Y(s)$ of the random variable $Y = mX + n$ is _____
(a) $s^n P_X(s^m)$ (b) $s^m P_X(s^n)$ (c) $s^n P_Y(s^m)$ (d) $s^m P_Y(s^n)$
- The probability generating function $A(s)$ of the marginal distribution $\Pr\{X=j\}$ is given by _____
(a) $P(s, 1)$ (b) $P(s, s)$ (c) $P(1, 1)$ (d) $P(1, s)$
- The probability generating function $B(s)$ of $\Pr\{Y=k\}$ is given by _____
(a) $P(s, 1)$ (b) $P(s, s)$ (c) $P(1, 1)$ (d) $P(1, s)$
- The probability generating function $(X+Y)$ is given by _____
(a) $P(s, 1)$ (b) $P(s, s)$ (c) $P(1, 1)$ (d) $P(1, s)$

15. In change of scale property $L\{f(at)\}$ is _____
 (a) $aF(s/a)$ (b) $sF(s/a)$ (c) $(1/a)F(s/a)$ (d) $(1/s)F(s/a)$
16. When the parameter $k = 1$, the gamma distribution becomes _____ distribution.
 (a) **exponential** (b) Chi-square (c) Erlang (d) Uniform
17. Distinct probability distributions have distinct Laplace transforms is _____ theorem
 (a) Convolution (b) **Uniqueness** (c) Continuity (d) Limiting
18. Negative binomial distribution can be obtained as the sum of number of independent _____ distributions
 (a) Gamma (b) **Geometric** (c) Exponential (d) Erlang

Unit - II

1. A square matrix in which each row and each column has exactly one entry with value unity and all others zero is called _____ matrix.
 (a) identity (b) reducible (c) **permutation** (d) irreducible
2. Perron obtained the result of eigen values for _____ matrix.
 (a) **positive** (b) non-negative (c) identity (d) negative
3. A nonnegative irreducible matrix is called primitive if _____
 (a) $h > 1$ (b) **$h = 1$** (c) $h = 0$ (d) $h > 0$
4. The representation $A = XDY'$ is known as _____ representation of A.
 (a) Jordan (b) diagonal (c) **spectral** (d) chain
5. The matrix D is stochastic iff it has an eigen value _____
 (a) **1** (b) 0 (c) > 0 (d) -1
6. A discrete parameter Markov process is known as _____
 (a) Increment chain (b) **Markov chain** (c) Stochastic chain (d) probability
7. Gaussian process is a Stochastic process in terms of _____ distribution.
 (a) poisson (b) **normal** (c) binomial (d) exponential
8. Poisson process is _____
 (a) **evolutionary** (b) stationary (c) covariance stationary (d) widesense stationary
9. If Gaussian process is stationary then it is _____ stationary
 (a) widesense (b) **strictly** (c) covariance (d) weakly
10. Stochastic process is strictly stationary if it is stationary of order n for _____ integer n.
 (a) positive (b) negative (c) **any** (d) state

Unit - III

1. If state k is either transient or persistent null, then for every j , _____
 (a) $p_{jk}^{(n)} \rightarrow 0$ as $n \rightarrow \infty$ (b) $p_{jk}^{(n)} \rightarrow \infty$ as $n \rightarrow \infty$
 (c) $p_{jk}^{(n)} \rightarrow F_{jk}$ as $n \rightarrow \infty$ (d) $p_{jk}^{(n)} \rightarrow \mu_{kk}$ as $n \rightarrow \infty$
2. When j is transient, the series $\sum_n p_{jj}^{(n)}$ _____
 (a) **converges** (b) diverges (c) zero (d) positive
3. The transition probabilities p_{jk} satisfy _____
 (a) $p_{jk} \leq 0$ (b) **$p_{jk} \geq 0$** (c) $p_{jk} \neq 0$ (d) $p_{jk} = 0$
4. The matrix of transition probabilities together with the initial distribution completely specifies _____
 (a) **markov chain** (b) transition matrix (c) absorbing matrix (d) persistent matrix

5. The m-step transition probability is denoted by ____
 (a) $p_{jk}^{(m)} = Pr\{X_{n+m} = k/X_n = j\}$ (b) $p_{jk}^{(m)} = Pr\{X_{n+m} = j/X_n = k\}$
 (c) $p_{jk}^{(n)} = Pr\{X_{n+m} = j/X_n = k\}$ (d) $p_{jk}^{(n)} = Pr\{X_{n+m} = k/X_n = j\}$
6. A chain is said to be _____ if $p_{jk} = p_k$ for all j.
 (a) markov chain (b) **order one** (c) order zero (d) discrete chain
7. If a closed set C contains only one state j, then the state is called _____.
 (a) persistent state (b) transient state (c) periodic state (d) **absorbing state**
8. The state is said to be persistent if _____.
 (a) $F_{jj} = 1$ (b) $F_{jj} = 0$ (c) $F_{jj} < 1$ (d) $F_{jj} > 1$
9. The state is said to be transient if _____.
 (a) $F_{jj} = 1$ (b) $F_{jj} = 0$ (c) $F_{jj} < 1$ (d) $F_{jj} > 1$
10. A persistent state is said to be null if _____.
 (a) $\mu_{jj} = \infty$ (b) $\mu_{jj} = 1$ (c) $\mu_{jj} < 1$ (d) $\mu_{jj} > 1$

Unit - IV

1. Integral valued process is also called _____ process.
 (a) **counting** (b) independent (c) stochastic (d) normal
2. Poisson process is a _____ process such that condition probabilities are constant.
 (a) Stationary (b) **Markov** (c) birth (d) increment
3. Poisson process has _____ distributed waiting times.
 (a) exponentially (b) beta (c) **gamma** (d) normal
4. Poisson process has independent _____ distributed interarrival times.
 (a) **exponentially** (b) beta (c) gamma (d) normal

Unit - V

1. Compound Poisson process is also known as Poisson _____ process.
 (a) conditional (b) random (c) **cluster** (d) combination
2. _____ process is an important application arises in Collective risk theory.
 (a) **Compound Poisson** (b) Compound Binormal
 (c) Compound Normal (d) Compound Markov
3. A conditional Poisson process is a non-homogeneous Poisson process whose intensity function $\lambda(t)$ is a _____ process.
 (a) Poisson (b) **Stochastic** (c) Stationary (d) Markov
4. $\lambda_n = \lambda$ and $\mu_n = \mu$ then the process is known as _____ process.
 (a) Pure Birth (b) Immigration-Death
 (c) **Immigration-Emigration** (d) Birth and Death
5. The probability of one birth between t and $t + h$ in linear growth process if n members are present at the instant t is _____.
 (a) **$n\lambda h + o(h)$** (b) $\lambda h + o(h)$ (c) $n\mu h - o(h)$ (d) $n\mu h + o(h)$
6. The waiting time has _____ distribution with parameter λ is called transition density.
 (a) normal (b) **exponential** (c) binomial (d) poisson
7. Transition density matrix is also known as _____ matrix.
 (a) Hermitian (b) **rate** (c) rank (d) skew
8. A systematic selection of Poisson process results in _____ process.

- (a) **Erlang** (b) Chapman (c) Increment (d) Two state
9. _____ process play an important role in queueing theory.
 (a) Pure Birth (b) **Birth and Death** (c) Yule-Furry (d) Pure Death
10. In case of discrete Markov chains, arc weights correspond to transition _____
 (a) densities (b) matrix (c) **probabilities** (d) state

Section – B (2 Marks)

Unit -1

1. Define s-transform.
2. Define Bivariate probability generating function.
3. Find $L[e^{at}]$.
4. Let X be a random variable with probability generating function P(s). Find the probability generating function of the random variable $Y = mX+n$ where m, n are integers and $m \neq 0$
5. Define Convolution.
6. Prove the linearity property of Laplace transform.
7. State and prove the first translation property of Laplace transform,
8. State and prove the second translation property of Laplace transform,
9. State and prove the Change of scale property of Laplace transform,
10. Define Laplace Stieltjes Transform
11. State Uniqueness theorem and justify.
12. State Continuity theorem.
13. State Convolution theorem.
14. Define Compound Poisson distribution.
15. Find the Laplace transform of Dirac function located at the point a.
16. Define Erlang distribution.
17. Find Laplace transform of Erlang distribution.

Unit- II

1. Define differential difference equation.
2. What are the methods for finding the solution of differential difference equation?
3. Define characteristic equation and eigen values of matrix A.
4. Define spectrum and spectral radius of matrix A.
5. Define non negative matrix.
6. Define permutation matrix.
7. Define irreducible matrix.
8. State Perron Frobenius theorem.
9. Define Stochastic Process
10. Define Doubly stochastic process
11. Define Stochastic process
12. List the classification of Stochastic process
13. Define independent increment process
14. State Gaussian Process
15. State Markov process

Unit – 3

1. Define Markov Chain.
2. Define homogenous markov chain.
3. Define one step and m-step transition probability.
4. Define Transition matrix.
5. Define Markov matrix.
6. Define order of a markov chains
7. Define absorbing state.
8. Define irreducible chain
9. Define mean recurrence time.
10. Define persistent state
11. Define transient state
12. Define periodic state.
13. Define aperiodic state.
14. Define ergodic chain.
15. Define class property
16. Define stationary distribution
17. Define intree and weight.

Unit - IV

1. Define n-step transition probability.
2. Define n-fold convolution of $f(z)$.
3. List the postulates of Poisson process
4. Prove the additive property of Poisson process
5. Define Poisson count process

Unit V

1. Define compound Poisson process
2. Define Conditional Poisson process
3. Define Renewal process
4. Define Immigration and Emigration
5. State the waiting time for change of state.
6. Define Immigration death process
7. Define transition density from state i .
8. List the properties of rate matrix.
9. Write the Forward and Backward Kolmogorov Equations.
10. Define Erlangian distribution.

Section – C (6 Marks)

Unit - I

1. Find the mean and variance of Poisson distribution.
2. Find the mean and variance of Geometric distribution.
3. Find the mean and variance of Binomial distribution.

4. State and prove Initial and Final Value Theorem.
5. Find the Laplace transform with mean and variance of Negative Exponential distribution.
6. Prove the following:
 - (i) The probability generating function $A(s)$ of the marginal distribution $\Pr\{X=j\}$ is given by $A(s) = P(s, 1)$
 - (ii) The probability generating function $B(s)$ of $\Pr\{Y=k\}$ is given by $B(s) = P(1, s)$
 - (iii) The probability generating function $(X+Y)$ is given by $P(s, s)$
7. State and prove Laplace transform of derivatives and integrals with examples.
8. Find the mean and variance in terms of derivatives of Laplace transform.
9. Find the Laplace transform of Poisson distribution.
10. Find the Laplace transform with mean and variance of Uniform distribution.
11. Define Erlang distribution and discuss its limiting form.
12. Let $X_i, i=1, 2, \dots$ have negative exponential distribution each with mean $1/\lambda$ and $S_N = X_1 + X_2 + X_3 + \dots + X_N$ where N has geometric distribution given by $\Pr\{N=n\} = pq^{n-1}, n=1, 2, \dots$ then prove that S_N has negative exponential distribution with mean $\frac{1}{\lambda p}$.
13. Let $X_i, i=1, 2, \dots$ have exponential distribution with mean $1/a$ and let N have Poisson distribution with mean c . We have $f^*(s) \equiv$ Laplace Transform of $X_i = a/(s+a)$, and $G(s) = e^{c(s-1)}$ and prove that the Laplace Transform of $S_N = X_1 + X_2 + X_3 + \dots + X_N$ is $G(f^*(s))$. Also find the probability density function of S_N .
14. Find the roots of Fibonacci sequence with its difference equation.
15. Solve the difference equation $U_n = (U_{n+1} + U_{n-1})/2, 1 \leq n \leq a-1$ having initial conditions $U_0 = 1$ and $U_a = 0$
16. Solve the difference equation $u_n = qu_{n-1} + p(1-u_{n-1}), n \geq 1, p+q=1$ having initial condition $u_0 = 1$

Unit - II

1. Solve the differential difference equation $u'_n(t) = u_{n-1}(t), t \geq 0, n = 1, 2, 3 \dots$ given the initial conditions $u_0(t) = 1, t \geq 0$ and $u_0(0) = 1, u_n(0) = 0$ for $n \neq 0$.
2. Solve the differential difference equation $p'_n(t) = -\lambda[p_n(t) - p_{n-1}(t)], n \geq 1, \lambda > 0$ $p'_0(t) = -\lambda p_0(t)$ with the initial conditions $p_n(0) = 0$ for $n \neq 0, p_0(0) = 1$.
3. Solve the differential difference equation $p'_n(t) = -(a+b)p_n(t) + ap_{n-1}(t) + bp_{n+1}(t), n \geq 1, p'_0(t) = -ap_0(t) + bp_1(t)$ with the initial conditions $p_n(0) = 0, n \neq 0$ and $p_0(0) = 1$.
4. Write short notes on Spectral representation of the matrix.
5. Prove the process $X(t) = A \cos \omega t + B \sin \omega t$ where A, B are uncorrelated random variable with mean 0 and variance 1 and ω is a positive constant.
6. Prove the process $\{X(t), t \in T\}$ whose probability distribution under a certain

$$\text{condition is given by } \Pr\{X(t) = n\} = \begin{cases} \frac{(at)^{n-1}}{(1+at)^{n+1}}, & n = 1, 2, \dots \\ \frac{at}{1+at}, & n = 0 \end{cases}$$

Unit – III

- Let $\{X_n, n \geq 0\}$ be a Markov chain with three states 0, 1, 2 and with transition matrix $\begin{pmatrix} 3/4 & 1/4 & 0 \\ 1/4 & 1/2 & 1/4 \\ 0 & 3/4 & 1/4 \end{pmatrix}$ and the initial distribution $\Pr\{X_0 = i\} = 1/3, i=0, 1, 2$. Find the transition probabilities.
- Derive Chapman-Kolmogorov equation.
- A particle performs a random walk with absorbing barriers, say, at 0 and 4. Whenever it is at any position $(0 < r < 4)$, it moves to $r + 1$ with probability p or to $(r - 1)$ with probability q , $p + q = 1$. But as soon as it reaches 0 or 4 it remains there itself. Find the transition probabilities and the transition matrix.
- Suppose that a coin with probability p for a head is tossed indefinitely. Let X_n , the outcome of the n^{th} trial, be k , where $k (= 0, 1, \dots, n)$ denotes that there is a run of k successes, i.e. the length of the uninterrupted block of heads is k . Find the transition probabilities. Find the transition matrix.
- If state j is persistent, then as $n \rightarrow \infty$,
 - $p_{jj}^{(nt)} \rightarrow t/\mu$ when state j is periodic with period t ;
 - $p_{jj}^{(n)} \rightarrow 1/\mu_{jj}$ when state j is aperiodic
- Consider the Markov chain with transition matrix $P = \begin{pmatrix} 0 & 1 & 0 \\ 1/2 & 0 & 1/2 \\ 0 & 1 & 0 \end{pmatrix}$. Prove that the states of the chain are periodic and persistent non-null.
- Explain the determination of higher transition probabilities.
- Explain the limiting behaviour of an aperiodic chain.
- Consider the two-state Markov chain $P = \begin{pmatrix} 1-a & a \\ b & 1-b \end{pmatrix}, 0 < a, b < 1$. Derive $\lim p_{ij}^{(n)}$
- Consider the three-state Markov chain with transition matrix $P = \begin{pmatrix} 0.5 & 0.3 & 0.2 \\ 0.2 & 0.4 & 0.4 \\ 0.1 & 0.5 & 0.4 \end{pmatrix}$. Derive $\lim p_{ij}^{(n)}$
- If the state j is persistent, then for every state k that can be reached from state j , $F_{jk} = 1$.
- Consider the three-state Markov chain with transition matrix $P = \begin{pmatrix} 0 & 2/3 & 1/3 \\ 1/2 & 0 & 1/2 \\ 1/2 & 1/2 & 0 \end{pmatrix}$. Find the limiting probability distribution.

Unit - IV

- Explain Random walk and find n -fold convolution of $f(z)$.
- Explain Queueing process
- Let m be the non-unit characteristic root of the causative matrix C .
If $-1 < m < 1$, $\lim_{n \rightarrow \infty} T_n$ exists is equal to $(u-m)/(1-m), (1-u)/(1-m)$.
If $0 \leq m < 1$, $\lim_{n \rightarrow \infty} T_n$ is stochastic iff C is stochastic.

4. State and explain the Postulates for Poisson process.
5. Derive $p_n(t)$ for Poisson process using method of generating function.
6. Find the autocorrelation coefficient and autocorrelation function between $N(t)$ and $N(t + s)$ where $\{N(t)\}$ is a Poisson process.

Unit - V

1. Write short notes on Pure birth process.
2. Prove the p.g.f of a non-homogeneous process $\{N(t)\}$ is given by $(s, t) = \exp\{m(t)(s - 1)\}$, where $m(t) = \int_0^t \lambda(x)dx$ is the expectation of $N(t)$.
3. Determine the Probability of Extinction.
4. Discuss the solution of the equation for finite state process.
5. Derive Erlang's formula.
6. Find v_0, v_1, v_2 and v_3 in two channel service system.
7. Suppose that particles reach a nuclear particle counter in accordance with a Poisson process with a mean rate of 4 per minute, but that the counter records only every third particle actually arriving.
 - (i) Find the probability that the number $X(t)$ of particles recorded in time t
 - (ii) Find the density function of the interval T between two successive records.
 - (iii) Find the probability that the interval T two records is less than or equal to half minute.

Section – D (12 Marks)

Unit - I

1. If $P(s)$ and $G(s)$ are two probability generating functions, then $G(P(s))$ is also a probability generating function.
2. (a) Find the mean and variance of Poisson distribution.
(b) Find the mean and variance of Geometric distribution.
3. (a) Find the mean and variance of Poisson distribution.
(b) Find the mean and variance of Binomial distribution.
4. (a) Find the mean and variance of Binomial distribution.
(b) Find the mean and variance of Geometric distribution.
5. Find the Laplace Transform with mean and variance of Gamma distribution and discuss its density.
6. State and prove the properties of laplace transforms with examples.
7. The probability function $p_n = \Pr\{N = n\}, n = 0, 1, 2, \dots$, of a random variable N satisfies the difference equations: $p_{n+1} - (1 + a)p_n + ap_{n-1} = 0, n \geq 1$ and $-p_1 + ap_0 = 0$. Since p_n 's are probabilities of the random variable N , we have also the condition $\sum_{n=1}^{\infty} p_n = 1$. Find p_n .
8. Find the general solution of a homogenous difference equation with constant coefficients. Discuss the case of non-homogenous.

Unit - II

1. List and explain any five properties of Eigen values and Eigen vectors.
2. Find the left and right eigen vector of the matrix $A = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$. Also find the properties

of constituent matrix.

3. Explain in detail about the Stationary and Gaussian process.
4. Prove the Poisson process and the process of $X(t) = A_1 + A_2 t$ where A_1 and A_2 are independent random variables with $E(A_i) = a_i$, $var(A_i) = \sigma_i^2$ $i = 1, 2$ are evolutionary.

Unit – III

1. Explain Polya's urn model and show that it does not follow Markov Chain.
2. Prove that the state j is persistent or transient according as $\sum_{n=0}^{\infty} p_{jj}^{(n)} = \infty$ or $< \infty$
3. In an irreducible chain, all the states are of the same type. They are either all transient, all persistent null, or all persistent non-null. Then prove that all the states are periodic and in the latter case they all have the same period.
4. Consider a communication system which transmits the two digit 0 and 1 through several stages. Let $\{X_n, n \geq 1\}$ be the digit leaving the n th stage of system and X_0 be the digit entering the first stage (leaving the 0th stage). At each stage there is a constant probability q that the digit which enters will be transmitted unchanged (i.e. the digit will remain unchanged when it leaves), and probability p otherwise (i.e. the digit changes when it leaves) $p + q = 1$. Find the probabilities.
5. If state k is either transient or persistent null, then for every j , $p_{jk}^{(n)} \rightarrow 0$ as $n \rightarrow \infty$ and if state k is aperiodic persistent non-null, then $p_{jk}^{(n)} \rightarrow F_{jk}/\mu_{kk}$ as $n \rightarrow \infty$
6. Consider a chain with an infinite number of states $(1, 2, \dots)$ having transition probability

$$\text{matrix} \begin{pmatrix} p_0 & p_1 & p_2 & p_3 & \dots \\ p_0 & p_1 & p_2 & p_3 & \dots \\ 0 & p_0 & p_1 & p_2 & \dots \\ 0 & 0 & p_0 & p_1 & \dots \\ \dots & \dots & \dots & \dots & \dots \end{pmatrix} \text{ where } \sum p_k = 1. \text{ Find } V(s).$$

7. Prove that the steady-state solution of an irreducible Markov chain (discrete or continuous parameter) with a finite number of states is given by $v_k, v_k = c_k / \sum_j c_j$, where $c_j = \sum_i w_i(T_j)$ is the sum over all intrees to the point j in the transition diagram of the process.

Unit - IV

1. Explain Maximum-likelihood estimation
2. Explain the procedure for the determination of a markov chain by MAICE
3. Explain Hypothesis testing
4. If Q and R are two stochastic matrices of the same order and if Q is non-singular, then the causative matrix $C = Q^{-1}R$ has unit row sums.
5. Explain about the Additive, Difference and Decomposition property of Poisson process.
6. Prove (i) the interval between two successive occurrences of a Poisson process $\{N(t)\}$ having parameter λ has a negative exponential distribution with mean $\frac{1}{\lambda}$. (ii) the intervals between successive occurrences of an event E are independently distributed with a common exponential distribution with mean $\frac{1}{\lambda}$ then the event form a Poisson process with mean λt .

Unit - V

1. Explain Yule-Furry process
2. Explain in detail the Birth and Death process.
3. Analyze the two state process.
4. Derive Chapman-Kolmogorov Equation.
5. Briefly explain the Erlang's process and Erlangian distribution.

ST. MARY'S COLLEGE(Autonomous)-THOOTHUKUDI

QUESTION BANK

I M.Sc. Mathematics

Elective II - Operation Research

(for those who joined in July 2021 and after)

Sub Code: 21PMAE21

Semester: II

Section – A (1 Marks)

Choose the correct answer

Unit I

1. In the cutting plane method, dual simple method is used to maintain _____
(a) **feasibility** (b) both feasibility and optimality
(c) optimality (d) none of these
2. Fractional algorithm, the optimum solution is _____
(a) **pure integer** (b) fractional (c) mixed (d) linear
3. The _____ algorithm was originally developed by A.H .Land and A.G. Doig
(a) **branch & bound** (b) mixed (c) cutting plane (d) fractional
4. Additive algorithm is also called as _____
(a) pure problem (b) binary problem
(c) **pure binary problem** (d) mixed problem
5. Integer linear programming all the variables are restricted to integer is called _____
a) pure b) mixed c) linear d) perfect
6. _____ problem is not in the application of integer programming.
a) fixed charge b) job shop scheduling c) dichotomies **d) fractional**
7. _____ algorithm ,the sub problem is said to be fathomed
a) branch & bound b) mixed c) cutting plane d) fractional
8. The absence of the integrality conditions the objective and the constraint functions are linear,the resulting model is called _____
a) pure integer program b) mixed integer program
c) linear program **d) integer linear program**

Unit II

9. The stages involved in solving an n variable dynamic programming problem are
(a) **n** (b) n+1 (c) n-1 (d) none
10. _____ problem is called fly away kit problem
(a) **cargo loading** (b) work force size (c) fixed charge (d) capital budgeting
11. The main difference between the forward and backward methods occurs in the way we define the _____ of the system.
(a) State (b) **stage** (c) decision variable (d) constraints
12. _____ is an example for probabilistic dynamic problem.
(a) cargo loading problem (b) capital budgeting problem
(c) **reliability problem** (d) linear programming
13. In forward procedure the computations are carried in the order _____
a) **$f_1 \rightarrow f_2 \rightarrow f_3$** b) $f_3 \rightarrow f_2 \rightarrow f_1$ c) $f_1 \rightarrow f_3 \rightarrow f_2$ d) $f_1 \rightarrow f_2$
14. In Backward procedure the computations are carried in the order _____
a) $f_1 \rightarrow f_2 \rightarrow f_3$ b) **$f_3 \rightarrow f_2 \rightarrow f_1$** c) $f_1 \rightarrow f_3 \rightarrow f_2$ d) $f_1 \rightarrow f_2$
15. In capital budgeting problem allocating cost is 5 million then the best revenue is _____
a) 12 b) 14 c) 16 d) **17**
16. _____ problem is called knapsack problem
a) **cargo loading** b) work force size c) fixed charge d) capital budgeting

Unit III

17. In a gas station where new deliveries arrive at the start of each week is an example for _____
(a) **Continuous review** (b) Periodic review (c) reorder point (d) none
18. _____ cost is the penalty incurred when we run out of stock.
(a) holding cost (b) **shortage cost** (c) setup cost (d) purchasing cost
19. The use of certain industrial supplies such as bolt, nuts is the application of _____ model.
(a) **single item static model**
(b) single item static model with price breaks
(c) multiple item static model
(d) probabilistic model

20. The ordering cycle for the single item static model is _____
 (a) y/h (b) $y/2$ (c) k/β (d) y/β
21. The daily demand for a commodity is approximately 100 units. Every time an order is placed a fixed cost of \$100 is incurred the daily holding cost per unit inventory is \$0.02. If the lead time is 23 days. What is the effective lead time?
 (a) 12 (b) 12 (c) **13** (d) 14
22. The time between the placement of an order and its receipt is called _____
 (a) replenishment (b) **delivery lag** (c) price break (d) time horizon
23. The time horizon defines the period over which the inventory level will be _____
 (a) decreased (b) increased (c) constant (d) **controlled**
17. Single item static model is also referred as _____
 (a) **economic lot size** (b) continuous review (c) price break (d) reorder point
18. The _____ represents the fixed charge incurred when an order is placed
 (a) **set up cost** (b) price break (c) shortage cost (d) holding cost
19. The _____ becomes an important factor when the commodity unit price becomes dependent on the size of the order
 (a) set up cost (b) shortage cost (c) holding cost (d) **purchasing cost**
20. _____ model is used for light bulbs in a building
 (a) **single item static** (b) single item static with price break
 (c) multiple item (d) dynamic model
21. Production cost per unit during regular time is denoted by _____
 (a) **c_i** (b) d_i (c) h_i (d) p_i
22. The _____ which represents the costs of carrying inventory stock
 (a) set up cost (b) price break (c) shortage cost (d) **holding cost**

Unit IV

23. _____ and _____ are the nodes of decision tree.
 (a) circle, triangle (b) square, rectangle
 (c) **square, circle** (d) cube, rectangle
24. When the index of optimism is one, then the criterion is too _____
 (a) pessimistic (b) **optimistic** (c) index (d) Hurwicz
25. In a _____ strategy game, no saddle point exists.
 (a) optimal (b) pure (c) **mixed** (d) none

26. The essential characteristic of a decision model are
 (a) decision alternative (b) states of nature (c) pay off (d) **all the these**
27. In decision under risk, the probabilities are referred to as _____
 (a) **prior probabilities** (b) posterior probabilities
 (c) bayes's probabilities (d) interior probabilities
28. A graphical representation of the decision problem can be made by using a _____
 (a) **decision tree** (b) decision uncertainty (c) decision risk (d) graphical tree
29. The parameter ____ is known as the index of optimism
 (a) **α** (b) β (c) γ (d) μ
30. In game theory, an opponent is called _____
 (a) **player** (b) winner (c) runner (d) weaker
31. The function $r(a_i, \theta_j)$ is referred to as _____ matrix
 (a) minimax (b) maximin (c) **regret** (d) index
32. Each player has a number of choices finite or infinite is called _____
 (a) **strategies** (b) games (c) payoff (d) outcomes
33. In the index of optimism, $\alpha = 0$ then the criterion is too _____
 (a) optimistic (b) **pessimisti** (c) hurwicz (d) index
34. In game theory when minimax value = maximin value, the corresponding pure strategies are called _____ strategies
 (a) **optimal** (b) maximum (c) minimum (d) minimax
35. In game theory when minimax value = maximin value, the corresponding pure strategies are called optimal strategies and the game is said to have _____
 (a) **saddle point** (b) optimal point (c) regret point (d) zero point

Unit V

36. The service mechanism in a queuing system is characterized by the
 (a) customer's behaviour (b) **server's behaviour**
 (c) customers in the system (d) none of these
37. In $(M/M/1):(\infty/FCFS)$ model, the expected number of customers in the system L_s is given by _____
 (a) $\frac{1}{\lambda}$ (b) $\frac{\lambda}{\mu - \lambda}$ (c) $\frac{\lambda^2}{\mu - \lambda}$ (d) $\frac{\lambda^2}{\mu(\mu - \lambda)}$
38. In a pure birth process, no _____ can take place.
 (a) arrival (b) **departure** (c) service (d) all of these

39. If the arrival rate of customers is λ per unit time, then the mean service rate is ____
 (a) $\frac{1}{\lambda}$ (b) λ (c) λ^2 (d) $\frac{\mu}{\lambda}$
40. The principal actors in a queuing situation are the _____
 (a) **customer & server** (b) arrivals & service (c) queue & line (d) discipline
41. In poisson distribution mean and variance are _____
 (a) **equal** (b) zero (c) different (d) one
42. Departures process are also known as _____
 (a) **pure death** (b) mixed death (c) poisson (d) exponential
43. Jockeying, balking and reneging are in _____
 (a) **human behavior** (b) calling source (c) queue size (d) service discipline
44. The most general design of a service facility includes both series and parallel processing station is called _____
 (a) queue size (b) **network queues** (c) priority queues (d) tandem queues
45. The suggestive name of arrivals process is _____
 (a) **pure birth** (b) pure death (c) queue size d) random birth
46. The Kendall notation of the form is _____
 a) **(a/b/c)** (b) (b/a/c) (c) (c/b/a) (d) (a/c/b)
47. Expected number of customers in system is denoted as _____
 (a) E_s (b) **L_s** (c) N_s (d) C_s
48. Expected number of customers in queue is denoted as _____
 (a) E_q (b) **L_q** (c) N_q (d) C_q

Section – B (2 Marks)

Answer all questions:

Unit I

1. Define mixed and integer linear program?
2. What is meant by fixed charge problem?
3. Write a note on fractional cut.
4. Write short notes about Dichotomies
5. What is called fathomed? Give example.
6. Define strength of the fractional cut

Unit II

7. Write the drawbacks of exhaustive enumeration
8. What is meant by dynamic programming?
9. Write down the basic elements of a DP model in cargo loading problem?
10. Give the recursive equations for forward and backward
11. What is meant by knapsack problem?
12. Write down the basic elements of a DP model in optimal subdivision problem?
13. Give the recursive equations for the Reliability problem
14. Give the recursive equations for work force size model and give the basic elements.

Unit III

15. What is meant by continuous review? Give example.
16. Define purchasing cost and holding cost.
17. Define Setup cost and Shortage cost.
18. Define lead time.
19. What is meant by stock replenishment?
20. Write the application of single item static model.
21. The daily demand for a commodity is approximately 100 units. Every time an order is placed, a fixed cost of \$ 100 is incurred. The daily holding cost per unit inventory is \$.02. If the lead time is 8 days, determine the value of economic lot size.
22. What are the assumptions of the model in a continuous review model?
23. Define single critical number policy.
24. Consider the single period model with $h=\$0.5$, $p=\$4.5$ and $c=\$0.5$. The demand density function given by $f(D) = \begin{cases} \frac{1}{10}, & 0 \leq D \leq 10 \\ 0, & D > 10 \end{cases}$. Determine the order quantity.

Unit IV

25. Write the formula for finding the expected cost per period in expected value criterion.
26. Explain most likely future criterion with example.
27. What is meant by aspiration level?
28. Define decision trees
29. State Bayes's probabilities.
30. Write a short note on Prior and Posterior probabilities.

31. What is meant by index of optimism?
32. Define saddle point.
33. What is meant by strategies?
34. Define two-person zero-sum game.
35. Find the range of values for 'p' and 'q' that will render the entry (2, 2) as a saddle point in the following game.

		B ₁	B ₂	B ₃
A ₁		1	q	6
A ₂		P	5	10
A ₃		6	2	3

Unit V

36. What is the difference between bulk and renege?
37. Write the factors that are related to a queueing model?
38. Mention the three rules of the Poisson and Exponential distribution.
39. Write the forgetfulness property in Queueing theory.
40. Define pure birth and pure death
41. Define a, b, c, d, e, f in queueing
42. Define Kendal notation
43. What the assumptions involved in the Pollaczek Khintchine (P-K) formula?
44. For (M/M/1):(GD/∞/∞) model write down the Little's formula.
45. Define a, b, c, d, e, f in queueing theory.

Section - C (6 Marks)

Answer all questions

Unit I

1. Explain Fixed charge problem
2. Solve graphically using cutting plane algorithm to solve the integer linear programming problem
 maximize $z = 7x_1 + 9x_2$
 subject to the constraints $-x_1 + 3x_2 \leq 6$;
 $7x_1 + x_2 \leq 35$; x_1, x_2 are non negative integers

3. Describe job- shop scheduling problem
4. Explain the Dichotomies
5. Describe the cutting plane algorithm
6. Using mixed algorithm solve the following

Basic	X ₁	X ₂	X ₃	X ₄	S ₁	R.H.S
Z	0	0	28/11	15/11	0	63
X ₂	1	0	7/22	1/22	0	3 $\frac{1}{2}$
X ₁	1	0	-1/22	3/22	0	4 $\frac{1}{2}$
S ₁	0	0	-7/22	-1/22	1	-1/2

7. Give the derivation of mixed algorithm
8. Explain the branch and bounded method in integer programming?
9. Explain Strength of the Fractional Cut with example

Unit II

10. Explain capital budgeting problem
11. Write a short note about forward and backward recursions?
12. Using Backward recursion solve the following

Proposal	Plant I		Plant 2		Plant 3	
	C1	R1	C2	R2	C3	R3
1	0	0	0	0	0	0
2	1	5	2	8	1	3
3	2	6	3	9	-	-
4	-	-	4	12	-	-

Assume that the total available capital is \$ 5 million

13. Derive the recursive formula for the cargo – loading problem.
14. Using the recursive formula for the cargo loading problem, solve (W=3)

I	w _i	v _i
1	2	65
2	3	80
3	1	30

15. Divide a positive quantity q into n parts in such a way that their product is a maximum.
16. Explain Reliability problem.
17. Explain Work force size model
18. Find the best reliability for the following DP problem?

k_j	j=1		j=2		j=3	
	R_1	c_1	R_2	c_2	R_3	c_3
1	0.6	1	0.7	3	0.5	2
2	0.8	2	0.8	5	0.7	4
3	0.9	3	0.9	6	0.9	5

The available total capital is \$10,000.

Unit III

19. Write the principal factors of inventory model
20. Explain single item static model
21. The daily demand for a commodity is approximately 100 units. Every time an order is placed, a fixed cost of \$ 100 is incurred. The daily holding cost per unit inventory is \$.02. If the lead time is 2 days, determine the economic lot size and the recorder point.
22. $k = \$100, \beta = 100, \mu = 100, \sigma = 10, h = 0.02, L = 2$ days. Determine the size of the buffer stock such that the probability of running out of stock during lead time is atleast 0.05.
23. Consider the inventory model with the following information.
 $k = \$10, h = \$1, \beta = 5$ units, $c_1 = \$2, c_2 = \1 , and $q = 15$ units. Compute optimum order quantity and total cost per unit time.
24. Consider the inventory problem with 3 items. The parameters of the problem are given in the table.

Item i	k_i	β_i (units)	h_i	a_i (ft ²)
1	\$10	2	\$0.3	1
2	\$5	4	\$0.1	1
3	\$15	4	\$0.2	1

Total available storage area = 25 ft². Find λ^* and the corresponding y_1^*, y_2^* , and y_3^* .

25. Consider a six period inventory model with the following data.

Period i	Demand D_i (units)	Setup Cost K_i (\$)	Holding Cost h_i (\$)
1	10	20	1
2	15	17	1
3	7	10	1
4	20	20	3
5	5	5	1
6	50	50	1

The purchasing cost per unit is 2 for all the periods.

Find the total cost.

26. Consider a four period production scheduling problem with the following data.

Period i	Capacity		Demand (units)
	a_{Ri}	a_{Ti}	b_i
1	100	50	120
2	150	80	200
3	100	100	250
4	200	50	200
	550	280	770

The production costs are identical for all the periods (i.e) $c_i=2$ and $d_i=3$ for all i , The holding cost is also constant for all periods and is given by $h_i=0.1$ for all i . The cost functions are assumed identical for all periods only for simplicity. Find the total cost.

27. Consider a 3-period model where regular and overtime productions are used. The production capacities for the three periods are as follows.

Period	Production Capacity(Units)		Demand
	Regular a_{Ri}	Overtime a_{Ti}	b_i
1	15	10	20
2	15	0	35
3	20	15	15

Production cost per unit is 5 for regular and 10 for overtime. The holding cost per unit is 1 unit and shortage cost per unit is 2 units. Find the total cost.

28. Consider the single period model with $h = \$1.00$, $p = \$4.00$, and $c = \$2.00$. The demand density function is given by

D	0	1	2	3	4	5
f(D)	.10	.20	.25	.20	.15	.10

Find the value of y^*

Unit IV

29. Suppose that $c_1 = \$100$, $c_2 = \$10$ and $n=50$. The values of P_t are given below

T	1	2	3	4	5
P_t	0.05	0.07	0.10	0.13	0.18

Find the expected cost.

30. suppose that $f(x)$ is the distribution function, Find the value of stock level I,

$$f(x) = \begin{cases} \frac{20}{x^2} & , 10 \leq x \leq 20 \\ 0 & , otherwise \end{cases} \text{for } A_1=1 \& A_2=2$$

31. A manufacturer produces a product in lots of fixed sizes. Because of occasional malfunctions in the production process, bad lots with an unacceptable number of defectives may be produced. The probability of producing bad lot is 0.05 and good lot is 0.95. The percentage of defectives in a good lot is 4% while a bad lot has 15% defective item. This is based on a binomial distribution and a sample size 2, specify the outcomes of the test and compute the posterior probabilities.

32. Explain Decision under uncertainty.

33. Derive Bayes's probabilities.

34. Consider the following payoff(profit) matrix

	θ_1	θ_2	θ_3	θ_4	θ_5
a_1	15	10	0	-6	17
a_2	3	14	8	9	2
a_3	1	5	14	20	-3
a_4	7	19	10	2	0

No probabilities are known for the occurrence of the nature states. Compare the solutions obtained by each of the following criteria

- (a) Laplace (b) Maximin

35. Find the saddle point and the value of the game of the following payoff matrix, which represents player A's gain.

		Player B			
		1	2	3	4
Player A	1	8	2	9	5
	2	6	5	7	18
	3	7	3	-4	10

Unit V

36. Discuss the basic elements of Queueing model?
 37. Explain arrival process
 38. Consider data gathered that represent the number of arrivals n per hour as summarized below.

n	0	1	2	3	4	5	6
Frequency f_n	10	31	40	20	10	4	6

The data indicate that during the observation period, 0 arrivals per hour was observed 10 times, 1 arrival 31 times, 2 arrivals 40 times, and so on.

Find the mean and variance.

39. Consider the queueing situation with one server in which arrivals occur at the rate $\lambda = 3$ per hour and service is performed at the rate $\mu = 8$ per hour. The probabilities p_n of n customers in the system are computed for the situation as given in the following table. Find L_s, W_s, L_q, W_q

N	0	1	2	3	4	5	6	7	≥ 8
p_n	.625	.234	.088	.033	.012	.005	.002	.001	0

40. In a car-wash service facility, information gathered indicates that cars arrive for service according to a Poisson distribution with mean 5 per hour. The time for washing and cleaning each car varies but is found to follow an exponential distribution with mean 10 minutes per car. The facility cannot handle more than one car at a time. Find L_s, W_s, L_q, W_q
41. Explain (M/M/1): (GD/N/ ∞).

42. In a car-wash service facility, information gathered indicates that cars arrive for service according to a Poisson distribution with mean 5 per hour. The time for washing and cleaning each car varies but is found to follow an exponential distribution with mean 10 minutes per car. Suppose that the facility has a total of 5 parking spaces. If the parking lot is full, newly arriving cars balk to seek service elsewhere. Find the waiting time in the system.
43. Explain the $(M/G/1):(GD/\infty/\infty)$ queueing model with example
44. In a car-wash service facility, information gathered indicates that cars arrive for service according to a Poisson distribution with mean 5 per hour. The washing is done by automatic machines, so that the service time may be considered the same and constant for all cars. The washing machine cycle takes 10 minutes exactly. Find L_s , W_s , L_q , W_q
45. In a $(M/M/2/GD/N/\infty)$ queueing model, find L_s
46. Explain self service model

Section – D (12 Marks)

Answer all questions:

Unit I

1. Describe the fractional cut algorithm
2. Using the fractional cut algorithm, solve the integer programming problem

maximize $z = 7x_1 + 9x_2$
 subject to $-x_1 + 3x_2 \leq 6$;

$7x_1 + x_2 \leq 35$; x_1, x_2 are non negative integers
3. Using branch and bound algorithm, solve

Maximize $z = 2x_1 + 3x_2$
 Subject to $5x_1 + 7x_2 \leq 35$
 $4x_1 + 9x_2 \leq 36$
 $x_1, x_2 \geq 0$, x_1, x_2 are integers.
4. Explain (i) Fixed charge problem
 (ii) job- shop scheduling problem

5. Explain cutting plane Algorithm and Find the optimal integer solution using cutting plane Algorithm.

$$\text{maximize } z = 7x_1 + 9x_2$$

$$\text{subject to } -x_1 + 3x_2 \leq 6;$$

$$7x_1 + x_2 \leq 35; x_1, x_2 \text{ non negative integers}$$

6. Explain branch and bound algorithm

Unit II

7. Using capital budgeting method, find the optimum solution. Assume that the total available capital is \$ 5 million

Proposal	Plant I		Plant 2		Plant 3	
	C1	R1	C2	R2	C3	R3
1	0	0	0	0	0	0
2	1	5	2	8	1	3
3	2	6	3	9	-	-
4	-	-	4	12	-	-

8. Develop the forward DP model and find the optimum solution. Assume that the total available capital is \$ 5 million

Proposal	Plant I		Plant 2		Plant 3	
	C1	R1	C2	R2	C3	R3
1	0	0	0	0	0	0
2	1	5	2	8	1	3
3	2	6	3	9	-	-
4	-	-	4	12	-	-

9. Using the recursive formula for the cargo loading problem, solve (W=5)

i	w _i	v _i
1	2	65
2	3	80
3	1	30

10. Explain the reliability problem and find the best reliability for the following DP problem?

k_j	j=1		j=2		j=3	
	R_1	c_1	R_2	c_2	R_3	c_3
1	0.6	1	0.7	3	0.5	2
2	0.8	2	0.8	5	0.7	4
3	0.9	3	0.9	6	0.9	5

The available total capital is \$10,000.

11. A construction contractor estimates that the size of the work force needed over the next 5 weeks to be 5,7,8,4 and 6 workers respectively. Excess labour kept on the force will cost \$300 per worker per week, the new hiring in any week will incur a fixed cost of \$400 plus \$200 per worker per week. Find the optimal solution.

Unit III

12. Explain inventory model and its principle factors.
13. Explain Single-item static model with price breaks
14. Explain (i) Single item static model (ii) Multiple item static model with storage limitation.
15. Consider a three - period inventory situation with discrete units and dynamic deterministic demand. The data for the problem are gives as follows.

Period I	Demand D_i	Setup Cost K_i	Holding Cost H_i
1	3 Units	\$3.00	\$1.00
2	2 Units	7.00	3.00
3	4 Units	6.00	2.00

The entering inventory x_I to period 1 is 1 unit. Suppose that the marginal purchasing cost is \$10 per unit for the first 3 units and \$20 for each additional unit. Find the optimal solution.

16. Let $K = \$100$, $D = 1000$ units, $P = \$10$, and $h = \$2$ and assume that the demand during lead time follows a uniform distribution over the range 0 to 100. Check whether the problem has a feasible solution.
17. Consider the four period model with the following data:

Period i	Demand D_i	Setup cost $K_i(\$)$
1	76	98
2	26	114
3	90	185
4	67	70

The holding cost per unit per period is constant and equal to \$1.00. Also the purchasing cost per unit is equal to \$2.00 for all the periods. The initial inventory x_1 is 15 units (The per unit holding and purchasing costs are taken the same over all the periods only for simplicity.)

18. (i) Explain uniform demand, no setup cost
(ii) Consider the single period model with $h=\$0.5$, $p=\$4.5$ and $c=\$0.5$. The demand density function given by $f(D) = \begin{cases} \frac{1}{10}, & 0 \leq D \leq 10 \\ 0, & D > 10 \end{cases}$. Assume zero initial inventory.

Consider $k=\$25$. Find the order quantity

Unit IV

19. Suppose that $c_1 = \$100$, $c_2 = \$10$ and $n=50$. The values of P_t are given below

T	1	2	3	4	5
P_t	0.05	0.07	0.10	0.13	0.18

Find the expected cost by using (i) Expected value criterion (ii) expected variance criterion

20. Explain Expected value - variance criterion with example.
21. Let $f(x) = \begin{cases} \frac{20}{x^2} & , 10 \leq x \leq 20 \\ 0 & , otherwise \end{cases}$ Then to find the stock level I for $A_1= 2$ & $A_2 =4$
22. Suppose the manufacturer ships lots to two customers, A and B. The contractors specify that the percentage of defectives for A and B should not exceed 5 and 8 , respectively . A penalty of \$100 is incurred per percentage point above the maximum limit. On the other hand, supplying better quality lots will cost the manufacturer \$80 per percentage point. Assuming that a sample of size 2 is inspected prior to shipping, how should the manufacturer decide where to ship an inspected lot?

23. Explain briefly about decision tree.
 24. Consider the following payoff(loss) matrix

		Customer Category			
		θ_1	θ_2	θ_3	θ_4
Supplies Level	a_1	5	10	18	25
	a_2	8	7	8	23
	a_3	21	8	12	21
	a_4	30	22	19	15

No probabilities are known for the occurrence of the nature states. Compare the solutions obtained by each of the following criteria

- (b) Laplace (b) Minimax (c) Savage (d) Hurwicz (assume that $\alpha = 0.5$)

25. Consider the following (3×3) game

		B		
		1	2	3
A	1	3	-1	-3
	2	-3	3	-1
	3	-4	-3	3

Find the optimal strategies which satisfy minimax theorem y_1^* , y_2^* , and y_3^* . Also find x_1^* , x_2^* , and x_3^* .

26. Solve the following (4×2) game.

		B	
		1	2
A	1	2	4
	2	2	3
	3	3	2
	4	-2	6

27. Solve the game $\begin{pmatrix} 2 & 2 & 3-1 \\ 4 & 3 & 2 & 6 \end{pmatrix}$ graphically.

Unit V

28. Explain departure process.

29. Explain (M/M/1):(GD/∞/∞) queueing model?

30. Explain the (M/M/C):(GD/∞/∞) queueing model with example

31. A small town is being services by two cab companies. Each of the two companies owns two cabs and are known to share the market almost equally. This is evident by the fact that calls arrive at each company's dispatching office at the rate of 10 per hour. The average time per ride is 11.5 minutes. Arrival of calls follows a Poisson distribution, whereas ride times are exponential. Find W_q

32. Two companies own two cabs and are known to share the market almost equally. This is evident by the fact that calls arrive at each company's dispatching office at the rate of 10 per hour. The average time per ride is 11.5 minutes. Arrival of calls follows a Poisson distribution, whereas ride times are exponential. He instructed the dispatching office to apologize to prospective customers for the unavailability of cabs once the waiting list reaches 16 customers. Find W_q

33. Explain the (M/M/R) : (GD/K/K), $R < K$ – Machine servicing model

QUESTION BANK

Section - A

UNIT – 1

- Which of the following is open in all the topological spaces?
(a) $\{a, b\}$ (b) $\{b\}$ (c) \varnothing (d) $\{a\}$.
- Open rays forms a _____ for the order topology.
(a) basis (b) open cover (c) **sub basis** (d) sub space.
- The function $f: X \times Y \rightarrow X$ is a _____ function.
(a) monotonic (b) harmonic (c) **continuous** (d) restricted.
- If f is continuous and $A \subseteq X$ then _____.
(a) $f(\overline{A}) \subset \overline{f(A)}$ (b) $f(\overline{A}) \supset \overline{f(A)}$ (c) $f(\overline{A}) = \overline{f(A)}$ (d) $f(\overline{A}) \neq \overline{f(A)}$.
- Indiscrete topology is also known as _____.
(a) k-topology (b) **trivial topology** (c) standard topology (d) basis.
- The collection of all one-point subsets of any set X is a basis for the _____ on X .
(a) k-topology (b) trivial topology (c) **discrete topology** (d) metric topology
- \mathfrak{B} is the collection $[a, b) = \{x / a \leq x < b\}$, the topology generated by \mathfrak{B} is _____ topology.
(a) discrete (b) trivial (c) metric (d) **lower limit**.
- The topologies of \mathbb{R}_ℓ and $\mathbb{R}_\mathcal{K}$ are strictly finer than the _____ topology on \mathbb{R} .
(a) k-topology (b) trivial topology (c) **standard topology** (d) discrete topology.
- The set $X = \{1, 2\} \times \mathbb{Z}_+$ is _____ set.
(a) unordered (b) **ordered** (c) bounded (d) lower limit.
- The map $\pi: X \times Y \rightarrow X$ defined by $\pi(x, y) = x$ is called the _____ of $X \times Y$.
(a) **projection** (b) injection (c) bijection (d) surjection.
- $\tau_Y = \{Y \cap U / U \in \tau\}$ is called the _____ topology.

- (a) standard (b) metric (c) **subspace** (d) discrete.
12. In the finite complement topology on a set X , the closed sets consist of X itself and all _____ subsets of X .
 (a) infinite (b) countable (c) uncountable (d) **finite**.
13. In the discrete topology on the set X , every set is _____.
 (a) infinite (b) countable (c) **both open and closed** (d) neither open nor closed.

UNIT - 2

14. Every topological space is _____.
 (a) metrizable (b) **not metrizable** (c) complete (d) Hausdorff.
15. Open balls forms a _____ for metric topology.
 (a) sub basis (b) topology (c) open rays (d) **basis**.
16. The topology of \mathcal{R}^n induced by the Euclidean metric d and the square metric ρ are same as _____ topology.
 (a) subspace (b) metric (c) standard (d) **product**.
17. The uniform topology on \mathcal{R}^J _____ the box topology.
 (a) is finer than (b) **is coarser than** (c) induce (d) is induced by.
18. The bijective continuous function $f: X \rightarrow Y$ is called _____ if $f^{-1}: Y \rightarrow X$ is also continuous.
 (a) homomorphism (b) **homeomorphism** (c) isometry (d) epimorphism.
19. The map $f: X \rightarrow Y$ is _____ if X can be written as the union of open sets U_α such that $f|_{U_\alpha}$ is continuous for each α .
 (a) homomorphism (b) homeomorphism (c) isometry (d) **continuous**.
20. The function $F: (-1, 1) \rightarrow \mathcal{R}$ defined by $F(x) = \frac{x}{1-x^2}$ is a _____ function.
 (a) homomorphic (b) **homeomorphic** (c) isometric (d) monotonic.
21. If $\{X_\alpha\}$ is an indexed family of spaces and $A_\alpha \subset X_\alpha$ for each α then _____.
 (a) $\pi \overline{A_\alpha} = \overline{\pi A_\alpha}$ (b) $\pi \overline{A_\alpha} \in \overline{\pi A_\alpha}$ (c) $\pi \overline{A_\alpha} \supset \overline{\pi A_\alpha}$ (d) $\pi \overline{A_\alpha} \subset \overline{\pi A_\alpha}$.
22. $\bar{d}(x, y) = \min \{d(x, y), 1\}$ is called _____ metric.
 (a) euclidean (b) **standard bounded** (c) square (d) uniform

UNIT - 3

23. Which of the following is connected?

- (a) \mathbb{Q} (b) set of all irrationals (c) $[1,2] \cup [3,4]$ (d) \mathbb{R} .
24. _____ cartesian product of connected space is connected.
 (a) arbitrary (b) **finite** (c) infinite (d) countable.
25. A simply ordered set L having more than one element is called linear continuum if L has _____.
 (a) greatest lower bound property (b) **least upper bound**
 (c) least common multiple (d) greatest common divisor.
26. _____ subspace of a compact space is compact.
 (a) infinite (b) uncountable (c) open (d) **closed**.
27. The image of a connected space under a _____ map is connected.
 (a) homomorphic (b) homeomorphic (c) isometric (d) **continuous**.
28. \mathbb{R}^ω in the product topology is _____
 (a) finite (b) countable (c) **connected** (d) bounded.
29. The real line \mathbb{R} is _____.
 (a) finite (b) not metrizable (c) **connected** (d) bounded.
30. Every compact subspace of a Hausdorff space is _____.
 (a) finite (b) countable (c) **closed** (d) open.
31. A point x of a space X is called _____ point of X if the one-point set $\{x\}$ is open in X .
 (a) **isolated** (b) limit (c) accumulation (d) essential.

UNIT – 4

32. Every _____ space with a countable basis is normal.
 (a) **regular** (b) hausdorff (c) topological (d) metric.
33. Every _____ Hausdorff space is normal.
 (a) closed (b) continuous image of (c) **compact** (d) connected.
34. _____ lemma states that “If every pair of disjoint closed sets in X can be separated by disjoint open sets, then they can be separated by a continuous function”.
 (a) Lebesgue (b) tube (c) **Uryshon** (d) pasting.

35. Any completely regular space is _____.
- (a) normal (b) Hausdorff (c) **regular** (d) closed.
36. A subset A of a space X is said to be _____ in X if $\bar{A} = X$.
- (a) normal (b) **dense** (c) regular (d) closed.
37. If a space X has a countable basis for its topology then X is said to be _____.
- (a) countable (b) first-countable (c) regular (d) **second-countable**.
38. A space for which every open covering contains a countable subcovering is called _____.
- (a) normal (b) dense (c) **Lindelof** (d) separable.
39. The space X is said to be _____ if for each pair A, B of disjoint closed sets of X there exists disjoint open sets containing A and B .
- (a) **normal** (b) Hausdorff (c) regular (d) closed.
40. A subspace of a completely regular space is _____.
- (a) **completely regular** (b) Hausdorff (c) closed (d) normal.
41. In a metric space a function $f: X \rightarrow X$ satisfies the condition $d(f(x), f(y)) = d(x, y)$ for all $x, y \in X$ then f is called _____.
- (a) a homomorphism (b) a homeomorphism (c) **an isometry** (d) a projection.

UNIT – 5

42. Every regular space X with a countable basis is _____.
- (a) closed (b) open (c) finite (d) **metrizable**.
43. If f is an imbedding of X into \mathcal{R}^ω then X is _____.
- (a) normal (b) Hausdorff (c) **completely regular** (d) metrizable.
44. A space X is completely regular iff it is _____ to a subspace of $[0, 1]^J$ for some J .
- (a) homomorphic (b) isomorphic (c) **homeomorphic** (d) isomorphic.
45. _____ product of compact spaces is compact in the product topology.
- (a) **arbitrary** (b) finite (c) countable (d) continuous.
46. A space X is _____ if each point x of X has a neighborhood that is metrizable in the subspace topology.

- (a) hausdorff (b) finite (c) **locally metrizable** (d) normal.
47. A compact Hausdorff space X is _____ if it is locally metrizable.
 (a) hausdorff (b) regular (c) **metrizable** (d) normal.
48. A collection \mathcal{A} of subsets of X has the _____ property if every countable intersection of elements of \mathcal{A} is nonempty.
 (a) finite intersection (b) **countable intersection** (c) least upper bound (d) maximal.
49. If \mathcal{D} is a collection of subsets of X that is maximal with respect to the finite intersection property, then any _____ of elements of \mathcal{D} is an element of \mathcal{D} .
 (a) **finite intersection** (b) countable intersection (c) least upper bound (d) supremum.
50. Let A be a closed subspace of a normal space X , then any continuous map of A into \mathbb{R} may be extended to a continuous map of _____.
 (a) **X into \mathbb{R}** (b) \mathbb{R} into X (c) \mathbb{R} into \mathbb{R} (d) X into X .

Section – B

UNIT – 1

1. Define Topology.
2. Define basis for a topology.
3. Show that R_l and R_k are not comparable.
4. Let X be a set and \mathcal{B} be a basis for a topology τ on X . Then τ equals the collection of all unions of elements of \mathcal{B} .
5. Define Standard topology.
6. Show that the real line with lower limit topology is strictly finer than the standard topology.
7. Define order topology.
8. Define Limit point and Closed set
9. Give examples for the following
 - (i) Limit point
 - (ii) Closed set
10. If \mathcal{B} is a basis for the topology on X , \mathcal{C} is a basis for the topology on Y then the collection $\mathcal{D} = \{B \times C \mid B \in \mathcal{B}, C \in \mathcal{C}\}$ is the basis for the topology on $X \times Y$.
11. Define Hausdorff space.

UNIT – 2

12. Define continuous function.
13. Is the function $f: (-1,1) \rightarrow \mathbb{R}$ given by $f(x) = \frac{x}{1-x^2}$ a homeomorphism?
14. Is the function given by $f(x) = 3x + 1$ a homeomorphism?
15. Prove that the function $f: X \rightarrow Y$ is continuous if for each $x \in X$ and each neighbourhood V of $f(x)$ there is a neighbourhood U of x such that $f(U) \subset V$.
16. Prove that the composition of two continuous function is continuous.
17. Define box Topology.
18. Define product Topology
19. State the comparison of the box and the product topology.
20. Define distance and metric topology.
21. Define Euclidean metric and square metric.

UNIT – 3

22. Define connected space.
23. Give example for connected space.
24. Prove that the continuous image of a connected space is connected.
25. Prove that the union of a collection of connected subspaces of X that have a point in common is connected.
26. Define homeomorphism with example.
27. Let A be connected subset of X . If $A \subset B \subset \bar{A}$, then prove that B is also connected.
28. Define Linear continuum.
29. Define Compact space.
30. Show that the real line \mathbb{R} is not compact.
31. Prove that every closed subspace of a compact space is compact.
32. Define finite intersection property.
33. Define uniform continuous.
34. Define isolated point in a space.

UNIT – 4

35. Define countable basis at x and First countable axiom.
36. Define second countable axiom.
37. Prove that the real line with lower limit topology is not second countable.

38. Give an example of a first countable space which is not second countable.
39. Prove that the subspace of a first countable space is first countable.
40. Define Lindelof space.
41. Define regular space.
42. Prove that the subspace of a regular space is regular.
43. Define Normal space.
44. State Uryshon Lemma.
45. Define completely regular space.

UNIT – 5

46. State Imbedding theorem
47. State Urysohn metrization theorem.
48. State Tietze extension theorem.
49. State Tychonoff theorem.

Section – C

UNIT – 1

1. Let X be a topological space. Suppose that \mathcal{C} is a collection of open sets of X such that for each open set U of X and each x in U , there exists an element C of \mathcal{C} such that $x \in C \subseteq U$. Then show that \mathcal{C} is a basis for the topology of X .
2. If $A \subset Y \subset X$, show that the closure of A in Y equals $\bar{A} \cap Y$ where \bar{A} is the closure of A in X .
3. If \mathcal{B} is a basis for the topology of X then the collection $\mathcal{B}' = \{B \cap Y \mid B \in \mathcal{B}\}$ is a basis for the subspace topology.
4. Let Y be a subspace of X . Then a set A is closed in Y iff it equals the intersection of a closed set of X with Y .
5. Let Y be a subspace of X . If A is closed in Y and Y is closed in X then prove that A is closed in X .
6. Show that the topologies of R_l and R_k are strictly finer than the standard topology, but are not comparable with one another.
7. If A is a subspace of X and B is a subspace of Y then the product topology on $A \times B$ is the same as the topology $A \times B$ inherits as a subspace of $X \times Y$.
8. Show that every finite set in a Hausdorff space is closed.
9. If X is a Hausdorff space, then a sequence of points of X converges to at most one point of X .
10. Let X be a space satisfying T_1 axiom. Let A be a subset of X . Then prove that the point x is a

limit point of A iff every neighbourhood of x contains infinitely many points of A .

UNIT – 2

11. State and prove Pasting Lemma.
12. State and prove Sequence Lemma.
13. State and prove Maps into products.
14. Let $\{X_\alpha\}$ be an indexed family of spaces. Let $A_\alpha \subset X_\alpha$ for each α . If $\prod X_\alpha$ is given the product or the box topology, then show that $\prod \overline{A_\alpha} = \overline{\prod A_\alpha}$
15. Let $f : A \rightarrow \prod X_\alpha$ be given by the equation $f(a) = (f_\alpha(a))$, $\alpha \in J$ where $f_\alpha : A \rightarrow X_\alpha$ for each α .
Let $\prod X_\alpha$ have the product topology. Then prove that f is continuous iff each f_α is continuous.
16. Prove that $\mathbb{R}^{\mathbb{W}}$ in the box topology is not metrizable.
17. State and prove Uniform Limit Theorem.

UNIT – 3

18. If X and Y are connected spaces, show that $X \times Y$ is connected.
19. State and prove Intermediate value theorem.
20. Prove that the continuous image of a compact space is compact.
21. State and prove Tube Lemma.
22. State and prove Lebesgue number lemma.
23. Prove that every compact subspace of a Hausdorff space is closed.
24. State and prove Extreme value theorem.
25. State and prove Uniform continuity theorem.
26. Prove that compactness implies limit point compactness.
27. Let X be a metrizable space. Prove that if X is limit point compact, then X is sequentially compact.

UNIT – 4

28. Prove the following:
 - (i) A subspace of a first countable space is first countable.
 - (ii) A countable product of first countable space is first countable.
29. Prove the following:
 - (i) A subspace of a second countable space is second countable.
 - (ii) A countable product of second countable space is second countable.
30. Suppose X has a countable basis. Then prove that every open covering of X contains a countable subcollection covering X .

31. Let one point sets in X be closed. Show that X is regular if and only if given a point x of X and a neighborhood U of x , there is a neighborhood V of x such that $\bar{V} \subset U$.
32. Let one point sets in X be closed. Show that X is normal if and only if given a closed set A and an open set U containing A , there is an open set U containing A such that $\bar{V} \subset U$.
33. Prove that a metrizable space is normal.
34. Prove that a compact Hausdorff space is normal
35. Prove that the product of completely regular spaces is completely regular.

UNIT – 5

36. State and prove Imbedding theorem
37. Prove that a space x is completely regular iff it is homeomorphic to a subspace of $[0,1]^J$ for some J .
38. Let X be any set. Let \mathcal{A} be a collection of subset of X having the finite intersection property. Then prove that there is a collection \mathcal{D} of subsets of X such that \mathcal{D} contains \mathcal{A} and \mathcal{D} has the finite intersection property, and no collection of subsets of X that properly contains \mathcal{D} has this property.
39. Let X be a set. Let \mathcal{D} be a collection of subset of X that is maximal with respect to the finite intersection property. Then:
 - (a) Prove that any finite intersection of elements of \mathcal{D} is an element of \mathcal{D}
 - (b) If A is the subset of X that intersects every element of \mathcal{D} then show that A is also the element of \mathcal{D} .

Section – D

UNIT – 1

40. Let \mathcal{B} and \mathcal{B}' be bases for the topologies τ and τ' respectively on X . Prove that the following are equivalent.
 - (i) τ' is finer than τ .
 - (ii) For each $x \in X$ and each basis element $B \in \mathcal{B}$ containing x , there is a basis element $B' \in \mathcal{B}'$ such that $x \in B' \subset B$
41. (i) Let A be subset of a topological space X and let A' be the set of all limit points of A . Then prove $\bar{A} = A \cup A'$

(ii) In a Hausdorff space, show that a sequence can converge to at most one point.

42. Let A be subset of a topological space X .

(i) Then $x \in \bar{A}$ iff every open set U containing x intersects A

(ii) Supposing the topology of X is given by a basis then $x \in \bar{A}$ iff basis element B containing x intersects A

43. A subset of a topological space is closed iff it contains all its limit points.

44. (i) Show that every finite set in a Hausdorff space is closed.

(ii) If X is a Hausdorff space, then a sequence of points of X converges to at most one point of X .

UNIT – 2

45. Let X and Y be topological spaces. Let $f : X \times Y$. Then the following are equivalent.

(i) f is continuous

(ii) For every subset A of X , one has $f(\bar{A}) \subset \overline{f(A)}$

(iii) $f^{-1}(B)$ is closed whenever B is closed in Y

46. (i) State and prove Sequence Lemma.

(ii) If the function $f : X \rightarrow Y$ is continuous, then prove that for every convergent subsequence

$x_n \rightarrow x$, the sequence $f(x_n) \rightarrow f(x)$. Also show that the converse holds if X is metrizable.

47. State and prove Rules for constructing continuous functions.

48. State and prove Uniform Limit Theorem. Also show that \mathbb{R}^w in the box topology is not metrizable.

49. The topologies on \mathbb{R}^n induced by the Euclidean metric d and the square metric ρ are same as the product topology on \mathbb{R}^n .

50. Let $\bar{d}(a, b) = \min\{|a - b|, 1\}$ be the standard bounded metric on \mathbb{R} . If x and y are the two points of \mathbb{R}^w , then $D(x, y) = \sup \left\{ \frac{\bar{d}(x_i, y_i)}{i} \right\}$ is a metric that induces the product topology on \mathbb{R}^w .

UNIT – 3

51. Prove that the finite Cartesian product of connected spaces is connected.

52. If L is a linear continuum in the order topology, then L is connected and so are intervals and rays in L .

53. Prove that the product of finitely many compact spaces is compact.

54. Prove that a space X is compact iff for every collection \mathcal{C} of closed sets in X having the

finite intersection property, the entire intersection of elements of \mathcal{C} is non-empty.

55. Let X be a simply ordered set having the least upper bound property. In the order topology, prove that each closed interval in X is compact.

56. A subspace A of \mathbb{R}^n is compact iff it is closed and bounded in the Euclidean metric d or the square metric ρ .

57. Let X be a nonempty compact Hausdorff space. If X has no isolated points, then prove X is uncountable.

58. Let X be a metrizable space. Prove that if X is sequentially compact, then X is compact.

UNIT – 4

59. Prove that every regular space with countable basis is normal.

60. Prove that the subspace of a Hausdorff space is Hausdorff and a product of Hausdorff space is Hausdorff.

61. Prove that the subspace of a regular space is regular and a product of regular space is regular.

62. Prove that every well ordered set is normal in the order topology.

63. State and prove Urysohn Lemma.

UNIT – 5

64. State and prove Urysohn metrization theorem.

65. State and prove Tietze extension theorem.

66. State and prove Tychonoff theorem.

St. Mary 's College (Autonomous) Thoothukudi

Question Bank

II M.Sc., Mathematics

Core II - Graph Theory

Sub. Code: 21PMAC32

Section-A (One Marks):

Choose The Following:

UNIT – I

1. If $\epsilon(G)$ is zero then the graph G is called_____
a) edge graph b) **null graph** c) vertex graph d) loop
2. An edge starting and ending with the same vertex is called_____
a) edge graph b) null graph c) vertex graph d) **loop**
3. A graph G is said to be self complementary if _____
a) $V(G)$ b) $E(G)$ c) $G \cong G^c$ d) $G^c \cong G$
4. If H is a subgraph of G then G is a_____ of H.
a) Spanning subgraph b) proper super graph c) **super graph** d) simple graph
5. If the origin and terminus coincide in a walk, then the walk is called_____
a) Cycle b) trail c) **closed walk** d) path
6. k-cycle is denoted by_____
a) K_k b) $K_{k,k}$ c) P_k d) C_k
7. A connected acyclic graph is _____
a) cycle b) **tree** c) forest d)spanning tree
8. The vertices in between the origin and the terminus are called_____ vertices.
a) **internal** b) isolated c) external d) pendant
9. A walk in which edges are not repeated is called _____
a) path b) cycle c) **trail** d) closed walk
10. An edge with distinct ends is also called _____
a) bridge b) pendant edge c) cut edge d) **link**
11. A vertex of degree zero is called _____ vertex.
a) pendant b) end c) **isolated** d) cut

12. A vertex of degree one is called a _____ vertex.
 a) null b) cut c) isolated d) **pendent**
13. A cut edge is also called a _____
 a) bond b) **bridge** c) band d) tree
14. A minimum edge cut is called a _____
 a) bond b) bridge c) **band** d) tree

UNIT-II

15. If a graph G is disconnected, then $\mathcal{K}(G)$ is _____
 a) 1 b) 2 c) **0** d) 3
16. If G is a non trivial path, then $\mathcal{K}(G)$ is _____
 a) **1** b) 2 c) 0 d) 3
17. If C is a cycle, then $\mathcal{K}(C)$ is _____
 a) 1 b) **2** c) 0 d) 3
18. If a graph G is disconnected then $\mathcal{K}'(G)$ is _____
 a) 3 b) **0** c) 1 d) 2
19. If G is a connected graph with a bridge, then $\mathcal{K}'(G)$ is _____
 a) 2 b) 0 c) **1** d) 3
20. A path which contains all the vertices of G is called _____
 a) traceable path b) **hamilton path** c) hamilton walk d) walk
21. A graph with Hamilton path is called _____
 a) **traceable graph** b) Eulerian graph c) hamilton cycle d) walk
22. A connected graph that has no cut vertices is called _____
 a) bond b) bridge c) band d) **block**
23. Every isolated vertex is a _____
 a) bond b) bridge c) band d) **block**
24. A graph G is k -connected if _____
 a) $\mathcal{K}(G) \geq k$ b) $\mathcal{K}'(G) \geq k$ c) $\mathcal{K}(G) = k$ d) $\mathcal{K}'(G) = k$
25. Every disconnected graph is _____
 a) one connected b) two connected c) **zero connected** d) non trivial

UNIT-III

26. Every perfect matching is a _____ matching.
a) minimum b) **maximum** c) either (a) or (b) d) neither (a) nor (b)
27. Which of the following statements is/are true?
1. A maximum matching need not be a perfect matching.
2. An augmenting path may not be an alternating path.
a) Both 1 & 2 b) **1 alone** c) 2 alone d) neither 1 nor 2
28. Which of the following statements is/are not true?
1. An alternating path is an augmenting path.
2. Every perfect matching need not be a maximum matching.
a) **Both 1 & 2** b) 1 alone c) 2 alone d) neither 1 nor 2
29. If G is a k -regular bipartite graph with $k > 0$ then G has _____ matching.
a) minimum b) maximum c) **perfect** d) no
30. A matching M in G is a maximum matching iff G contains _____ path.
a) **no M-augmenting** b) M-alternating c) M-augmenting d) no M-alternating
31. If M is a matching in G such that every vertex in G is M saturated then M is _____ matching.
a) minimum b) maximum c) **perfect** d) only
32. If M is a maximum matching and K is a minimum covering of G , then _____
a) $|M| \neq |K|$ b) $|M| > |K|$ c) $|M| \leq |K|$ d) $|M| = |K|$

UNIT-IV

33. Every loopless graph G with v vertices and e edges is _____ colorable.
a) 1-edge b) 2-edge c) $v - edge$ d) **e - edge**
34. A graph G is k -edge colorable if G has _____ k -edge coloring.
a) improper b) no c) **proper** d) optimal
35. A k -vertex coloring is said to be _____ if no two adjacent vertices get the same color.
a) **proper** b) optimal c) improper d) non-optimal
36. Every critical graph is a _____
a) bond b) forest c) **block** d) tree

37. The number of distinct k-colorings of G is denoted by _____
 a) $E_k(G)$ b) $V_k(G)$ c) $J_k(G)$ d) $\pi_k(G)$
38. A graph G is said to be K-chromatic if _____
 a) $\chi'(G) = K$ b) $\chi'(G) < K$ c) $\chi(G) > K$ d) $\chi(G) = K$
39. An edge coloring \mathcal{C} is said to be _____ if no two adjacent edges have the same colour.
 a) **proper** b) improper c) optimal d) non-optimal
40. A graph G is said to be k-edge chromatic if _____
 a) $\chi'(G) = K$ b) $\chi(G) = K$ c) $\chi'(G) > K$ d) $\chi(G) > K$
41. If G is k-critical, then G contains atleast _____ vertex/vertices of degree atleast k-1.
 a)k b) k-1 c) zero d) **one**

UNIT-V

42. A subset S of V is _____ set if no two vertices of S are adjacent in G.
 a) covering b) **independent** c) minimal d) maximal
43. For any graph $G(V,E)$, $\alpha + \beta =$ _____
 a) $|E|$ b) ρ c) $|V|$ d) k
44. The set $S \subseteq V$ is an independent set iff $V-S$ is _____ set of G.
 a) minimal b) maximal c) **covering** d) independent
45. If $m = \min\{k, l\}$ then $r(k, l) \geq$ _____
 a) $2^{m/2}$ b) $2^{m/3}$ c) $2^{m/n}$ d) $2^{3m/2}$
46. $r(k, 1) =$ _____
 a) 2 b) **1** c) 0 d) k
47. $r(2, l) =$ _____
 a) **l** b) 2 c) 0 d) 1
48. Which of the following graph is non-planar?
 a) K_2 b) **K_5** c) K_3 d) K_4
49. Which of the following statements is not true?
 a) A planar embedding of a plane graph G is isomorphic to G
 b) $K_{3,3}$ is non planar
 c) **Isomorphic plane graphs have isomorphic duals**

- d) Each plane graph has exactly one unbounded face
50. Every tournament graph has a directed _____.
- a) Hamilton cycle b) Euler tour c) Euler trail **d) Hamilton path**

Section - B (Two Marks):

UNIT – I

1. Show that for any simple graph G , $\delta \leq \frac{2E}{V} \leq \Delta$
2. Define complete bipartite graph.
3. Discuss about incidence matrix with example.
4. Define edge induced subgraph.
5. What is a walk in a graph?.
6. Prove that every forest is a bipartite graph.
7. Differentiate tree and forest with examples.
8. Define spanning tree.
9. Prove that every tree is a bipartite graph.
10. Explain the terms bond and cocycle.
11. Define cut vertex of a graph.
12. Prove that if e is an edge of a tree T , then $T - e$ is also a tree.

UNIT-II

13. Define vertex cut with example.
14. What is vertex connectivity? Give one example.
15. Define block with example.
16. Prove that if G is 2- connected then any two vertices of G lies on a common cycle.
17. What is a subdivision?
18. State Menger's theorem.
19. Define Eulerian graph and Euler trail.
20. Define Hamiltonian cycle. Give one example.
21. Define the term 'degree majorised'.
22. Define Maximal non Hamiltonian graph.
23. Define Chavatal graph.

24. Define one-tough graph.
25. Show that G is k -edge connected, then $\epsilon \geq \frac{k\gamma}{2}$.

UNIT-III

26. Define matching with example.
27. Define M - saturated and M -unsaturated vertex.
28. Define perfect matching. Give example.
29. Define maximum matching.
30. Define M augmenting path
31. Discuss about covering of a graph.
32. Define minimum covering.
33. State marriage problem.
34. State Tutte theorem

UNIT-IV

35. Define k -edge chromatic graph
36. Define type 1 graph
37. Prove that for any graph G , $\chi'(G) \geq \Delta$.
38. Show that every k -chromatic graph has atleast k -vertices of degree atleast $k-1$.
39. Prove that every critical graph is a block.
40. Define K - vertex colouring. Give one example.
41. Define K -critical graph with example.
42. Prove that for any graph G , $\chi(G) \leq \Delta + 1$.

UNIT -V

43. Define Independent set with example.
44. Prove that the set $S \subseteq V$ is an independent set iff $V-S$ is a covering of G .
45. What is a Clique?
46. Let S be a subset of $V(G)$. Show that $\langle S \rangle$ is a clique in G iff S is an independent set in G^c .
47. Define Ramsey number.
48. Define an embeddable graph.

49. What is a stereographic projection?
50. Define dual of a graph.
51. Define indegree and outdegree of a directed graph.

Section-C (5 Marks):

UNIT – I

1. Prove that an edge e of G is a cut edge of G iff e is contained in no cycle of G .
2. Show that for any graph the number of vertices of odd degree is even.
3. Discuss and prove that in a tree any two vertices are connected by a unique path.
4. If G is a tree with γ vertices then $\epsilon = \gamma - 1$. Justify
5. Deduce that a connected graph is a tree iff every edge is a cut edge.
6. Prove that a tree has atleast two end vertices and that every connected graph contains a spanning tree.
7. State and prove Cayley's theorem.

UNIT-II

8. State and Prove Whitney Theorem.
9. Prove that if G is a block with $\gamma \geq 3$ then any two edges of G lie on a common cycle.
10. State and Prove the Necessary Condition for a graph to be Hamiltonian Graph.
11. Prove that a simple graph is Hamiltonian iff its closure is Hamiltonian.
12. Let G be a simple graph with $\gamma \geq 3$ and $C(G)$ is complete, then prove that G is Hamiltonian.
13. State and prove Dirac Theorem.
14. Show that for any graph G , $C(G)$ the closure of graph G is well defined .
15. Prove that the only non-hamiltonian graphs with γ vertices, $\gamma \geq 3$ and $\binom{\gamma - 1}{2} + 1$ edges are $C_{1,\gamma}$ and $C_{2,5}$.

UNIT-III

16. Prove that a matching M in G is a maximum matching iff G contains no M augmenting path. (or) State and prove Berge theorem.

17. State and prove marriage problem.

(or)

Show that if G is a k -regular bipartite graph with $k > 0$ then G has a perfect matching.

18. Discuss and prove that if G is a bipartite graph with bipartition (X, Y) , then G contains a matching that saturates every vertex in X iff $|N(S)| \geq |S| \forall S \subseteq X$.

19. Prove that if M is a matching and K is a covering such that $|M| = |K|$ then M is a maximum matching and K is a minimum covering.

20. Prove that every 3-regular graph without cut edges has a perfect matching.

UNIT-IV

21. Prove that if G is a connected graph which is not an odd cycle, then G has a two-edge colouring in which both colours are represented at each vertex of degree at least two.

22. Prove that if G is bipartite, then $k' = \Delta$.

23. Let $c = (E_1, E_2, \dots, E_k)$ be an optimal k -edge coloring of G and there is a vertex u in G and colors i and j such that i is not represented at u and j is represented at least twice at u , then show that the component of $G(E_i \cup E_j)$ that contains u is an odd cycle.

24. Prove that if G is simple, then $\pi_k = \pi_k(G - e) - \pi_k(G \cdot e)$ for any edge e of G .

25. Prove that if G is k -Critical, then $\delta \geq k - 1$.

26. Deduce that a critical graph with no vertex cut is a clique.

27. Prove that if G is a k -critical graph with a 2-vertex cut $\{u, v\}$ of G , then

$$d(u) + d(v) \geq 3k - 5.$$

28. For any graph G , prove the following statements.

- i) $\pi_k(G)$ is a polynomial in k of degree γ .
- ii) All the coefficients of $\pi_k(G)$ are integers.
- iii) Leading term of k^γ and the constant term is zero.
- iv) The coefficients of $\pi_k(G)$ alternate in sign.

UNIT – V

29. Show that if $\delta > 0$, then $\alpha' + \beta' = \nu$.

30. Show that for any graph G , $\alpha + \beta = \nu$.

31. Prove that for any two positive integers k and l , $r(k, l) \leq \binom{k+l-2}{k-1}$
32. State and prove Turans theorem.
33. K_5 is non planar. Justify and write the proof.
34. If v is a vertex of a planar graph G , then show that G can be embedded in the plane in such a way that v is on the exterior face of the embedding.
35. Explain the following terms which are connected to directed graphs i)Orientation ii)Dicomponent iii)Strict iv)Reachable v)Underlying graph.

Section-D (10 Marks):

UNIT – I

1. Prove that a graph is bipartite iff it contains no odd cycles.
2. Prove that for any vertex v of a tree G , v is a cut vertex of G iff $d(v) > 1$.
3. Show that an edge e of G is a cut edge of G iff e is contained in no cycle of G .
4. Analyze and prove that in a tree any two vertices are connected by a unique path.
5. Prove that every non trivial tree has atleast two vertices of degree one.
6. Let T be a spanning tree of a connected graph G and let e be any edge of T . Then prove the following i) the cotree \bar{T} contains no bond of G .
ii) $\bar{T} + e$ contains a unique bond of G .
7. State and prove Cayley's formula.

UNIT – II

8. Show that a graph G with $v \geq 3$ is 2-connected iff any two vertices of G are connected by atleast two internally disjoint paths.
9. Prove that for any graph G , $\mathcal{K} \leq \mathcal{K}' \leq \delta$.
10. Prove that a non empty connected graph is Eulerian iff it has no vertices of odd degree.
11. Let G be simple graph and let u and v be non adjacent vertices in G such that $d(u) + d(v) \geq \gamma$. Then prove that G is Hamiltonian iff $G + uv$ is Hamiltonian.
12. Let G be a simple graph with degree sequence $(d_1, d_2, \dots, d_\gamma)$ where $d_1 \leq d_2 \leq \dots \leq d_\gamma$ and $\gamma \geq 3$. Suppose that there is no value of $m < \frac{\gamma}{2}$ for which $d_m \leq m$ and $d_{\gamma-m} < \gamma - m$ then prove that G is Hamiltonian.

13. Show that for any graph G , $C(G)$ the closure of graph G is well defined.
14. Prove that if G is a non-hamiltonian simple graph with $\gamma \geq 3$ then G is degree majorized by some $C_{m,\gamma}$.

UNIT-III

15. State and prove Halls theorem.

(or)

Let G be a bipartite graph with bipartition (X,Y) , then G contains a matching that saturates every vertex in X iff $|N(S)| \geq |S| \forall S \subseteq X$.

16. Prove that a matching M in G is a maximum matching iff G contains no M augmenting path.
17. Deduce that if G is a bipartite graph, then the number of edges in a maximum matching is equal to the number of vertices in a minimum covering.
18. State and prove Tutte theorem.

(or)

Prove that a graph G has a perfect matching iff $o(G - S) \leq |S| \forall S \subseteq V$.

UNIT-IV

19. State and Prove Vizing's theorem.
20. State and Prove Brook's Theorem.
21. Prove the below statements
- i) If G is bipartite, then $k' = \Delta$.
 - ii) Let $c = (E_1, E_2, \dots, E_k)$ be an optimal k -edge coloring of G . If there is a vertex u in G and colors i and j such that i is not represented at u and j is represented atleast twice at u , then the component of $G(E_i \cup E_j)$ that contains u is an odd cycle.
22. Prove that if G is 4-chromatic then G contains a subdivision of K_4 .
23. Show that for any positive integer k , there is a k -chromatic graph containing no triangle.

UNIT-V

24. Show that for any two integers $k \geq 2, l \geq 2, r(k, l) \leq r(k, l - 1) + r(k - 1, l)$. Also if $r(k, l - 1)$ and $r(k - 1, l)$ are both even, then strict inequality holds.

25. State and prove Erdos theorem.
26. Define stereographic projection and show that a graph G is embeddable in the plane iff it is embeddable on the sphere. Also explain the terms dual graphs, faces and boundary with appropriate examples.
27. Discuss and prove that a digraph D contains a directed path of length $\chi - 1$.
28. Analyze and prove that a loopless digraph D has an independent set S such that each vertex of D not in S is reachable from a vertex in S by a directed path of length at most two.

ST.MARY'S COLLEGE (Autonomous), THOOTHUKUDI

Question Bank

II M.Sc Mathematics

Semester III

Core III - Measure theory

Sub Code: 21PMAC33

PART:A

Unit:I

1. The length of an interval I is defined as
a) sum of end points b) **difference of end points** c) zero d) one
2. The outer measure of an interval is its
a) **length** b) open interval c) closed interval d) measure
3. For any set A, $m^*(A)$
a) = 0 b) > 0 c) < 0 d) **≥ 0**
4. If A is countable then $m^*(A)$
a) = **0** b) > 0 c) < 0 d) ≥ 0
5. The countable union of all open sets is called.....
a) open sets b) closed sets c) **borel sets** d)measurable
6. The countable union of all closed sets is called.....
a) open sets b) closed sets c) **borel sets** d)measurable
7. A function f is said to be lebesgue measure if its is measurable
a) codomain b) **domain** c) function d)interval
8. A linear combination of a characteristic function is called.....

- a) step b) **simple** c) measurable d) outermeasure
9. The set $[0, 1]$ is
- a) open b) measurable c) **uncountable** d)countable
10. If a set E is measurable then E^c is
- a) **measurable** b) non measurable c) countable d) simple

Unit:II

11. Union of two measurable sets is
- a) not a measurable set b) **again a measurable set**
- c) not a outer measure d) an outer measure set
12. An integrable function should be afunction.
- a) measurable b) **non negative measurable** c) simple d) step
13. A linear combination of a characteristic function is afunction.
- a) Step b) **Simple** c) Unique d) Equivalent
14. If $m^*(A) = 0$ then the outer measure of A union B is =.....
- a) 0 b) $m^*(A)$ c) **$m^*(B)$** d) $m(A)$
15. A linear combination of a characteristic function is afunction.
- a) Step b) **Simple** c) Unique d) Equivalent
16. Every step function is also afunction.

- a) bounded b) **Simple** c) Step d) Equivalent
17. All Riemann integrals areintegral.
- a) **lebesgue** b) Simple c) Unique d) bounded
18. A function f is called integrable then $\int f < \dots\dots\dots$
- a) ∞ b) 0 c) m d) n
19. A function f is said to be integrable if both f^+ and f^- arefunction.
- a) measurable b) **integrable** c) Unique d) simple
20. If f is integrable then $|f|$ is
- a) nonzero b) Simple c) measurable d) **integrable**

Unit:III

21. If a normed linear space is complete then the absolutely summable series is.....
- a) **summable** b) complete c) simple d) linear space
22. The L^p spaces are
- a) measurable b) **complete** c) summable d) absolutely summable
23. If $f \in L^p$ and $g \in L^p$ then $f + g$ belongs to
- a) L^p b) L^q c) L^1 d) L^∞
24. Every convergent sequence is
- a) simple b) complete c) summable d) **cauchy**
25. L^p spaces are space
- a) linear b) **normed linear** c) finite d) infinite

26. A complete normed linear space is called.....space
- a) **banach** b) normed linear c) finite d) infinite
27. If L^∞ is a normed linear space then $\|f\|_\infty$
- a) **ess sup $|f(t)|$** b) ess sup $|g(t)|$ c) sup ess $|f(t)|$ d) sup ess $|g(t)|$
28. If p and q are the non negative extended real numbers then $\frac{1}{p} + \frac{1}{q} =$
- a) **1** b) 0 c) ∞ d) pq
29. If f and g are in L^p then $\|f + g\| \leq$
- a) $|f + g|$ b) $|f| + |g|$ c) $\|f\| + \|g\|$ d) 0
30. In Riesz fischer theorem L^p spaces are
- a) measurable b) **complete** c) summable d) finite

Unit:IV

31. The second property of μ is called =.....
- a) additive b) countably additive c) countably subadditive d) countable
32. Every σ - finite measure is
- a) **measurable** b) convergent c) summable d) simple
33. The Hahn decomposition of any set is unique upto.....
- a) singular b) mutually singular c) whole set d) null set
34. If E is a null set then $|\gamma|(E) =$

- a) = 0 b) > 0 c) < 0 d) ≥ 0

35. If E is the countable union of measurable sets then E is calledmeasure

- a) finite b) infinite c) σ - finite d) disjoint

36. The measure γ is finite iff f is

- a) singular b) mutually singular c) **integrable** d) non negative

37. In Randon Nickodym theorem the derivative of γ is denoted by

- a) $[\frac{d\gamma}{d\mu}]$ b) $[\frac{d\mu}{d\gamma}]$ c) $[\frac{d\mu}{dx}]$ d) $[\frac{d\gamma}{dx}]$

38. If E is a null set then the absolute value of γ is

- a) = 0 b) > 0 c) < 0 d) ≥ 0

39. If both γ^+ and γ^- are finite then γ is a measure

- a) finite b) infinite c) **finite signed** d) infinite signed

40. A set E is called a finite measure if $\mu(E) < \dots\dots\dots$

- a) ∞ b) 0 c) m d) X

Unit:V

41. If $\bar{\mu}$ is a outer measure restricted to \mathcal{B} then $\bar{\mu}$ is

- a) measurable b) **complete measure** c) σ -algebra d) algebra

42. The set function μ^* is an

- a) measure b) complete measure c) σ -algebra d) **outer measure**

43. \mathcal{R} is a

- a) σ -algebra b) algebra c) **semi algebra** d) complete measure

44. If E is a measurable set then E_x is a measurable subset of

- a) E b) X c) Y d) XY

45. The union of any finite number of measurable set is

- a) **measurable** b) complete measurable c) σ -algebra d) outer measure

46. If $A \in \mathcal{a}$ then $\mu^*(A) = \dots\dots\dots$

- a) 0 b) A c) $\mu(A)$ d) $\bar{\mu}(A)$

47. If $A \in \mathcal{a}$ then A is

- a) **measurable** b) complete measurable c) σ -algebra d) outer measure

48. If $A \in \mathcal{a}$ and $B \in \mathcal{B}$ then $A \times B$ is called

- a) measurable b) **measurable rectangle** c) rectangle d) outer measure

49. \mathcal{R} denote the collection of all

- a) measurable b) complete measurable c) **measurable rectangle** d) real

50. The set of all intervals in \mathcal{R} is

- a) algebra b) **semi algebra** c) σ -algebra d) disjoint

Part :B

Unit I

1. Define Boolean algebra.

2. Define σ - algebra.
3. Define length of a interval.
4. Define the measure of E.
5. Define translation invariant.
6. Define countably additive measure.
7. Define outer measure.
8. Define F_σ and G_δ set.
9. Define simple function.
10. Define step function.
11. Define measurable function.
12. Define measurable set.
13. Define lebesgue measure.
14. Define borel set.
15. Define characteristic function.

Unit:II

16. Define Riemann integral.
17. Define simple function.
18. Define characteristic function.
19. Define canonical representation.
20. Define non negative measurable function.
21. Define integrable function.
22. Define measurable function.

Unit:III

23. Define L^p space.
24. Define linear space.
25. Define normed linear space.
26. State Holder inequalities.
27. State Minkowski's inequalities.
28. Define convergent.
29. Define cauchy sequence.
30. Define Complete.
31. Define banach space.
32. Define summable.
33. Define absolutely summable.
34. State Riesz fischer theorem.

35. Define linear function.
36. Define bounded linear function.

Unit:IV

37. Define measurable set.
38. Define lebesgue integral.
39. Define mutually singular.
40. Define finite measure.
41. Define σ -finite measure.
42. Define semi finite measure.
43. Define complete measure space.
44. Define measurable function.
45. Define signed measure.
46. Define positive and negative measurable set.
47. Define null set.

Unit:V

48. Define a measurable set.
49. Define an outer measure
50. Define range.
51. Define semi algebra.
52. Define product measure.
53. Define X- cross section.
54. Define Y- cross section.

Part:C

Unit:I

1. State and prove countably subadditivity property.
2. State and prove countably subadditivity property for outer measure.
3. Prove that $[0, 1]$ is uncountable.
4. If A is a set and for $\varepsilon > 0$ there is an open set O such that $A \subset O$ and $m^*(O) \leq m^*(A) + \varepsilon$ then prove that there is a G_δ set G such that $A \subset G$ and $m^*(A) = m^*(G)$.
5. If $m^*(A) = 0$ then prove that $m^*(A \cup B) = m^*(B)$.
6. Prove that E is measurable iff $m^*(A) \geq m^*(A \cap E) + m^*(A \cap E^C)$.
7. Prove that a set E is measurable iff E^C is measurable.
8. If $m^*(E) = 0$ then prove that E is measurable.
9. Prove that union of two measurable set is measurable.

10. If $\{E_n\}$ be an infinite decreasing sequence of measurable sets then prove that $m(\cap E_i) = \lim m(E_n)$.
11. If f is a measurable function and $f = g$ almost everywhere then prove that g is measurable.
12. Prove that X_A is measurable iff A is measurable.

Unit:II

13. If φ and ψ are simple function then prove that $a\varphi + b\psi \rightarrow \int a\varphi + b\psi$ is linear a function.
14. If f be defined and bounded on a measurable set E with $m(E)$ is finite then prove that $\inf \int \psi(x) dx = \sup \int \varphi(x) dx$ where $f \leq \psi$ and $f \geq \varphi$. Also prove that f is measurable.
15. Prove that a Riemann integral is a lebesgue integral.
16. State and prove Bounded convergence theorem.
17. State and prove Factor's lemma.
18. State and prove monotone convergence theorem.
19. If f is integrable then prove that $|f|$ is integrable.

Unit:III

20. State and prove Holder inequalities.
21. State and prove Minkowski's inequalities.
22. Prove that a normed linear space X is complete iff every absolutely summable series is summable.
23. Let g be an integrable function on $[0, 1]$ and suppose that there is a constant M such that $|\int fg| \leq M \|f\|_p$ for all bounded measurable functions f . Then prove that g is in L^q , and $\|g\|_q \leq M$.
24. Prove that $\|f\| = \|g\|$ for each function g in L^q defines a bounded linear functional f on L^p by $F(f) = \int fg$.

Unit:IV

25. If $A \in \mathcal{B}$ and $B \in \mathcal{B}$, $A \subseteq B$ then prove that $\mu(A) \leq \mu(B)$.
26. If $E_i \in \mathcal{B}$, $\mu(E_i) < \infty$ and $E_i \supset E_{i+1}$ then prove that $\mu(\cap_{i=1}^{\infty} E_i) = \lim_{n \rightarrow \infty} \mu(E_n)$
27. State and prove countability sub additive property.

28. If f and g be two measurable real valued function defined on the same domain then prove that $f+c$, cf , $f+g$, $g-f$ and fg are also measurable.
29. If E is a measurable set such that $0 < \gamma(A) < \infty$ then prove that there is a set in E with $\gamma(A) > 0$.
30. If μ is a complete measure and f is a measurable function then prove that $f = g$ almost everywhere and g is measurable.
31. Prove that every measurable subset of a positive set is itself a positive set.

Unit:V

32. If $A \in \mathcal{a}$ and if $\{A_i\}$ is any sequence of sets in \mathcal{a} such that $A \subset \cup A_i$ then prove that $\mu(A) \leq \sum \mu(A_i)$.
33. If $A \in \mathcal{a}$ then prove that $\mu^*(A) = \mu(A)$.
34. Prove that the set function μ^* is an outer measure.
35. If $A \in \mathcal{a}$ then prove that A is measurable with respect to μ^* .
36. If $\{(A_i \times B_i)\}$ be a countable collection of measurable rectangle whose union is a measurable rectangle $A \times B$ then prove that $\lambda(A \times B) = \sum \lambda(A_i \times B_i)$.
37. If x be a point of X and E be a set in $R_{\sigma\delta}$. Then prove that E_x is a measurable subset of Y .
38. State and prove Tonell's theorem.

Part : D

Unit:I

1. Prove that the outer measure of an interval is its length.
2. Prove that the collection of measurable set is a σ -algebra.
3. Prove that (a, ∞) is measurable.
4. Prove that every borel set is measurable.
5. If $\{E_i\}$ is a sequence of measurable sets then prove that $m(\cup E_i) \leq \sum m(E_i)$. Also if the sets $\{E_n\}$ are pairwise disjoint then prove that $m(\cup E_i) = \sum m(E_i)$.
6. If E be a set then prove that the following condition are equivalent:
 - i) E is measurable.
 - ii) For given $\varepsilon > 0$ there is an open set O contains E such that $m^*(O - E) < \varepsilon$.
 - iii) For given $\varepsilon > 0$ there is an closed set F contained in E such that $m^*(E - F) < \varepsilon$.
7. If f be an extended real valued function whose domain is measurable then prove that the following are equivalent:
 - i) For each real number α , the set $\{x / f(x) > \alpha\}$ is measurable.

- ii) For each real number α , the set $\{x / f(x) \geq \alpha\}$ is measurable.
 - iii) For each real number α , the set $\{x / f(x) < \alpha\}$ is measurable.
 - iv) For each real number α , the set $\{x / f(x) \leq \alpha\}$ is measurable.
 - v) For each extended real number α , the set $\{x / f(x) = \alpha\}$ is measurable.
8. If f and g be two measurable real valued function defined on the same domain then prove that $f+c$, cf , $f+g$, $g-f$ and fg are also measurable.
9. If f be a measurable function defined on $[a, b]$ and assume that f takes the values $\pm \infty$ only on a set of measure zero then prove that there is a step function g and a continuous function h such that $|f - g| < \varepsilon$ and $|f - h| < \varepsilon$.
10. State and prove the Little wood's third principle.

Unit:II

11. If f and g are bounded measurable defined on a set E of finite measure then prove that

$$i) \int a\phi + b\psi = a \int f + b \int g$$

$$ii) \text{ If } f = g \text{ almost everywhere then prove that } \int f = \int g.$$

$$iii) \text{ If } f \leq g \text{ almost everywhere then prove that } \int f \leq \int g.$$

- iv) If A and B are disjoint measurable sets of finite measure then prove that

$$\int_{A \cup B} f = \int_A f + \int_B f.$$

12. If f and g are non negative measurable function then prove that

$$i) \int cf = c \int f \text{ where } c > 0$$

$$ii) \int f + g = \int f + \int g$$

$$iii) \text{ If } f \leq g \text{ almost everywhere then } \int f \leq \int g$$

13. If f and g are non negative measurable function. If f is integrable and $g(x) < f(x)$ then prove that g is also integrable and $\int f - g = \int f - \int g$.

14. State and prove lebesgue convergence theorem.

15. State and prove the generalization of lebesgue convergence theorem.

Unit:III

16. State and prove Riesz representation theorem.
17. State and prove Riesz Fisher theorem.
18. Prove that L^p spaces are complete.

Unit:IV

19. State and prove Jordan decomposition theorem.
20. State and prove Randon – Nikodym theorem.
21. State and prove lebesgue decomposition theorem
22. State and prove Hahn decomposition theorem.

Unit:V

23. The class \mathcal{B} of μ^* is a σ - algebra if $\bar{\mu}$ is μ^* restricted to \mathcal{B} then prove that $\bar{\mu}$ is a complete measure on \mathcal{B} .
24. State and prove the Caratheodory theorem.
25. State and prove Fubin's theorem.
26. If E be a set in $R_{\sigma\delta}$ with $(\mu \times \gamma)(E) < \infty$. Then prove that the function g defined by $g(x) = \gamma(E_x)$ is a measurable function of x and $\int g d\mu = (\mu \times \gamma)(E)$.

Section-A (1 Marks)

UNIT - I

- The order of $\frac{\partial^2 \theta}{\partial x^2} = \frac{\partial \theta}{\partial t}$ is _____
a)3 b)4 c)2 d)1
- If $p \frac{\partial(u,v)}{\partial(y,z)} + q \frac{\partial(u,v)}{\partial(z,x)} =$ _____
a) $\frac{\partial(u,v)}{\partial(x,z)}$ b) $\frac{\partial(u,v)}{\partial(x,y)}$ c) $\frac{\partial(u,v)}{\partial(y,z)}$ d) $\frac{\partial(v,u)}{\partial(x,y)}$
- Eliminate the arbitrary function f from the equation $z=f(x^2+y^2)$ _____
a) $xq + yp = 0$ b) $xq + yp = 1$ c) $xq - yp = 0$ d) $xq - yp = 1$
- The Lagrange's equation is given as _____
a) $Pp+Qq=R$ b) $dz=pdx+qdy$ c) $dz=pdx-qdy$ d) $Pp-Qq=R$
- A system of two I order partial differential equation are said to be compatible if they have _____
a) different solutions b) **same solutions** c) integral values d) constants
- The direction ratios of the point (x,y,z) is _____
a) $\left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}\right)$ b) $\left(\frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}\right)$ c) $\left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial z}\right)$ d) $\left(\frac{\partial f}{\partial x}, \frac{\partial f}{\partial y}, \frac{\partial f}{\partial p}\right)$
- The auxillary equation is given by _____
a) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ b) $\frac{dx}{p} = \frac{dy}{q} = \frac{dz}{r}$ c) $\frac{dx}{Q} = \frac{dy}{P} = \frac{dz}{R}$ d) $\frac{dx}{R} = \frac{dy}{P} = \frac{dz}{Q}$
- The solution of $F(x,y,z,p,q)$ is a two parameter system of the surface $f(x,y,z,a,b)=0$ such an integral is called _____
a) general integral b) **complete integral** c) singular integral d) surface integral
- In a function $f\{x,y,z,a,\varphi(a)\}=0$, when the fuction $\varphi(a)$ which defines this subsystem is arbitrary. Then the solution obtained is called _____
a) **general integral** b) complete integral c) singular integral d) surface integral

10. The envelope of two parameter system of $f(x,y,z,a,b)$ exists it is also a solution of $F(x,y,z,p,q)$.
is called the _____
a) general integral b) complete integral c) **singular integral** d) surface integral
11. The set of five number of $D(x,y,z,p,q)$ is called _____ of space.
a) integral element b) **plane element** c) tangent element d) elementary cone
12. A plane element (x_0,y_0,z_0,p,q) whose components satisfy an equation $F(x,y,z,p,q)=0$ is called
an _____ of $f(x,y,z,p,q)=0$ at the point (x_0,y_0,z_0) .
a) **integral element** b) plane element c) tangent element d) elementary cone
13. The set of plane elements envelope a cone with vertex p and this cone is called _____ of
 $F(x,y,z,p,q)=0$ at the point p.
a) integral element b) plane element c) tangent element d) **elementary cone**
14. The element of the type $\{x_0,y_0,g(x_0,y_0),g_x(x_0,y_0),g_y(x_0,y_0)\}$ determined by the tangent at each
point of s is called _____ of surface s at the point $(x_0,y_0,g(x_0,y_0))$.
a) integral element b) plane element c) **tangent element** d) elementary cone
15. Any set $(x(t),y(t),z(t),p(t),q(t))$ of five real functions satisfying the condition
 $z'(t) = p(t)x'(t) + q(t)y'(t)$ is defined as the _____ at the point (x,y,z) of C.
a) integral strip b) **strip** c) tangent element d) elementary cone
16. If the strip is an integral element of $F(x,y,z,p,q)=0$ then it is called an _____
a) **integral strip** b) strip c) tangent element d) elementary cone
17. If at each point a curve C given by $x=x(t), y=y(t), z=z(t)$ touch a generator of the elementary
cone then the strip is called _____
a) integral strip b) strip c) tangent element d) **characteristic strip**

UNIT-II

18. A system of two partial differential equations $f(x,y,z,a,b) = 0$ and $g(x,y,z,a,b) = 0$ are said to be
compatible if _____
a) $[f,g] \neq 0$ b) **$[f,g] = 0$** c) $[f,g] = a$ d) $[f,g] \neq a$
19. The compatible equation $\frac{\partial(f,g)}{\partial(x,p)} + p \frac{\partial(f,g)}{\partial(z,p)} + \frac{\partial(f,g)}{\partial(y,q)} + q \frac{\partial(f,g)}{\partial(z,q)} =$ _____
a) **0** b) $\neq 0$ c) a d) x
20. If $[f,g] = 0$ is _____
a) **Compatible** b) charpit's equation c) complete integral d) separable

21. If the equations involving p and q, then p value is _____
- a) f(a) b) **a** c) $\partial(a)$ d) a+b
22. If $\frac{dx}{f_p} = \frac{dy}{f_q} = \frac{dz}{pf_p + qf_q} = \frac{dp}{-(f_x + pf_z)} = \frac{dq}{-(f_y + qf_z)}$ is called _____
- a) compatible b) **charpit's equation** c) complete integral d) seperable
23. If $z = px + qy + f(p, q)$ is called _____ equation
- a) compatible b) charpit's c) **clairaut** d) seperable
24. Equation not involving the independent variables is _____
- a) **p = aq** b) q = ap c) p = xq d) q = yp
25. The general solution of equation involving p and q is _____
- a) $z = x + Q(a)$ b) **$z = ax + Q(a) + b$** c) $z = ax + Q(a)$ d) $x + Q(a) + b$
26. A first-order PDE equation is said to be a Clairaut type if it can be written in the form _____
- a) **$z = px + qy + f(p, q)$** b) $z = qx + py + f(q, p)$ c) $z = px + qy$ d) $z = px + q$
27. A first-order PDE is separable if it can be written in the form _____
- a) **$f(x, p) = g(y, q) = a$** (b) $f(y, p) = g(x, q) = p$ (c) $f(x, q) = g(y, p) = a$ (d) $f(x, p) = f(y, q) = a$
28. The equation $f\{x(t), y(t), z(t), a, b\} = 0$ must have _____ equal roots.
- a) four b) six c) **two** d) one
29. Eliminant of t from the equation $f\{x(t), y(t), z(t), a, b\} = 0$ and $\frac{\partial}{\partial t} f\{x(t), y(t), z(t), a, b\} = 0$ _____
- a) **$\Psi(a, b) = 0$** b) $f(a, b) = 0$ c) $\Psi(b, a) = 0$ d) $g(a, b) = 0$
30. If $g(x, y, z, h, k) = 0$ a curve Γ in whose equations the constants h, k appear as _____ parameters.
- a) **independent** b) dependent c) one d) two
31. The equation $f_y dp + f_x dx = 0$ its solution is _____
- a) **$f(x, p) = a$** b) $f(x, p) = a$ c) $\Psi(x, p) = 0$ d) $\Psi(y, q) = 0$

UNIT-III

32. The function z in the origin of second order equation is given by an expression of type $z =$ _____
- a) $f(u)g(v) + w$ b) $f(u) - g(v) + w$ c) **$f(u) + g(v) + w$** d) $f(u)g(v)$

33. The function z which can be expressed in the form $z = f(x + ay) + g(x - ay)$ satisfy the partial differential equation $t =$ _____
- a) a^2r b) ar c) a/r d) a^2
34. The homogenous linear PDE is of the form $F(D, D')z = 0$ is called the _____
- a) laplace function b) **complementary function** c) telegraphy function d) one dimensional
35. If _____ is a solution of $F(D, D')z = 0$ provided $F(a, b) = 0$
- a) e^{ax+iby} b) e^{ax+iby} c) $e^{-(ax+iby)}$ d) 0
36. The P.I of the equation $(D^2 - D')z = e^{x+y}$ is _____
- a) $-ye^{x+y}$ b) x, y c) xy d) 0
37. $F(D, D')e^{ax+by} =$ _____
- a) **$F(a, b)e^{ax+by}$** b) zero c) $F(a, D)e^{ax+by}$ d) e^{ax+iby}
38. Hyperbolic condition is _____
- a) **$S^2 - 4RT > 0$** b) $S^2 - 4RT < 0$ c) $S^2 - 4RT = 0$ d) $S^2 - 4RT \leq 0$
39. Parabolic condition is _____
- a) $S^2 - 4RT > 0$ b) $S^2 - 4RT < 0$ c) **$S^2 - 4RT = 0$** d) $S^2 - 4RT \leq 0$
40. Elliptic condition is _____
- a) $S^2 - 4RT > 0$ b) **$S^2 - 4RT < 0$** c) $S^2 - 4RT = 0$ d) $S^2 - 4RT \leq 0$

UNIT-IV

41. If the given PDE has two families of characteristics then it is _____
- (a) **hyperbolic** (b) elliptic (c) parabolic (d) linear solution
42. Cauchy problem does not possess a _____
- (a) normal solution (b) **unique solution** (c) linear solution (d) trivial solution
43. In the elliptic case $4RT - S^2 > 0$ so that _____ always holds.
- (a) $\Delta > 0$ (b) $\Delta < 0$ (c) $\Delta = 0$ (d) **$\Delta \neq 0$**
44. If ϕ is indefinite, the characteristic cones are real then we say that the equations are _____
- (a) Parabolic (b) **hyperbolic** (c) elliptic (d) greens function
45. If $\phi = \sum_{i,j}^3 a_{ij} \delta_i \delta_j$. If $\phi = 0$ defines a _____
- (a) **characteristic Surface** (b) characteristic Cone (c) conoid (d) reciprocal Cone

46. If $Mw = 0$ is one of the property of function $w(x, y, \varepsilon, \eta)$ is called _____
 (a) boundary soln (b) **green's function** (c) hyperbolic (d) parabolic
47. If $M = L$ then the operator L is called _____
 (a) **selfadjoint** (b) binary operator (c) green's function (d) adjoint operator
48. Which is second order linear ordinary differential equation?
 (a) **$f(D)X = \lambda X$** (b) $f(D)X = X$ (c) $f(D)X = Y$ (d) $f(D)X = XY$
49. $\frac{1}{x} f(D)X$ is of the function _____ alone.
 (a) z (b) y (c) **x** (d) xy
50. In separable of variables $\frac{1}{x} f(D)X =$ _____
 (a) $\frac{1}{y} g(D')X$ (b) $\frac{1}{y} g(D)Y$ (c) $\frac{1}{y} g(D)X$ (d) **$\frac{1}{y} g(D')Y$**
51. A curve γ in the xy plane satisfying _____ is called a characteristics base curve of cauchy's problem for second order PDE.
 a) **$A(\varepsilon_x, \varepsilon_y) = 0$** b) $A(\varepsilon_x, \varepsilon_y) \neq 0$ c) $A(\varepsilon_x, \varepsilon_y) < 0$ d) $A(\varepsilon_x, \varepsilon_y) > 0$
52. The equation of the characteristic surface is _____
 a) $\sum_{i,j}^3 a_{ij} \frac{\partial f}{\partial x_i} \frac{\partial f}{\partial x_j} > 0$ b) **$\sum_{i,j}^3 a_{ij} \frac{\partial f}{\partial x_i} \frac{\partial f}{\partial x_j} = 0$** c) $\sum_{i,j}^3 a_{ij} \frac{\partial f}{\partial x_i} \frac{\partial f}{\partial x_j} < 0$ d) $\sum_{i,j}^3 a_{ij} \frac{\partial f}{\partial x_i} \frac{\partial f}{\partial x_j} \neq 0$
53. The equation of the cone is _____
 a) $\sum_{i,j} a_{ij} \delta_i \delta_j \neq 0$ b) $\sum_{i,j} a_{ij} \delta_i \delta_j > 0$ c) **$\sum_{i,j} a_{ij} \delta_i \delta_j = 0$** d) $\sum_{i,j} a_{ij} \delta_i \delta_j < 0$
54. If φ is indefinite the characteristic cones are real then the equation $\varphi = \sum_{i,j}^3 a_{ij} \delta_i \delta_j$ is _____
 a) elliptic b) hyperbolic c) parabolic d) conoid

UNIT-V

55. The equation $\nabla^2 \Psi = 0$ is known as _____
 a) Poisson's equation b) **Laplace's equation**
 c) potential equation d) elliptic equation
56. The equation $\nabla^2 \Psi = -4\pi\rho$ is known as _____
 a) **poisson's equation** b) laplace's equation
 c) potential euation d) elliptic equation
57. If $\nabla^2 \psi = 0$ is _____ equation.
 a) gravitation b) **laplace's** c) electrostatics d) dielectrics

58. If $H = -grad \psi$ is _____
 a) electrostatics b) **magnetostatics** c) dielectrics d) gravitation
59. If the surface $\psi(x,y,z)=c$ is called _____
 a) **equipotential surface** b) magnetostatics c) dielectrics d) gravitation
60. If $j = -\sigma grad \psi$ is _____ called.
 a) **steady currents** b) electrostatics c) magnetostatics d) equipotential surface
61. If $\mathbf{F} = grad \Psi$ is _____
 a) **gravitation** b) Electrostatics. c) magnetostatics. d) steady currents
62. If there can be no singularities in Ψ except at isolated masses is _____
 a) **Gravitation** b) Electrostatics. c) Magnetostatics d) steady currents
63. If there can be no singularities in Ψ except at isolated charges and dipoles is _____
 a) Gravitation b) **Electrostatics** c) Magnetostatics d) steady current
64. In _____ the function Ψ is constant on any conductor.
 a) Gravitation b) **Electrostatics** c) Magnetostatics. d) steady currents
65. In Elementary solution of laplace equation the solution corresponding to a surface S carrying an electric charge of density σ is _____
 a) $\Psi(\mathbf{r}) = \int_s \frac{\sigma(\mathbf{r}')dS'}{|\mathbf{r}-\mathbf{r}'|}$ b) $\Psi(\mathbf{r}) = \int_s \frac{\sigma(\mathbf{r}')dr'}{|\mathbf{r}-\mathbf{r}'|}$ c) $\Psi(\mathbf{r}) = \int_s \frac{\sigma(\mathbf{r}')dS'}{|\mathbf{sr}-\mathbf{r}'|}$ d) $\Psi(\mathbf{r}) = \int_s \frac{\sigma(\mathbf{r})dS'}{|\mathbf{r}-\mathbf{r}'|}$
66. If _____ is called a family of equipotential surfaces.
 a) $f(x, y, z) = 0$ b) $\Psi(x, y, z) = 0$ c) $f(x', y', z') = c$ d) $\Psi(x, y, z) = c$
67. If $\Psi = A \int e^{-\int x(f)df} df + B$ is the equation of _____
 a) steady flow of heat b) surface Waves on a Fluid
 c) **family of equipotential surfaces** d) irrotational motion of a perfect fluid
68. The Helmholtz's equation is _____.
 a) $(\nabla^2 + k^2)\Psi = 0$ b) $(\nabla^2 - k^2)\Psi = 0$
 c) $\nabla^2 + k^2 = 0$ d) $\nabla^2 - k^2 = 0$

SECTION-B

(2 Marks)

UNIT-I

1. Eliminate the constants a and b from the equation $(x+a)(y+b)=z$.
2. Define complete solution.

3. Eliminate the constants a and b from the equation $ax^2+by^2+z^2=1$
4. Define lagrange's equation.
5. Define compatible.
6. Define complete.
7. Define complete integral.
8. Define general integral.
9. Define tangent element.
10. Define elementary cone.
11. Define characteristic type.
12. Define strip.
13. Define integral element.
14. Along every characteristic strip equation $F(x, y, z, p, q)$ is a constant.

UNIT-II

15. Write compatible equation.
16. Check whether the given equations $xp = yq$ and $z(xp + yq) = 2xy$ are compatible. Find a complete integral of the equation $pq = 1$
17. Find a complete integral of the equation $p^2y(1+x^2) = qx^2$
18. Find a complete integral of the equation $p+q = pq$
19. Find a complete integral of the equation $zpq = p+q$
20. Find a complete integral of the equation $pqz = p^2(xq+p^2) + q^2(yq+p^2)$
21. Write charpit's equation.
22. Define complete integral.

UNIT-III

23. Eliminate the function f and g from the equation $z = f(x + ay) + g(x - ay)$.
24. If $u = f(x + iy) + g(x - iy)$ where the function f and g are arbitrary then show that
- $$\frac{\partial^2 y}{\partial x^2} + \frac{\partial^2 y}{\partial y^2} = 0.$$
25. Define reducible and irreducible
26. If u is the complementary function and z is a particular integral of the linear PDE then $u + v$ is the general solution of the equation.
27. If u_1, u_2, \dots, u_n are solutions of the homogenous linear PDE is $F(D, D')z = 0$ then $\sum_{r=1}^n c_r u_r$ where c_r 's are the arbitrary constant is also a solution.
28. Find the P.I of the equation $(D^2 - D')z = 2y - x^2$.
29. Solve the equation $r + s - 2t = e^{x+y}$.
30. Prove that if u is the complementary function and z_1 a particular integral of a linear PDE then $u + z_1$ is a general solution of the equation.
31. Find the P.I of $(D^2 - D')z = e^{x+y}$.

UNIT-IV

32. Define characteristic Curve of second order PDE?
33. Define Characteristic Curve?
34. Define Conoid?
35. Define Characteristic Cone?
36. Define Characteristic Surface?
37. Define the initial condition of first kind?
38. Write the four properties for the function $w(x, y, \varepsilon, \eta)$?
39. Define Separable?
40. Find the solution of the equation $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{1}{k} \frac{\partial z}{\partial t}$?

UNIT-V

41. Define Gravitation.
42. Define the conditions of surface Waves on a Fluid.
43. Define the conditions of Magnetostatics.
44. Define the conditions of steady flow of heat.
45. Define dielectrics.
46. Write the conditions of steady currents.
47. Write any four conditions of Electrostatics.
48. Write the conditions of irrotational motion of a perfect fluid.
49. State two occurrence of wave equation in physics.
50. Give the application of wave equation in transverse vibrations of the string.
51. Define Helmholtz's equation.
52. Give the application of wave equation in electric signals in cables.

SECTION-C

(6 Marks)

UNIT-I

1. Find the solution of $x(x^2+3y^2)p-y(3x^2+y^2)q=2z(y^2-x^2)$
2. Find the general solution of $px(x+y)=qy(x+y)-(x-y)(2x+2y+z)$
3. Find the general integral of $px(x+y)=qy(x+y)-(x-y)(2x+2y+z)$
4. Find the general integral of $x(x^2+3y^2)p-y(3x^2+y^2)q=2z(y^2-x^2)$
5. Find the surface which intersect the surface of the system $z(x+y)=c(3z+1)$ orthogonally and which pass through the circle $x^2+y^2=1, z = 1$
6. Find the equation of the system of surfaces which cut orthogonally the cones $x^2+y^2+z^2=cxy$.
7. Verify that $z=ax+by+a+b-ab$ is a complete integral of the partial differential equation $z=px+qy+p+q-pq$ where a and b are arbitrary constants. Show that the envelope of all planes corresponding to complete integrals provides a singular solution of the differential equation and determine a general solution by finding the envelope.

8. Verify that $(x-a)^2+(y-b)^2+z^2=1$ is a complete integral of the partial differential equation $z^2(1+p^2+q^2)=1$ also find the general and singular integrals.
9. Cauchy's method of solving non-linear equation.
10. Integrate the equation for the characteristic of the equation $p^2+q^2=4z$. Expressing x,y,z and p in terms of q and then find the solution of this equation which reduces to $z=x^2+1$ when $y=0$.
11. Determine the characteristic of the equation $z=p^2-q^2$ and find the integral surface which passes through the parabola $4z+x^2=0, y=0$.

UNIT-II

12. Show that the equations $f(x,y,z,p,q) = 0, g(x,y,z,p,q) = 0$ are compatible if

$$\frac{\partial(f,g)}{\partial(x,p)} + \frac{\partial(f,g)}{\partial(y,q)} = 0. \text{ Verify that the equations } p = P(x,y), q = Q(x,y) \text{ are compatible if } \frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}.$$

13. Find a complete integral of the equation $p^2z^2 + q^2 = 1$.
14. Find a complete integral of the equation $p + q = pq$.
15. Find a complete integral of the equation $p = p^2 - q^2$.
16. Find a complete integral of the equation $p = (z + qy)^2$
17. Derive Charpit's equation.
18. Find the complete integral of the equation $z^2 = pqxy$.
19. Show that the only integral surface of the equation $2q(z - px - qy) = 1 + q^2$ which is circumscribed about the paraboloid $2x = y^2 + z^2$ is the enveloping cylinder which touches it along its section by the plane $y+1 = 0$.

UNIT-III

20. If $(\alpha_r D + \beta_r D' + \gamma_r)$ is factor of $F(D, D')$ and $\phi_r(\epsilon)$ is an arbitrary function of a single variable ϵ then, if $\alpha_r \neq 0, u_r = \exp\left(-\gamma_r \frac{x}{\alpha_r}\right) \phi_r(\beta_r x - \alpha_r y)$ a soln of equation $F(D, D')z = 0$.
21. Solve the equation $\frac{\partial^4 z}{\partial x^4} + \frac{\partial^4 z}{\partial y^4} = 2 \frac{\partial^4 z}{\partial x^2 \partial y^2}$
22. S.T the equation $\frac{\partial^2 y}{\partial t^2} + 2k \frac{\partial y}{\partial t} = c^2 \frac{\partial^2 y}{\partial x^2}$ passes the solution of the form $c_r e^{-kt} \cos(\alpha_r x + \epsilon r)$ where c_r, α_r, δ_r are constants and $wr^2 = \alpha_r^2 c^2 - k^2$
23. Find the solution of the equation $\nabla_1^2 z = e^{-x} \cos y$ which tends to zero as $x \rightarrow \infty$.

24. Show that f and g are arbitrary function of a single variable then

$u = f(x - vt + i\alpha y) + g(x - vt - i\alpha y)$ is a solution of the equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = \frac{1}{c^2} \cdot \frac{\partial^2 u}{\partial t^2}$ provided that $\alpha^2 = 1 - v^2/c^2$.

25. Verify the PDE $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = 2z/x^2$ is satisfied by $z = \frac{1}{x} \phi(y - x) + \phi'(y - x)$ where ϕ is an arbitrary function

26. Reduce the equation $(n-1)^2 \frac{\partial^2 z}{\partial x^2} \cdot y^{2n} \frac{\partial^2 z}{\partial y^2} = ny^{2n-1} \frac{\partial z}{\partial y}$

27. Reduce the equation $\frac{\partial^2 z}{\partial x^2} = x^2 \frac{\partial^2 z}{\partial y^2}$.

28. Find the P.I of $(D^2 - D')z = A \cos(lx + my)$ where A, l, m , are constant.

UNIT-IV

29. Explain the Cauchy problem for second order PDE?

30. Derive the characteristic base curve of second order PDE?

31. Show that the characteristics of the equation $Rr + Ss + Tt = f(x, y, z, p, q)$ are invariant with respect to any transformations of the independent variables?

32. Classify the equations $u_{xx} + u_{yy} = u_z$?

33. Classify the equations $u_{xx} + u_{yy} = u_{zz}$?

34. Determine the solution of the equations $s = f(x, y)$ which satisfies the boundary conditions z and q prescribed on a curve C ?

36. Define Riemann – Green function?

37. Give an example for Separation of variable?

UNIT-V

38. Write the conditions of gravitation and irrotational motion of a perfect fluid

39. Write the conditions of electrostatics and Magnetostatics.

40. Write the conditions of steady currents, surface Waves on a Fluid and steady flow of heat.

41. Derive families of equipotential surfaces

42. Find the distribution which gives rise to the potential $\Psi = \begin{cases} a^2 - 3x^2 & r < a \\ \frac{a^5(y^2+z^2-2x^2)}{r^5} & r > a \end{cases}$ where $r^2 = x^2 + y^2 + z^2$.
43. If $\rho > 0$ and $\Psi(r)$ is given by $\Psi(r) = \int_v \frac{\rho(\vec{r}')}{|\vec{r}-\vec{r}'|} dr'$ where the volume V is bounded prove that $\lim_{r \rightarrow \infty} r\Psi(r) = M$ where $M = \int_v \rho(\vec{r}') dr'$
44. Show that surfaces $x^2 + y^2 + z^2 = cx^{\frac{2}{3}}$ can form a family of equipotential surfaces, and find the general form of the corresponding potential function.
45. Show that the surfaces $(x^2 + y^2)^2 - 2a^2(x^2 - y^2) + a^4 = c$ can form a family of equipotential surfaces, and find the general form of the corresponding potential functions.
46. State the occurrence of elastic waves in solids.
47. State the occurrence of sound waves in space.
48. Derive d'Alembert's solution of the one-dimensional wave equation.

SECTION-D

(10 Marks)

UNIT-I

- Find the solution of
 - $y^2p - xyp = x(z - 2y)$
 - $(y + zx)p - (x + yz)q = x^2 - y^2$
- The general solution of the partial differential equation $Pp+Qq=R$ is $F(u,v)=0$.
- The general solution of partial differential equation $Pp+Qq=R$ is $F(u,v)=0$ where F is an arbitrary function and $u(x,y,z)=c_1, v(x,y,z)=c_2$ form the solution of the equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ which is an auxiliary equation for the given linear Partial Differential Equation.
- Find the surface which is orthogonal to the one parameter system $z = cxy(x^2+y^2)$ and which passes through the hyperbola $x^2-y^2=a^2, z = 0$.
- Find the solution of the equation $z = \frac{1}{2}(p^2 + q^2) + (p - x)(q - y)$ which through the x-axis.
- Find the characteristic of the equation $pq-z$ and determine the integral surface which passes through the parabola $x=0, y^2=z$.
- Verify that the equation
 - $z = \sqrt{2x+a} + \sqrt{2y+b}$

- b) $z^2 + \mu = 2(1 + \lambda^{-1})(x + \lambda y)$ are both complete integral of the partial differential equation $z = \frac{1}{p} + \frac{1}{q}$ show further that the complete integral (b) is the envelope of the one parameter subsystem obtained by taking $b = -\frac{a}{\lambda} - \frac{\mu}{1+\lambda}$.

UNIT - II

8. Derive compatible system of first order equation.
9. Show that the equation $xp = yq$, $z(xp + yq) = 2xy$ are compatible and solve them.
10. Show that the equations $xp - yq = x$, $x^2 p + q = xz$ are compatible and find the solution.
11. Show that the equation $f(x, y, p, q) = 0 = g(x, y, p, q)$ are compatible then to prove $\frac{\partial(f,g)}{\partial(x,p)} + \frac{\partial(f,g)}{\partial(y,q)} = 0$ verify that the equations $p = P(x, y), q = Q(x, y)$ are compatible if $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$.
12. Find the complete integral of the equation $(p^2 + q^2)y = qz$.
13. Find the complete integral of the equation $p^2 x + q^2 y = z$.
14. Find a complete integral of the partial differential equation $(p^2 + q^2)x = pz$ and deduce the solution which passes through the curve $x = 0, z^2 = 4y$.
15. Show that the equation $xpq + yq^2 = 1$ has complete integrals (a) $(z+b)^2 = 4(ax+y)$
(b) $kx(z+h) = k^2y + x^2$ and deduce (b) from (a).

UNIT-III

16. Derive the origin of second order equation
17. If $(\alpha_r D + \beta_r D' + \gamma_r)^n$, $(\alpha_r \neq 0)$ is a factor of $F(D, D')$ and if the function $\varphi_{r_1}, \varphi_{r_2} \dots \dots \varphi_{r_n}$ are arbitrary then prove that $e^{-\frac{\gamma_r x}{\alpha_r}} \sum_{s=1}^n x^{s-1} \varphi_{r_s} (\beta_r x - \alpha_r y)$ is a solution of $F(D, D')z = 0$.
18. If $(\alpha_r D + \gamma_r)^n$ is a factor of $F(D, D')$ and if the functions $\varphi_{r_1}, \varphi_{r_2}, \dots, \varphi_{r_n}$ are arbitrary then $\exp\left(-\gamma_r \frac{y}{\beta_r}\right) \cdot \sum_{s=r}^n y^{s-1} \varphi_{r_s} (\beta_r x)$ is a solution of $F(D, D')z = 0$.
19. Reduce the equation $\frac{\partial^2 z}{\partial x^2} + 2\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = 0$ to canonical form and hence solve it.
20. Reduce the equation $\frac{\partial^2 z}{\partial x^2} = x^2 \frac{\partial^2 z}{\partial y^2}$

21. Prove that the one dimensional wave equation $\frac{\partial^2 z}{\partial x^2} = \frac{\partial^2 z}{\partial y^2}$ is hyperbolic with canonical form $\frac{\partial^2 z}{\partial u \partial v} = 0$.

22. Find the solution of the equation $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = x - y$.

23. Reduce the equation $\frac{\partial^2 z}{\partial x^2} + x^2 \frac{\partial^2 z}{\partial y^2} = 0$ to canonical form.

UNIT – IV

24. Explain Characteristic Curves of second order equation?

25. Determine characteristic of equation in three variables?

26. Explain Riemann method of solution of linear hyperbolic equation of second order?

27. Illustrate the method of finding the solution of second order linear PDE?

28. Show that $\int_v \frac{dr'}{|r-r'|} \leq 2\pi \left(\frac{3V}{4\pi}\right)^{\frac{2}{3}}$ irrespective of whether the point with position vector \vec{r} is inside or outside the volume V or on the surfaces bounding it.

UNIT-V

29. Derive elementary solutions of Laplace's equation.

30. Derive families of equipotential surfaces.

31. If $\rho > 0$ and $\Psi(r)$ is given by $\Psi(r) = \int_v \frac{\rho(\vec{r}')}{|\vec{r}-\vec{r}'|} dr'$ where the volume V is bounded prove that

$$\lim_{r \rightarrow \infty} r\Psi(r) = M \text{ where } M = \int_v \rho(\vec{r}') dr'$$

32. Show that surfaces $x^2 + y^2 + z^2 = cx^{\frac{2}{3}}$ can form a family of equipotential surfaces, and find the general form of the corresponding potential function.

33. Show that the family of right circular cones $x^2 + y^2 = cz^2$ where c is a parameter, forms a set of equipotential surfaces, and show that the corresponding potential function is of the form

$$A \log \tan \frac{1}{2} \theta + B \text{ where A and B are constants and } \theta \text{ is the usual polar angle.}$$

34. Summarize the relations in some of the branches in physics in which the field equations can be reduced to Laplace equation.
35. Show that the velocity potential $\Psi = \frac{1}{2}Va^3r^{-2} \cos \theta$ satisfies all the conditions associated with the rectilinear motion of a sphere of radius a moving through a perfect incompressible fluid which is moving irrotationally and is at rest at infinity.
36. By applying Green's theorem in the above form to the region between an equipotential surface S and the infinite sphere with $\Psi' = |r - r'|^{-1}$ and Ψ the potential of the whole distribution of matter, prove that the potential inside S due to the joint effects of Green's equivalent layer and the original matter outside S is the constant potential of S .
37. State the Occurrence of Wave Equation in Physics.
38. Evaluate the elementary solutions of the one-dimensional wave equation.
39. The points of trisection of a string are pulled aside through a distance ε on opposite sides of the position of equilibrium, and the string is released from rest. Derive an expression for the displacement of the string at any subsequent time and show that the mid-point of the string always remains at rest.

QUESTION BANK

II M.Sc. Mathematics

Core V

Research Methodology

Sub. Code: 21PMAC35

Semester III – (November)

Section A

Unit I

1. Pick out the wrong one. The research is
 - (a) Systematic and scientific search
 - (b) Collecting data
 - (c) Formulating hypothesis
 - (d) **Unsystematized efforts of gaining knowledge**
2. *Ex post facto studies* involves in
 - (a) Analytical research
 - (b) **Descriptive research**
 - (c) Quantitative research
 - (d) Motivational research
3. The purpose of _____ is to create a data base.
 - (a) **Inferential approach**
 - (b) Experimental approach
 - (c) Simulation approach
 - (d) Qualitative approach
4. Prognosis means
 - (a) investigation of economic structure
 - (b) diagnosis of events
 - (c) business decisions
 - (d) **the prediction of future developments**
5. The number of methods involved in library type
 - (a) 1
 - (b) **2**
 - (c) 3
 - (d) 4
6. Research is the systematic approach concerning of a theory.
 - a) **Formulation**
 - b) advancement
 - c) contribution
 - d) collecting
7. To test a hypothesis of a causal relationship between variables is known as
 - a) Diagnostic
 - b) **hypothesis testing**
 - c) formulative
 - d) descriptive
8. In research, the researchers uses already available facts and data.
 - a) Descriptive
 - b) formulative
 - c) **analytical**
 - d) systematic
9. is important in the behavioral sciences.
 - a) Descriptive
 - b) **qualitative**
 - c) analytical
 - d) systematic
10. Opinion research is also known as
 - a) Quantitative
 - b) Qualitative
 - c) **Attitude**
 - d) systematic

Unit II

11. The _____ to be used must be decided by the researcher taking into consideration the nature of the inquiry and other related factors.

- (a) **sample design** (b) Tabulation (c) interpretation (d) enumeration
12. _____ is a part of the technical procedure wherein the classified data are put in the form of tables.
 (a) sample design (b) **Tabulation** (c) interpretation (d) enumeration
13. In sampling the cost of taking random samples from individual strata is often so expensive.
 (a) systematic (b) **stratified** (c) Quota (d) sequential
14. Who correctly states that the statement of the objective is of basic importance.
 (a) Redman (b) Mory (c) Clifford Woody (d) **W.A. Neiswanger**
15. _____ sampling is also known as purposive sampling.
 (a) simple random (b) cluster (c) Quota (d) **deliberate**
16. _____ sampling is quite close to cluster sampling.
 (a) Quota (b) **area** (c) sequential (d) systematic
17. "In collection of statistical data commonsense is the chief requisite and experience the chief teacher" said by _____.
 (a) Clifford Woody (b) W.A. Neiswanger (c) Redman (d) **A.L. Bowley**
18. If the researcher had no hypothesis to start with he might seek to explain his findings on the basis of some theory. This is known as _____.
 (a) **interpretation** (b) generalization (c) analysis (d) enumeration
19. _____ is very important step in the research process.
 (a) formulating the research problem (b) development of working hypothesis
 (c) **execution of the project** (d) analysis of data
20. A complete enumeration of all the items in the population is known as _____ inquiry.
 (a) analysis (b) population (c) complete (d) **census**

Unit III

21. Text books are examples of _____ of information.
 (a) primary sources (b) secondary sources (c) **tertiary sources** (d) none
22. A _____ is something like an architect's plan.
 (a) **research proposal** (b) Assignment (c) data collection (d) formatting
23. _____ of information are summaries of information gathered from primary sources.
 (a) primary sources (b) **secondary sources** (c) tertiary sources (d) none
24. _____ text means have straight edges on both left and right sides.
 (a) Align left (b) Align right (c) Center (d) **Justify**
25. The body of the text is normally _____ spaced.
 (a) single (b) **double** (c) triple (d) one and a half

26. _____ headings are used for major chapter divisions.
(a) **Centered** (b) Chapter (c) Side (d) Paragraph
27. The usual margin recommended at the left of the page is _____ cm.
(a) 1 (b) 2 (c) 3 (d) **4**
28. Chapter number is usually placed about _____ cm from the top of the page.
(a) 3 (b) 4 (c) **5** (d) 6
29. _____ sources of information are summaries of information gathered from primary sources.
(a) primary sources (b) **secondary sources** (c) tertiary sources (d) none
30. Line space between chapter number and chapter title.
(a) single (b) **double** (c) triple (d) one and a half
31. _____ single space separates the centered heading from text above and below.
(a) one (b) two (c) **three** (d) one and a half
32. Page numbers are positioned approximately _____ cm from the bottom of the page.
(a) 1 (b) **1.5** (c) 2 (d) 2.5
33. The length of the abstract may be _____ words.
(a) 100 (b) **200** (c) 300 (d) 400
34. _____ single space normally separate the side heading from the text above.
(a) one (b) two (c) **three** (d) one and a half
35. The usual margin recommended are _____ cm at the top of the page.
(a) 1 (b) 1.5 (c) 2 (d) **2.5**
36. The wider margin at the _____ is to allow for binding.
(a) **left** (b) right (c) top (d) bottom

Unit IV

37. _____ section containing details of works consulted or referred to during a study.
(a) Preliminaries (b) Abstract (c) Introduction (d) **Reference**
38. The heading bibliography is then used in place of _____.
(a) Preliminaries (b) Abstract (c) Introduction (d) **Reference**
39. _____ make light work of much of the careful checking necessary in the final draft of a paper.
(a) **Word processors** (b) Spelling checker (c) Dictionary (d) none
40. _____ will detect most spelling and typographical errors.
(a) **Word processors** (b) **Spelling checker** (c) Dictionary (d) none

Unit V

41. The _____ states the results as fully as possible in a brief presentation.
(a) preliminaries (b) **abstract** (c) introduction (d) reference
42. The first section of the paper is _____.
(a) preliminaries (b) abstract (c) **introduction** (d) reference
43. Words being defined should be distinguished by _____.
(a) uppercase (b) **italics** (c) underline (d) text effect
44. The _____ should contain the *concluding remarks* or key conjectures.
(a) preliminaries (b) abstract (c) **introduction** (d) reference
45. We can avoid placing two formulas consecutively, separated only by a _____.
(a) **comma** (b) colon (c) semicolon (d) hyphen
46. _____ cannot be compared with notation via a relational symbol.
(a) **Words** (b) Definitions (c) symbols (d) none

Section B

Unit I

1. Define Research.
2. What are the objectives of Research?
3. Define Diagnostic Research Studies.
4. What is hypothesis testing.
5. Differentiate Descriptive and analytical research studies.
6. Define case study.
7. Define stimulation approach.
8. What are the significance of Research?
9. Define Research Methods.
10. Define Research Methodology.
11. How do Research and scientific methods are related?
12. Discuss about the different groups of Research Methods.

Unit II

13. Define multi stage random sampling.
14. Define interpretation.
15. What is quota sampling?
16. Define research process.
17. Draw the flow chart for research process.

18. Define systematic sampling.
19. Define stratified sampling.
20. Define sequential sampling.
21. Define cluster sampling.
22. Define area sampling.

Unit III

23. Write criteria for selecting a topic.
24. Write the elements of qualitative studies.
25. How do you organize a research proposal?
26. Define pagination.
27. Discuss the procedure to write an abstract for a thesis.
28. Name the three main sections of a thesis.
29. Explain – Centred headings.
30. What are primary sources?
31. Write a short note on data storage and retention.
32. How do you write an abstract for the thesis.

Unit IV

33. Write the checklist for quotations.
34. Write the checklist for headings and subheadings.
35. Write the functions of word processors and spelling checker.
36. Write the checklist for tables.
37. Write the check list for referencing.
38. Write the checklist for footnotes.
39. Write the checklist for figures
40. What is plagiarism.

Unit V

41. Discuss - “suppose” vs “suppose that”.
42. Write the condition for separation of formulas in writing a thesis.
43. Write the condition for using “such that” and “so that” in thesis.
44. Write any two points in mathematical English for non-native speakers.
45. Write the condition for using “pairwise” and “mutually” in thesis.
46. Write a note on universal quantifiers.
47. Discuss operators vs constants.
48. Write the condition for using “maximal” and “maximum” in thesis.

Section C

Unit I

1. Discuss about the importance of Research.
2. Compare Quantitative and Qualitative Research.
3. Discuss about some other types of Research.
4. What are Research approaches?
5. Write the significance of Research.
6. Discuss about Operation Research and Market Research.
7. What is the difference between Research Methods and Research Methodology?
8. What are the basics postulates of Scientific Methods?

Unit II

9. Write the methods of collecting data in the case of a survey.
10. How do you prepare the report or thesis?
11. How do you formulate the research problem.
12. Explain – Analysis of data.
13. Write a short summary on criteria of good research.
14. Explain some important sample designs.

Unit III

15. Explain briefly about the criteria for selecting a topic.
16. Explain – primary, secondary and tertiary sources.
17. Write the contents of a research proposal.
18. Write the procedures in data storage and retention.
19. Write a summary on the elements of Quantitative studies.
20. Write a summary on the elements of Qualitative studies.
21. Write briefly about the different level of heading.
22. Write the general format for the different types of headings.
23. Write the formatting and style related to margins, spacing, pagination, paragraph indentation and justification.

Unit IV

24. Write the checklist for tables.
25. Write the checklist for general format.
26. Write the checklist for appendices.
27. Write the checklist for evaluating empirical / experimental research studies.

28. Write the checklist for evaluating analytical / literary research studies.
29. Write the checklist for quotations and tables.
30. Write the checklist for headings and subheadings.
31. Write the check list for referencing.
32. Write the checklist for footnotes and figures.
33. Analyze the way of preventing plagiarism when writing a research article?

Unit V

34. Write the usage of English in Mathematical writing.
35. Explain the mathematical English for non-native speakers.
36. Explain any ten Terminology, Notation especially in discrete mathematics.
37. Write any ten mathematical style in writing a thesis.

Section D

Unit I

1. Explain the different types of Research.
2. What are the types, methods and techniques used in the research methodology.
3. Write a note on Research Methodology.
4. What is the Role of Research in day today life.

Unit II

5. Write a short summary on criteria of good research.
6. Draw the flow chart of research process and explain any four steps.
7. Explain some important sample designs.
8. Write the methods of collecting data in the case of a survey.
9. How do you formulate the research problem.
10. Explain – Analysis of data.

Unit III

11. Write an essay on the general format of a thesis.
12. Write a summary on the page and chapter format.
13. Write an essay on planning the thesis.
14. Write a summary on the elements of Quantitative studies.
15. Write a summary on the elements of Qualitative studies.
16. Write the general format for the different types of headings.

Unit IV

17. Write an essay on editing and evaluating the final product.
18. Write the checklist for evaluating empirical / experimental research studies.
19. Write the checklist for evaluating analytical / literary research studies.
20. Categorize the different types of plagiarism.

Unit V

21. Explain any ten Terminology, Notation especially in discrete mathematics.
22. Write any ten mathematical style in writing a thesis.
23. Write the usage of English in Mathematical writing.
24. Explain the mathematical English for non-native speakers.

QUESTION BANK

II M.Sc Mathematics

Subject Code: 21PMAE31

Semester III

Core Elective – Fluid Mechanics

Section A

Unit I

- _____ is the branch of science that deals with the behaviour of fluids at rest.
(a) Fluid Kinematics (b) **Fluid Statics**
(c) Fluid Dynamics (d) Fluid Mechanics
- _____ is a dimensionless quantity.
(a) **Specific gravity** (b) Specific volume
(c) Specific weight (d) Weight density
- _____ affects the viscosity.
(a) Density (b) Pressure (c) **Temperature** (d) Force
- A fluid which possess viscosity is known as _____.
(a) Ideal Plastic fluid (b) Newtonian fluid
(c) Ideal fluid (d) **Real fluid**
- The bulk modulus of elasticity in adiabatic condition is _____.
(a) $E = \rho p$ (b) **$E = kp$** (c) $E = \omega p$ (d) $E = p$
- Rise or fall of a liquid in a capillary tube is caused by _____.
(a) Gravity (b) **Surface tension** (c) Acceleration (d) Viscosity
- The ratio of compressive stress to volumetric strain is called _____.
(a) tangential stress (b) **Bulk modulus of elasticity**
(c) pressure (d) Compressibility
- The surface tension on a hollow bubble is _____.
(a) **$pd/8$** (b) $pd/4$ (c) $pd/2$ (d) $pd/16$
- _____ is due to cohesion between particles at the surface.
(a) Capillarity (b) **Surface Tension** (c) Viscosity (d) Bulk Modulus
- _____ is the reciprocal of mass density.
(a) Specific weight (b) Specific gravity (c) **Specific volume** (d) Relative density

Unit II

- _____ states fluid pressure is transmitted with equal intensity in all directions
(a) Newton (b) Gauss (c) Einstein (d) **Pascal**
- The pressure at any point in a fluid at rest is obtained by _____.
(a) Pascals law (b) **Hydrostatic law** (c) Law of action (d) Universal gas law
- _____ is the pressure below atmospheric pressure.
(a) Gage pressure (b) absolute vacuum
(c) absolute pressure (d) **vacuum pressure**

14. _____ is used for measuring gauge pressure.
 (a) Barometer (b) **Piezometer**
 (c) U-tube Manometer (d) Inverted U-tube Manometer
15. _____ are the devices used for measuring the difference of pressures between two points in a pipe.
 (a) Simple manometer (b) **Differential manometer**
 (c) Barometer (d) Piezometer
16. For compressible fluids, _____ changes with change of pressure and temperature.
 (a) specific weight (b) **density** (c) specific volume (d) Specific gravity

Unit III

17. If the fluid is at rest then the velocity gradient is _____ zero
 (a) **equal to** (b) greater than (c) less than (d) not equal to
18. In total pressure, the force always acts _____ to the surface.
 (a) perpendicular (b) parallel (c) vertical (d) **normal**
19. The moment of resultant force about an axis is _____ the sum of moments of the components about the same axis.
 (a) **equal to** (b) greater than (c) less than (d) not equal to
20. The horizontal component acts through the _____ of the vertical projection
 (a) centre of gravity (b) **centre of pressure** (c) line of action (d) normal axis
21. I_G is the moment of inertia of the area about its _____ axis
 (a) x axis (b) y axis (c) **centre of gravity** (d) centre of pressure
22. Moment of inertia of a triangle is _____.
 (a) $\frac{bh^3}{12}$ (b) $\frac{bh^3}{24}$ (c) $\frac{bh^3}{36}$ (d) $\frac{bh^3}{48}$

Unit IV

23. _____ are the devices used for changing the water level in a canal or a river for navigation.
 (a) Sluice gates (b) **Lock gates** (c) Grill gates (d) liquid container
24. In the vertical motion of the rotation of fluid, the positive sign is used with constant upward _____.
 (a) velocity (b) **acceleration** (c) gravity (d) angle
25. In the vertical motion of the rotation of fluid, the negative sign is used with constant _____ acceleration
 (a) upward (b) **downward** (c) rightward (d) leftward
26. The free surface of the liquid subjected to constant vertical acceleration is _____.
 (a) parallel (b) inclined (c) vertical (d) **horizontal**
27. The surface of liquid will become _____ plane in horizontal motion.
 (a) curved (b) rotating (c) **inclined** (d) vertical

Unit V

28. In the stability of a submerged body the body's center of gravity must lie _____ the Centre of buoyancy.
 (a) right (b) **below** (c) above (d) left

29. In the stability of a floating cylinder the body's center of gravity must lie _____ the Center of buoyancy.
 (a) right (b) **below** (c) above (d) left
30. The stability of a floating body is determined by the position of _____
 (a) centre of gravity (b) metacenter
 (c) centre of buoyancy (d) metacentric height
31. _____ is defined as the point about which a body starts oscillating when the body is tilted by a small angle.
 (a) **Metacenter** (b) Buoyancy (c) Floatation (d) centric pressure
32. In case of floating body, the weight of the body is _____ the weight of liquid displaced.
 (a) not equal to (b) greater than (c) **equal to** (d) less than

Section B

Unit I

1. Define Fluid Mechanics
3. Define Mass density
4. Define vapour pressure
5. Define bulk modulus of elasticity.
6. Define Specific gravity
7. Define specific volume
8. Define isothermal and adiabatic process
9. State Newtons law of viscosity.
10. Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.

Unit II

11. Define Pressure
12. Define pressure head
13. Define Absolute pressure
14. Define Gauge pressure.
15. Define Manometers
16. Define Mechanical gauges
17. Define Single column manometer
18. Define Differential manometer
19. List the two types of single column manometer.
20. A pipe contains an oil of specific gravity 0.9. A differential manometer connected at the two points A and B shows a difference in mercury level as 15cm. Find the difference of pressure at the two points.

Unit III

21. What are the forces acting on the fluid particle when the velocity gradient is zero?
22. Define total pressure.
23. Define centre of pressure
24. State the principle of moments
25. List the four submerged surfaces.
26. Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of the water.

Unit IV

27. What are Lock gates?

28. What are the important cases for consideration for pressure in a liquid container?
29. What are the forces acting on the liquid container subjected to constant horizontal acceleration?
30. What are the forces acting on the liquid container subjected to constant vertical acceleration?

Unit V

31. Define buoyant force.
32. Define center of buoyancy.
33. Define Metacentre
34. Define Metacentric height
35. Define stable equilibrium
36. Define unstable equilibrium
37. Define neutral equilibrium
38. What is the condition for the stability of a floating cylinder?

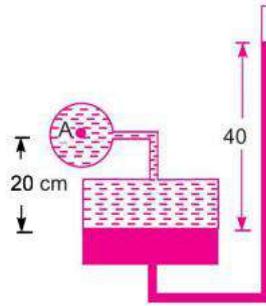
Section C

Unit I

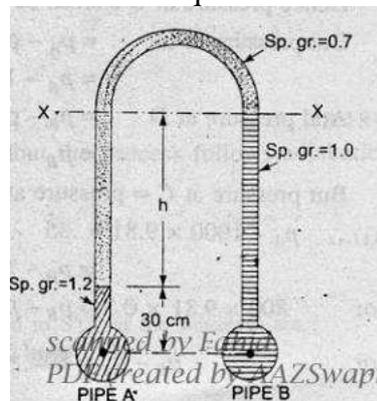
1. Calculate the specific weight, density and specific gravity of one litre of liquid weighs 7 N.
2. Explain viscosity and kinematic viscosity
3. List and explain the types of fluids.
4. Determine the intensity of a shear of an oil having viscosity = 1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm and its journal bearing. The clearance is 1.5 mm and the shaft rotates at 150 r.p.m.
5. The space between two square flat parallel plates is filled with oil. Each side of the plate is 60cm. The thickness of the oil film is 12.5mm. The upper plate which moves at 2.5 metre per sec requires a force of 98.1 N to maintain the speed. Determine
 - (i) the dynamic viscosity of the oil in poise
 - (ii) the kinematic viscosity of the oil in stokes if the specific gravity of the oil is 0.95.
6. A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12 Nm is required to rotate the inner cylinder at 100 r.p.m. Determine the viscosity of the fluid.
7. An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of the shaft is 0.5 m and it rotates at 200rpm. Calculate the power lost in oil for a sleeve length of 100mm. the thickness of oil film is 1.0 mm.
8. Derive the relation between Bulk modulus and pressure for a gas.

Unit II

9. State and explain Pascals law.
10. State and explain Hydrostatic law.
11. A hydraulic press has a ram of 20cm diameter and a plunger of 3 cm diameter. It is used for lifting a weight of 30 kN. Find the force required at the plunger.
12. What are the gage pressure and absolute pressure at a point 3m below the free surface of a liquid having a density of $1.53 \times 10^3 \text{ kg/m}^3$ if the atmospheric pressure is equal to 750 mm of mercury? The specific gravity of the mercury is 13.6 and density of water 1000 kg/m^3
13. A single column manometer is connected to a pipe containing a liquid of specific gravity 0.9 as shown in the diagram. Find the pressure in the pipe if the area of the reservoir is 100 times the area of the tube for the manometer reading is shown in the diagram. The specific gravity of the mercury is 13.6.



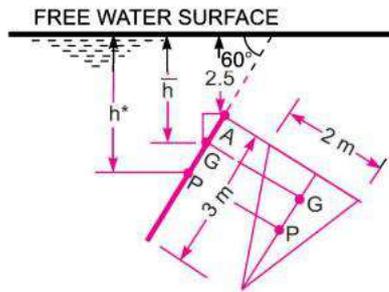
14. Find out the differential reading h of an inverted U-tube manometer containing oil of specific gravity 0.7 as the manometric fluid when connected across pipes A and B as shown in the diagram below conveying liquids of specific gravities 1.2 and 1.0 and immiscible with manometric fluid. Pipes A and B are located at the same level and assume the pressures at A and B are equal.



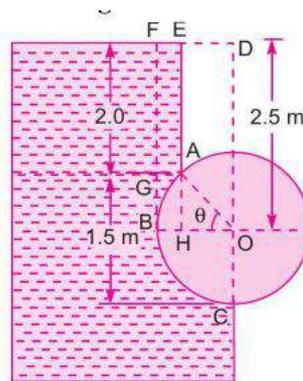
15. An aeroplane is flying at an altitude of 5000 m. Calculate the pressure around the aeroplane, given the lapse rate in the atmosphere is $0.0065^\circ K/m$. Neglect variation of g with altitude. Take pressure and temperature at ground level as 10.143 N/cm^2 and 15°C and density of air as 1.285 kg/cm^3 .

Unit III

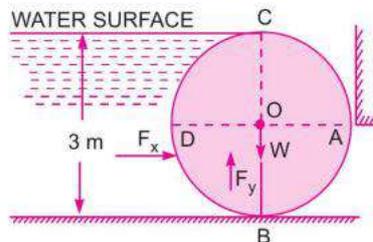
16. A rectangular plane surface is 2m wide and 3m deep. It lies in vertical plane in water. Calculate the total pressure and position of centre of pressure on the plane surface when its upper edge is horizontal and (a) coincides with water surface (b) 2.5m below the free water surface.
17. A tank contains water upto a height of 0.5m above the base. An immiscible liquid of specific gravity 0.8 is filled on the top of water upto 1m height. Calculate
- total pressure on one side of the tank
 - the position of centre of pressure for one side of the tank which is 2m wide.
18. Find the total pressure and position of centre of pressure on a triangular plate of base 2m and height 3m which is immersed in water in such a way that the plane makes an angle of 60° with the free surface of the water. The base of the plate is parallel to water surface and at a depth of 2.5 m from water surface.



19. The diagram shows the cross section of a tank full of water under pressure. The length of the tank is 2m. An empty cylinder lies along the length of the tank on one of its corner as shown. Find the vertical component force acting on the curved surface ABC of the cylinder.

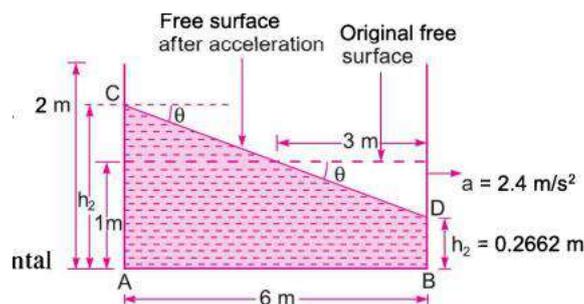


20. A cylinder 3m in diameter and 4m long retains water on one side. The cylinder is supported as shown in the diagram. Determine the horizontal reaction at A and the vertical reaction at B. The cylinder weighs 196.2 kN. Ignore friction.



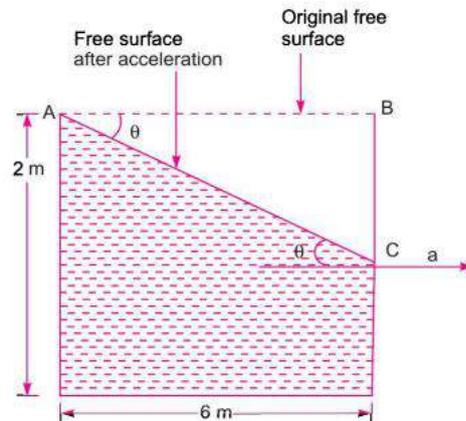
Unit IV

21. A rectangular tank is moving horizontally in the direction of its length with a constant acceleration of 2.4 m/s^2 . The length, width and depth of the tank are 6m, 2.5 m and 2 m respectively. If the depth of the water in the tank is 1 m and the tank is open at the top then calculate
- the angle of the water surface to the horizontal
 - the maximum and minimum pressure intensities at the bottom.



22. A rectangular tank of length 6m, width 2.5 m and height 2m is completely filled with

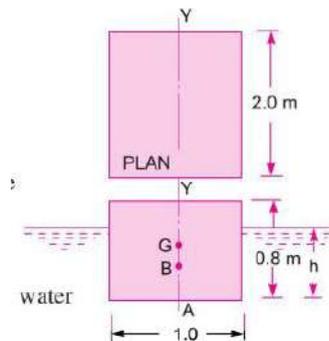
water when at rest. The tank is open at the top. The tank is subjected to horizontal constant linear acceleration of 2.4 m/s^2 in the direction of its length. Find the volume of the water spilled from the tank.



23. Derive the formula for gauge pressure of the liquid container subjected to constant vertical acceleration.
24. A drainage circular pipe of diameter 4m is half full of water at rest. Find the magnitude and line of action of resultant force per metre length that the water exerts on the curved section AB of the pipe.

Unit V

25. A stone weighs 392.4 N in air and 196.2 N in water. Compute the volume of stone and its specific gravity.
26. Find the density of a metallic body which floats at the interface of mercury of specific gravity 13.6 and water such that 40% of its volume is submerged in mercury and 60% in water.
27. A block of wood of specific gravity 0.7 floats in water. Determine the meta centric height of the block if its size 2m x 1m x 0.8 m.



28. A solid cylinder of 10 cm diameter and 40 cm long consist of two parts made of different materials. The first part at the base is 1 cm long and specific gravity 6. The other part of the material is made up of the material having specific gravity 0.6. State , if it can float vertically in water.
29. Discuss the experimental method of determination of meta centric height.

Section D

Unit I

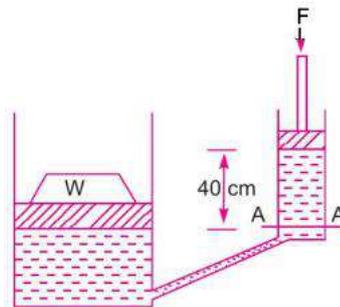
1. If the velocity profile of a fluid over a plate is parabolic with the vertex 20 cm from the plate, where the velocity is 120 cm/sec. Evaluate the velocity gradients and shear stress at a distance of 0, 10 and 20cm from the plate, if the viscosity of the fluid is 8.5 poise.
2. Two large plane surfaces are 2.4 cm apart. The space between the surfaces is filled

with glycerine. Examine force is required to drag a very thin plate of surface area 0.5 square metre between the two large plane surfaces at a speed of 0.6m/s if

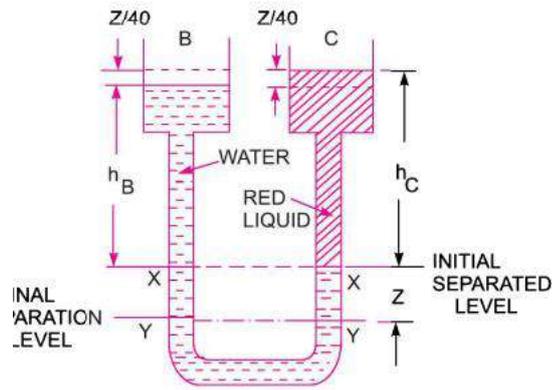
- (i) The thin plate is in the middle of the two plane surfaces
 - (ii) The thin plate is at a distance of 0.8 cm from one of the plane surfaces? Take the dynamic viscosity of glycerine = $8.10 \times 10^{-1} \text{ Ns/m}^2$
3. Explain Surface Tension. Analyze the Surface Tension on (i) liquid droplet (ii) hollow bubble (iii) liquid jet
 4. Define Capillarity. Derive the expression for Capillary rise and Capillary fall.
 5. A vertical gap 2.2 cm wide of infinite extent contains a fluid of viscosity 2 Ns/m^2 and specific gravity 0.9. A metallic plate $1.2 \text{ m} \times 1.2 \text{ m} \times 0.2 \text{ cm}$ is to be lifted up with a constant velocity of 0.15 m/s through the gap. If the plate is in the middle of the gap, find the force required. The weight of the plate is 40 N.

Unit II

6. Calculate the pressure due to a column of 0.3 of (a) water (b) oil of specific gravity 0.8 and (c) mercury of specific gravity 13.6. Take the density of water as 1000 kg/m^3 .
7. The diameter of a small piston and large piston of a hydraulic jack are 3 cm and 10 cm respectively. A force of 80 N is applied on the small piston. Find the load lifted by the large piston if
 - (i) pistons are at the same level
 - (ii) small piston is 40 cm above the large piston. The density of liquid in the jack is 1000 kg/m^3 .

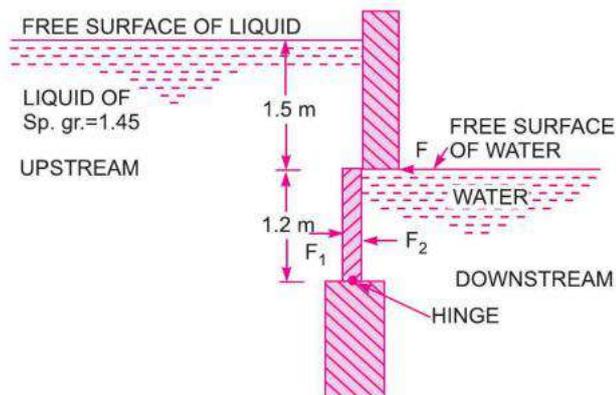


8. A U-tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipe line is reduced to 9810 N/m^2 . Calculate the new difference in the level of mercury. Sketch the arrangements in both the cases.
9. Elaborate in detail about the pressure at a point in compressible fluid for the case adiabatic process.
10. A pressure gage consists of two cylindrical bulbs B and C each of 10 sq. cm cross sectional area, which are connected by a U-tube with vertical limbs each of 0.25 sq.cm cross sectional area. A red liquid of specific gravity 0.9 is filled into C and clear water is filled into B, the surface of separation being in the limb is attached to C. Find the displacement of the surface of separation when the pressure on the surface in C is greater than that in B by an amount equal to 1 cm head of water.

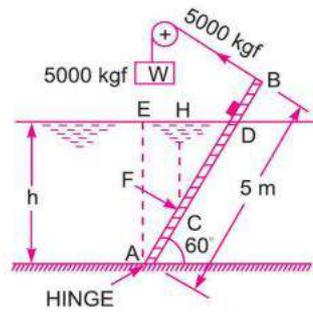


Unit III

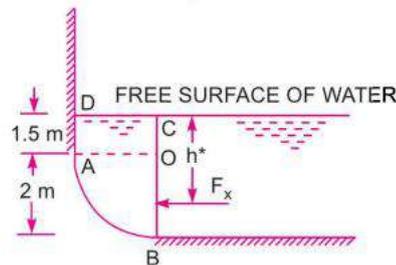
11. A vertical sluice gate is used to cover an opening in a dam. The opening is 2m wide and 1.2m high. On the upstream of the gate, the liquid of specific gravity 1.45 lies upto a height of 1.5m above the top of the gate whereas on the downstream side the water is available upto a height touching the top of the gate. Estimate the resultant force acting on the gate and position of centre of pressure. Find also the force horizontally at the top of the gate which is capable of opening it. Assume that the gate is hinged at the bottom.



12. Derive the total pressure and centre of pressure of the vertical plane surface submerged in liquid
13. Derive the total pressure and centre of pressure of the inclined plane surface submerged in liquid
14. A rectangular gate 5m x 2m is hinged at its base and inclined at 60° to the horizontal as shown in the diagram. To keep the gate in a stable position a counter weight of 5000 kgf is attached at the upper end of the gate as shown in the diagram. Find the depth of the water at which the gate begins to fall. Neglect the weight of the gate and friction at the hinge and pulley.



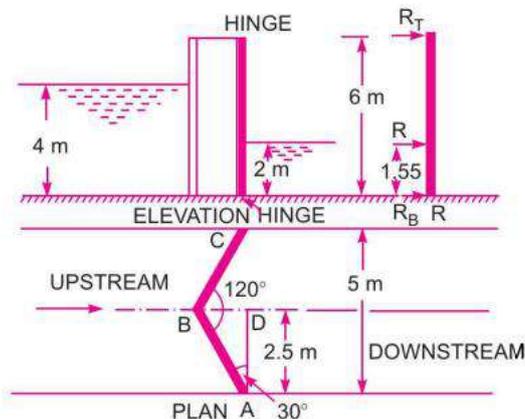
15. Compute the horizontal and vertical components of the total force acting on a curved surface AB which is in the form of a quadrant of a circle of radius 2m. Take the width of the gate as unity.



Unit IV

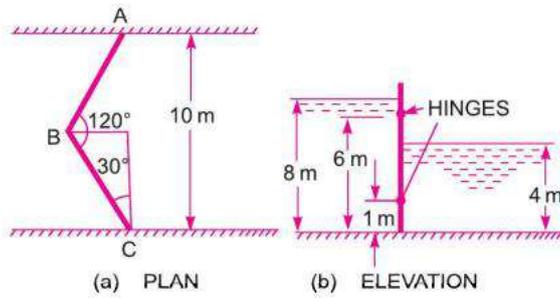
Derive the formula for resultant force and reactions at the top and bottom hinges of lock gates.

Each gate of a lock is 6m high and is supported by two hinges placed on the top and bottom of the gate. When the gates are closed, they make an angle of 120° . The width of the lock is 5m. If the water levels are 4m and 2m on the upstream and downstream sides respectively, determine the magnitude of the forces on the hinges due to water pressure.



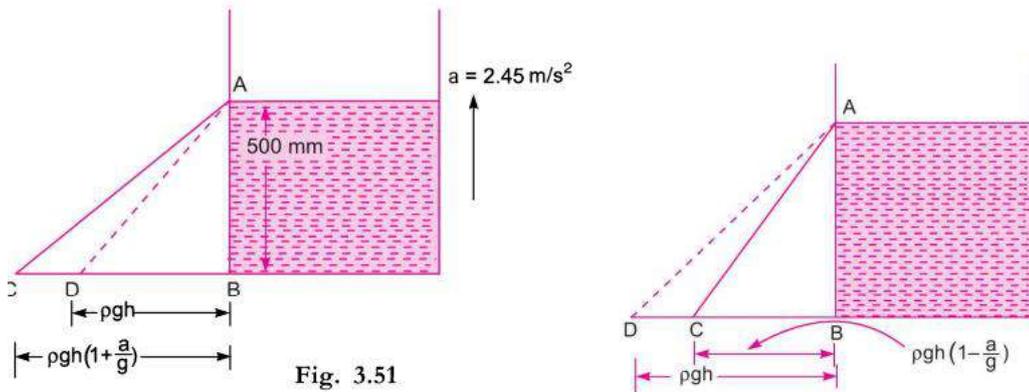
The end gates ABC of a lock are 9m high and when closed include an angle of 120° . The width of the lock is 10m. Each gate is supported by two hinges located at 1m and 6m above the bottom of the lock. The depths of the water on the two sides are 8m and 4m respectively. Find

- Resultant water force on each gate
- Reaction between the gates AB and BC
- Force on each hinge, considering the reaction of the gate acting in the same horizontal plane as resultant water pressure.



Explain in detail about the liquid container subjected to constant horizontal acceleration. A tank containing water up to a depth of 500 mm is moving vertically upward with constant acceleration of 2.45 m/s^2 . Find the force exerted by water on the side of the tank. Also calculate the force on the side of the tank when the width of the tank is 2 m and

- the tank is moving vertically downward with a constant acceleration of 2.45 m/s^2
- the tank is not moving at all.

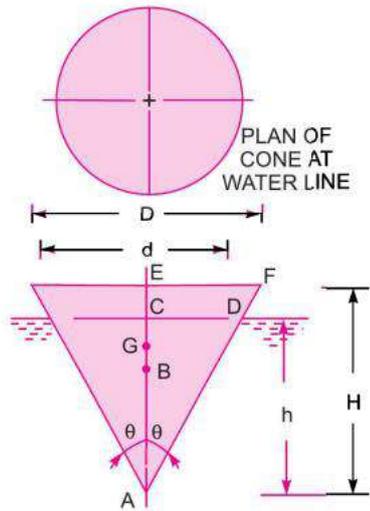


Unit V

Derive the analytical method for meta centric height.

A body has the cylindrical upper portion of 3 m diameter and 1.8 m deep. The lower portion is a curved one, which displaces a volume of 0.6 m^3 of water. The centre of buoyancy of the curved portion is at a distance of 1.95 m below the top of the cylinder. The centre of gravity of the whole body is 1.20 m below the top of the cylinder. The total displacement of the water is 3.9 tonnes. Find the meta centric height of the body. Elaborate in detail about the stability in submerged and floating bodies

A solid cone floats in water with its apex downwards. Determine the least apex angle of the cone for stable equilibrium. The specific gravity of the material of the cone is 0.8.



Find the period of oscillation for a floating body.

ST.MARY'S COLLEGE (Autonomous), THOOTHUKUDI-628001

QUESTION BANK

II M.Sc. Mathematics

Core XV - Complex Analysis

Sub.Code: 21PMAC41

Semester IV – (April)

SECTION –A

UNIT - I

- Cross ratio is _____ under linear transformation.
a) **Invariant** b) unique c) analytic d) bounded
- An arc is a closed curve if the end points _____.
a) continuous b) **differential** c) coincide d) conformal
- The condition of a normalized representation is _____.
a) $ad+bc = 1$ b) $ad-bc = 1$ c) $ad-bc > 1$ d) **$ad-bc \neq 0$**
- The transformation $w = kz$ is called rotation if _____.
a) $|k| = 0$ b) $|k| > 0$ c) $k > 0$ d) $|k| = 1$
- An analytic function degenerates if it reduces to _____.
a) **Constant** b) differential function c) zero d) imaginary
- The change is reversible iff $\varphi(z)$ is _____.
a) Strictly decreasing b) **strictly increasing** c) monotonic decreasing d) monotonic increasing
- A linear transformation carries circles into _____.
a) complex plane b) Jordan arc c) **circles** d) defined region
- A simple arc is also known as _____.
a) opposite arc b) Closed curve c) point curve d) **Jordan arc**
- The length of an infinitesimal line segment at the point z is multiplied by the factor _____.
a) $f(z)$ b) $f'(z)$ c) $|f'(z)|$ d) $|f(z)|$
- The arc is differentiable if $z'(t)$ exists and is _____.
a) analytic b) **continuous** c) closed d) connected

UNIT – II

- The line integral depends only on the _____.
a) **End points** b) complex function c) opposite arc d) rectifiable arcs
- A function is analytic on the rectangle if it is analytic in an _____.
a) closed set b) disc c) **open set** d) complex plane
- A piecewise differential arcs are _____.
a) Cauchy b) **rectifiable arcs** c) convergent d) bounded
- All linear transformation forms a _____.
a) Abelian group b) set c) jordan arc d) **group.**

5. The derivative of an analytic function is _____.
a) differential b) unique c) **analytic** d) continuous
6. Every polynomial of degree ≥ 1 has _____ root.
a) atmost one b) **atleast one** c) no d) many
7. If a point 'a' lies inside the circle 'c' then $n(c, a) =$ ____
a) **1** b) 0 c) > 1 d) > 0
8. $\int |d\varepsilon| =$ _____
a) Radius of circle b) constant c) area of circle d) **perimeter of circle**
9. The integral over any closed curve is _____
a) 1 b) **0** c) multiple of 2 d) $2\pi i$
10. In Cauchy's Representation formula the value of $n(c, a)$ is ____
a) **1** b) 0 c) multiple of 2 d) $2\pi i$

UNIT-III

1. The sum, product and quotient of two meromorphic function is _____.
a) **meromorphic** b) constant c) analytic d) continuous
2. A non constant analytic function maps open sets onto _____.
a) closed set b) disc c) **openset** d) complex plane
3. A region is simply connected if its complement w.r.t the extended plane is _____.
a) **connected** b) continuous c) convergent d) bounded
4. The integral of an exact differential over any cycle is _____.
a) 1 b) -1 c) < 1 d) **0**
5. The zeros of an analytic function which does not vanish identically are _____.
a) **Isolated** b) poles c) residue d) regular
6. Regular is synonyms for _____.
a) Removable b) isolated c) **analytic** d) poles
7. If 'a' is a pole of $f(z)$, then $f(a) =$ _____.
a) 0 b) 1 c) -1 d) ∞
8. The difference of two function with the same singular part is _____.
a) Complex b) **analytic** c) differential d) identical
9. A region is simply connected if its complement is _____.
a) Analytic b) continuous c) constant d) **connected**
10. A region with holes is called _____ connected region
a) Simply b) **multiply** c) single d) cauchy

UNIT – IV

1. A meromorphic function which is analytic in a region except for _____.
a) **Poles** b) holes c) residue d) chains
2. If u and v are harmonic function such that v is harmonic conjugate of u, then uv is _____
a) Meromorphic b) conjugate of uv c) **harmonic** d) analytic

3. If u is a harmonic in a disk $|z| < \rho$ then $u(0) = \underline{\hspace{2cm}}$
 a) α b) β c) 0 d) 1
4. The real and imaginary part of an analytic function are _____
 a) **Harmonic** b) analytic c) continuous d) differential
5. Reflection principle is also known as _____
 a) Analytic principle b) **symmetry principle** c) reflexive principle d) regular

UNIT – V

1. Every function which is meromorphic in the whole plane is the _____ of two entire functions
 a) Remainder b) dividend c) product d) **quotient**
2. The absolute convergence of the product $\prod_1^{\infty} (1 + a_n)$ is the convergence of the series _____
 a) $\sum_1^{\infty} |a_n|$ b) $\sum a$ c) $\sum_1^{\infty} a$ d) $\sum_1^{\infty} b$
3. Convergence is uniform on every _____ subset of Ω .
 a) connected b) **compact** c) closed d) open.
4. The convergence of infinite product $\prod_1^{\infty} (1 + a_n)$ is _____
 a) $\sum_1^{\infty} |a_n|$ b) $\sum_{-\infty}^{\infty} |b|$ c) $\sum_0^{\infty} |a_n|$ d) $\sum_1^{\infty} |b|$
5. Every function which is meromorphic in the whole plane is the quotient of two _____.
 a) constant function b) analytic function c) unit function d) **entire function**
6. The value of $\prod_{n=2}^{\infty} (1 - \frac{1}{n^2}) = \underline{\hspace{2cm}}$
 a) 1 b) 0 c) -1/2 d) **1/2**

Section – B

UNIT –I

1. Prove that the reflection $z \rightarrow \bar{z}$ is not a linear transformation.
2. Define Analytic function.
3. Find the fixed points of the linear transformation $\omega = \frac{2z}{3z-1}$.
4. Define Jordan Arc.
5. What do you mean by symmetry?
6. When do you say that an arc is piecewise regular?.
7. Find the fixed points of the linear transformation $\omega = \frac{3z-4}{z-1}$..
8. State symmetric principle.
9. Define the Cross ratio (z_1, z_2, z_3, z_4) .
10. Find the value of the cross ratio $(1, i, -i, 0)$
11. What is degenerate?

12. Define regular.

UNIT – II

1. Define Line Integral

2. State Cauchy's theorem for a Rectangle.

3. Define Index of the point.

4. Find $\int_{|z|=1} \frac{e^z}{z} dz$.

5. Prove the necessary and sufficient condition for a line integral depends only on end points.

6. Find the C.R equation in the complex plane.

7. Show that $\int_a^b c f(t) dt = c \int_a^b f(t) dt$

8. Compute $\int_{|z|=1} |z - 1| |dz|$

9. Define rectifiable arcs.

10. Compute $\int_{|z|=r} x dz$

11. State Cauchy's theorem for disk.

12. What is Cauchy's representation formula.

13. What is meant by Cauchy's estimate?

UNIT - III

1. Define Removable Singularities

2. Prove that the zeros of an analytic function which does not vanish identically are isolated.

3. State the general statement of Cauchy's theorem.

4. Define Isolated Singularity of a function.

5. Define Poles

6. Define Isolated essential singularity

7. Define Meromorphic.

8. Define Chain

9. Define Cycles

10. Define Simply connected

11. Define Homologues

12. Define Locally Exact differentials.

UNIT-IV

1. State the Residue theorem.

2. Calculate the residue of $\frac{z+1}{z^2-2z}$ at its poles.

3. Calculate the residue of $\frac{z+1}{z^2+2z}$ at its poles.

4. Find the residue at $z = 0$ of $\frac{1+e^z}{z \cos z + \sin z}$
5. Calculate the residue of $\frac{ze^z}{(z-1)^3}$ at its poles.
6. Define meromorphic function.
7. State Argument Principle
8. State Rouché theorem.
9. How many roots does the equation $z^7 - 2z^5 + 6z^3 - z + 1 = 0$ have in the disk $|z| < 1$?
10. How many roots does the equation $z^4 - 6z + 3 = 0$ have their module between 1 and 2 ?
11. State Generalized Argument Principle.
12. Define harmonic function.
13. If u and v are harmonic. Prove that $u + v$ and all are harmonic.
14. Prove that the real and imaginary parts of an analytic function are harmonic.
15. If u and v are harmonic function such that v is harmonic conjugate of u , then prove that uv is harmonic.
16. If u is a harmonic in a disk $|z| < \rho$ then prove that $u(0) = \beta$
17. State the Schwarz's theorem.
18. State the reflection principle.

UNIT -V

1. State the Weierstrass Theorem
2. State the Taylor Series
3. Define Rational Function.
4. Define Infinite product.
5. Define Entire.

Section - C

UNIT -I

1. Prove that the most general linear transformation is composed by the translation and inversion a rotation and a Homothetic transformation followed by another translation.
2. Show that collection of all linear transformations form a group.
3. If $T_1 z = \frac{z+2}{z+3}$; $T_2 z = \frac{z}{z+1}$ Find $T_1 T_2 z$, $T_2 T_1 z$, $T_1^{-1} T_2 z$.
4. Prove that Every Linear transformation preserves cross ratio.
5. Find the linear transformation which carries $0, i, -i$ into $1, -1, 0$
6. Show that an analytic function in a region Ω with constant modulus is constant.
7. Prove that every linear transformation preserves symmetric.
8. Prove that general linear transformation which take $a \rightarrow a'$ $b \rightarrow b'$ can be written as $\omega = T_z$
 where $\frac{\omega - a'}{\omega - b'} = k \left(\frac{z - a}{z - b} \right)$.
9. Prove that, every linear transformation has two fixed points.

UNIT-II

1. The integral $\int_{\gamma} f dz$ with continuous f depends only on the end points γ iff f is the derivative of an analytic function in Ω .
2. Prove that $\int_{\gamma} f(z) dz = 0$ iff the integral depends only on the end points.
3. State and prove extended form of Cauchy's theorem of a rectangle.
4. If $f(z)$ is analytic in an open disk Δ , then $\int_{\gamma} f(z) dz = 0$ for every closed curve γ in Δ .
5. State and Prove Extended form of Cauchy's theorem for a circular disk.
6. Prove that as a function of 'a' the index $n(\gamma, a)$ is constant in each of the regions determined by γ and zero in the unbounded region.
7. State and Prove Morera's theorem.
8. State and Prove Cauchy estimate theorem.
9. State and prove Liouville's theorem.
10. State and prove Cauchy's theorem in a disk.

UNIT -III

1. Obtain necessary and sufficient condition for a function to has a removable singularities at 'a'.
2. State and prove uniqueness theorem.
3. State and prove Wierstrass theorem.
4. State and prove local mapping theorem.
5. State and prove open mapping theorem.
6. If $f(z)$ is defined and continuous on a closed and bounded set E and analytic on the interior of E then the maximum $|f(z)|$ on E is assumed on the boundary of E .
7. State and prove Schwarz's lemma.
8. If $f(z)$ is analytic in a simply connected region Ω then $\int_{\gamma} f(z) dz = 0$ holds for all cycles in Ω .
9. Suppose that $f(z)$ is analytic in the region Ω' obtained a point 'a' from a region Ω . A necessary and sufficient condition that there exist, an analytic function Ω which coincide with $f(z)$ in Ω' is that $\lim_{z \rightarrow a} (z - a) f(z) = 0$. The extended function is uniquely determined.
10. Prove that the zeroes of a non-vanishing analytic functions are isolated.
11. If $f(z)$ is an analytic in a region Ω and the set E of all zero of $f(z)$ has a limit point α in Ω . then prove that $f(z)$ vanish identically in Ω .
12. If $f(z)$ & $g(z)$ are analytic in Ω and if $f(z) = g(z)$ on a set E which has a accumulation point in Ω , then prove that $f(z)$ is identically equal to $g(z)$.

13. If $f(z)$ has a pole at $z = a$ of order h , $f(z) = f_n(z) / (z-a)^h$ where $f_n(z)$ is analytic and $f_n(a) \neq 0$.

UNIT – 1V

1. State and prove the residue theorem.
2. State and prove argument principle
3. State and prove Rouché's theorem.
4. State and prove generalized argument principle.
5. If u_1 and u_2 are harmonic in a region Ω then $\int_{\gamma} u_1^* du_2 - u_2^* du_1 = 0$ for every cycle which is homologous to zero in Ω .
6. State and prove Schwarz's theorem.
7. State and prove reflection principle.

UNIT – V

1. State and Prove Weierstrass's Theorem.
2. State and Prove Hurwitz Theorem.
3. P.T. the necessary condition for convergence of infinite product $\prod a_n$ is $\lim_{n \rightarrow \infty} a_n = 1$.
4. Prove that the necessary condition for the convergence of infinite product

$$\prod_1^{\infty} (1 + a_n) \text{ is } \lim_{n \rightarrow \infty} a_n = 0.$$

5. Show that a necessary and sufficient condition for the absolute convergence of the product

$$\prod_1^{\infty} (1 + a_n) \text{ is the convergence of the series } \sum_1^{\infty} |a_n|$$

6. Show that $\prod_{n=2}^{\infty} (1 - \frac{1}{n^2}) = \frac{1}{2}$
7. Prove that $\prod_1^{\infty} (1 + \frac{z}{n}) e^{-z/n}$ converges uniformly and absolutely on every compact set.
8. Prove that if $g(z)$ is an entire function then $f(z) = e^{g(z)}$ is also an entire function and not equal to zero. Conversely if $f(z)$ is an entire function which is never zero then $f(z)$ must be of the form $e^{g(z)}$.
9. Prove that every function which is meromorphic in the whole plane is the quotient of two entire functions.

Section - D

UNIT – I

1. Prove that an analytic function in a region Ω whose derivative vanishes identically must reduce to a constant. The same is true if either the real part, the imaginary part, the modulus, or the argument is constant.

2. Show that three distinct points z_2, z_3, z_4 in the extended complex plane, There exist a unique linear transformation S which carried them to $1, 0, \infty$ respectively.
3. Prove that the image of the real axis under any linear transformation is either a circle or a straight lines.
4. Prove that the cross ratio (z_1, z_2, z_3, z_4) is real iff the four points lies on a circle or a straight line.
5. Bring out the geometrical significance of symmetrical points.
6. Describe the Riemann surface associated with the function $w = z^n$

UNIT-II

1. Prove that the line integral $\int_{\gamma} p dx + q dy$ defined in Ω depends only on the end points of

γ iff there exists a function $U(x, y)$ in Ω with the partial derivatives $\frac{\partial U}{\partial x} = p$ & $\frac{\partial U}{\partial y} = q$.

2. If the function $f(z)$ is analytic on R , then $\int_{\partial R} f(z) dz = 0$ where ∂R is a boundary of R .

3. If the piecewise differentiable closed curve γ does not pass through the point 'a' then the value of the integral $\int_{\gamma} \frac{dz}{z-a}$ is a multiple of $2\pi i$.

4. State and Prove Integral Formula.

5. If $f(z)$ is analytic in the region Ω , C is circle in Ω , Z is a point in Ω not C then

$$f'(z) = \frac{1}{2\pi i} \int_c \frac{f(\xi) d\xi}{(\xi - z)} \text{ and } f^n(z) = \frac{n!}{2\pi i} \int_c \frac{f(\xi) d\xi}{(\xi - z)^{n+1}}.$$

6. Compute $\int_{|z|=\rho} \frac{|dz|}{|z-a|^2}$ under the condition $|a| \neq \rho$

UNIT- III

1. Prove that If $f(z)$ is defined and continuous on a closed bounded set E and analytic on the interiors of E then the maximum of $|f(z)|$ on E is assumed on the boundary of E .

2. Prove that z_j be the zero's of a function $f(z)$ which is analytic in a disc Δ & does not vanish identically each zero being counted as many times as its order indicates for every closed curve γ in Δ which does not pass through zero $\sum_j n(\gamma, z_j) = \frac{1}{2\pi i} \int_{\gamma} \frac{f'(z)}{f(z)} dz$ where the sum has only a

finite no. terms $\neq 0$.

3. State and Prove Taylor's Theorem.

4. A region Ω is simply connected iff $n(c, a) = 0$ for all cycles c in Ω and all points a which do not belong to Ω .

5. Let $f(z)$ be defined and analytic in a region. Suppose for some pt $a \in \Omega$, $f(a)$ and the derivatives $f^{(r)}(a)$ all vanishes, then $f(z) \equiv 0$ on Ω .

6. State and prove the general statement of Cauchy's theorem.

UNIT – IV

1. Compute $\int_0^\pi \frac{d\theta}{a + \cos \theta}$, $a > 1$

2. Compute $\int_0^{\frac{\pi}{2}} \frac{d\theta}{a + \sin^2 \theta}$, $a > 1$

3. Compute $\int_{-\infty}^{\infty} \frac{x^2 - x + 2}{x^4 + 10x^2 + 9} dx$.

4. Compute $\int_0^\infty \frac{x^2 dx}{x^4 + 5x^2 + 6}$

5. State and prove Mean value theorem.

6. State and prove Poissons formula.

UNIT – V

1. State and Prove Mittag – Leffler.

2. Use Mittag-leffler theorem to show that $\frac{\pi^2}{\sin^2 \pi z} = \sum_{n=-\infty}^{\infty} \frac{1}{(z - n)^2}$ and deduce that

$$\pi \cot \pi z = \frac{1}{z} + z \sum_{n=1}^{\infty} \frac{z}{z^2 - n^2}.$$

3. Prove that the infinite product $\prod_1^{\infty} (1 + a_n)$ with $1 + a_n \neq 0$ converges simultaneously with the

series $\sum_1^{\infty} \log(1 + a_n)$ whose terms represent the value of the principal branch of the logarithm.

4. State and Prove Weierstrass Factorization Theorem.

ST.MARY'S COLLEGE (Autonomous) - THOOTHUKUDI
QUESTION BANK

II M.Sc. Mathematics

Core XVI - Functional Analysis

Sub.Code:21PMAC42

Semester IV - April
(W.e.f 2021)

Section -A(1 Marks)

UNIT-I

1. The normed linear space N is _____.
(a) **a metric space** (b) a banach space (c) closed (d) open.
2. If $(x_n) \rightarrow x$ then _____.
(a) $(x_n - x) \rightarrow x$ (b) $\|x_n - x\| < \varepsilon$ (c) $\|x_n - x\| > \varepsilon$ (d) $(x_n) \rightarrow 0$
3. If the normed linear space N is complete then the space N/M is _____.
(a) a metric space (b) **a banach space** (c) closed (d) open.
4. If the linear transformation T is continuous at the origin then _____.
(a) $\|T(x)\| > k\|x\|$ (b) $\|T(x)\| \gg k\|x\|$ (c) $\|T(x)\| \ll k\|x\|$ (d) $\|T(x)\| \leq k\|x\|$.
5. The simplest of all normed linear spaces is _____.
(a) N/M (b) l_p (c) R^n (d) **C**.
6. The non-zero normed linear space N is a banach space $\Leftrightarrow \{x: \|x\| = 1\}$ is _____.
(a) Cauchy (b) convergent (c) **complete** (d) bounded.
7. If $S = \{x: \|x\| \leq 1\}$ is the closed unit sphere in N and its image $T(S)$ is a bounded set then _____.
(a) T is not continuous (b) **T is continuous** (c) $T(S)$ is open (d) S is a closed graph.
8. If N and N' are normed linear spaces and if N' is a banach space then _____ is a banach space.
(a) $\mathfrak{B}(N)$ (b) $\mathfrak{B}(N, N')$ (c) N (d) $T(N)$.
9. The one-one linear transformation from a normed linear space N to the normed linear space N' such that $\|T(x)\| = \|x\| \forall x \in N$ then N is _____ to N' .
(a) homeomorphic (b) homomorphic (c) isomorphic (d) **isometrically isomorphic**.
10. If x_0 is a non zero vector in a normed linear space N then there exists a _____ such that $f_0(x_0) = \|x_0\|$ and $\|f_0\| = 1$.
(a) operator f_0 in N^* (b) **functional f_0 in N^*** (c) functional f_0 in N (d) operator f_0 in N .

11. If N is a normed linear space then the closed unit sphere S^* in N^* is _____ in the weak* topology.
 (a) not compact (b) not Hausdorff (c) **compact Hausdorff** (d) a Banach space.

UNIT-II

12. The continuous linear transformation $T: B \rightarrow B'$ is _____.
 (a) Closed mapping (b) **open mapping** (c) bijective (d) artificial mapping.
13. The one-one linear transformation of a Banach space onto another is _____.
 (a) **homeomorphism** (b) monomorphism (c) epimorphism (d) homomorphism.
14. If $N = \{x \in L, E(x) = 0\}$ where L is a linear space, then N is the _____.
 (a) normed space (b) normed linear space (c) **null space** (d) range.
15. The _____ continuous linear transformation on a Banach space is called a projection.
 (a) nilpotent (b) **idempotent** (c) isomorphic (d) homomorphic.
16. The null space of any continuous linear transformation is _____.
 (a) homomorphic to the range (b) homeomorphic to the range (c) open (d) **closed**.
17. If $A = \{x: (I - P)(x) = 0\}$ then A is _____.
 (a) the range of $(I - P)$ (b) **the null space of $(I - P)$** (c) idempotent (d) nilpotent.
18. If T' is a linear mapping of the linear space L into itself and N^* is a linear subspace of L , then which of the following is true?
 (a) $T'(N^*) \subseteq N^* \Leftrightarrow T$ is continuous (b) $T'(N^*) \supseteq N^* \Leftrightarrow T$ is continuous
 (c) $T'(N^*) \subseteq N^* \Leftrightarrow T$ is not continuous (d) $T'(N^*) \supseteq N^* \Leftrightarrow T$ is an operator
19. If x and y are any two vectors in a Hilbert space, then $|(x, y)| \leq \|x\| \|y\|$ this is _____.
 (a) parallelogram law (b) **Schwarz's inequality**
 (c) Parseval's equation (d) polarization identity.
20. $\|x\|^2 = \sum |(x, e_i)|^2$ is called _____.
 (a) parallelogram law (b) Schwarz's inequality
 (c) **Parseval's equation** (d) polarization identity.
21. The open sphere S_r with the center in the origin and radius r is defined as _____.
 (a) $S_r = \{x: \|x\| > r\}$ (b) $S_r = \{x: \|x\| \geq r\}$
 (c) $S_r = \{x: \|x\| < r\}$ (d) $S_r = \{x: \|x\| \leq r\}$

22. The graph of T is defined as _____
- (a) $G_T = \{(x, Tx) / x \in B\}$ (b) $G_T = \{(x, Tx) / x \in B'\}$
 (c) $G_T = \{(Tx, x) / x \in B'\}$ (d) $G_T = \{(Tx, x) / x \in B\}$

UNIT-III

23. The adjoint operation $T: \mathfrak{B}(H) \rightarrow \mathfrak{B}(H)$ is a _____ mapping.
- (a) Closed mapping (b) open mapping (c) **bijective** (d) artificial mapping.
24. If $T^* = A_1 - iA_2$ then the self-adjoint operators A_1 is called the _____.
- (a) vector of T^* (b) principal part of T^* (c) **real part of T** (d) imaginary part of T
25. A non-zero vector x satisfies the equation $Tx = \lambda x$ for some scalar λ is called _____ of T.
- (a) eigen value (b) spectrum (c) **eigen vector** (d) spectral resolution.
26. An operator T on a Hilbert space H is unitary iff it is _____ of H into itself.
- (a) homeomorphism (b) monomorphism (c) epimorphism (d) **isometric isomorphism.**
27. The self-adjoint operators in $\mathfrak{B}(H)$ form a closed real linear subspace of a real banach space, then $\mathfrak{B}(H)$ contains _____.
- (a) the linear transformation (b) continuous transformation
 (c) **identity transformation** (d) the operator.
28. The real banach space of all self-adjoint operators on H is _____.
- (a) Hilbert space (b) simply ordered set (c) **partially ordered set** (d) Hausdorff space.
29. If T is an operator on H, then T is _____ if and only if its real and imaginary parts commute.
- (a) **normal** (b) continuous (c) regular (d) complex.
30. If H is finite dimensional then every isometric isomorphism of H into itself is _____.
- (a) normal (b) continuous (c) regular (d) **unitary.**
31. The unitary operators on H forms _____ .
- (a) Hilbert space (b) vector space (c) **a group** (d) banach space.
32. The set of all continuous linear functionals on H is called _____
- (a) **conjugate space** (b) banach space (c) functional space (d) vector space

33. The operator N on H is said to be normal if _____
 (a) $N=N^*$ (b) $NN^* = N^*N$ (c) $(N_1N_2)^*=N_2^*N_1^*$ (d) $N^* = 1$
34. An operator U is normal iff it is _____
 (a) **invertible** (b) adjoint (c) normal (d) self-adjoint

UNIT-IV

35. $\sigma(T)$ is a _____ subspace of a complex plane.
 (a) linear (b) **compact** (c) connected (d) open.
36. If the operator T on a Hilbert space H is singular then _____.
 (a) **$0 \in \sigma(T)$** (b) $1 \in \sigma(T)$ (c) $\sigma(T)$ is empty (d) $\sigma(T)$ is regular
37. If the eigenspaces M_i 's are pairwise orthogonal and span H , then the operator on H is _____.
 (a) **normal** (b) compact (c) connected (d) open.
38. The spectral resolution is _____.
 (a) not unique (b) compact (c) **unique** (d) open.
39. The mapping $x \rightarrow x^{-1}$ of G into G is continuous and _____.
 (a) **homeomorphism** (b) monomorphism (c) epimorphism (d) isometric isomorphism.
40. If T is non-singular operator on H then _____.
 (a) $0 \in \sigma(T)$ (b) $1 \in \sigma(T)$ (c) **$\lambda \in \sigma(T) \Leftrightarrow \lambda^{-1} \in \sigma(\lambda^{-1})$** (d) $(ATA^{-1}) \neq \sigma(T)$.
41. If T is not normal then the eigen spaces _____ the Hilbert space H .
 (a) covers (b) reduce (c) span (d) **do not span**.
42. If the operator T on H is normal then its adjoint T^* is _____ in T .
 (a) **a polynomial** (b) closed (c) open (d) normal.
43. The _____ is a subset of Z the set of all topological divisors of zero.
 (a) $\sigma(T)$ (b) **boundary of S** (c) boundary of Z (d) eigen spaces.
44. The topological divisors of zero in _____ are permanently singular.
 (a) banach space (b) Hilbert space (c) linear space (d) **banach algebra**.

UNIT-V

45. If A is a division algebra, then it equals the set of all scalar multiples of the _____.

(a) inverse (b) unit (c) unity (d) **identity**.

46. $\sigma(x^n) =$ _____.

(a) $\sigma(x)$ (b) $\sigma(x)^n$ (c) $\sigma(x)^2$ (d) x^n

47. If r is an element of R , then $1 - r$ is _____.

(a) left regular (b) **right regular** (c) left singular (d) right singular.

48. Every maximal left ideal in a Banach algebra A is _____.

(a) **closed** (b) compact (c) unique (d) open.

49. If $r(x)$ is the spectral radius then _____ is true.

(a) $r(x) \neq \lim \|x^n\|^{1/n}$ (b) $r(x) = \lim \|x^n\|^{1/n}$ (c) $r(x) \leq \lim \|x^n\|^{1/n}$ (d) $r(x) \geq \lim \|x^n\|^{1/n}$.

50. If x is an element of the Banach algebra and if there exists an element y such

$xy = yx = 1$, then x is _____.

(a) **regular** (b) singular (c) simple (d) semi simple.

51. Every maximal left ideal in a Banach algebra A is _____.

(a) open (b) **closed** (c) bounded (d) an integral domain.

52. If A is a Banach algebra and R is the radical of A , then A/R is _____ Banach algebra.

(a) regular (b) singular (c) simple (d) **semi simple**.

Section – B(2 Marks)

Unit -I

1. Prove that the scalar multiplication is jointly continuous.
2. Define Banach space and give an example.
3. Define isometric isomorphism.
4. Prove that norm is a continuous function.
5. Is any metric space a normed linear space? Justify.
6. Define bounded linear transformation.
7. Define norm of T .
8. Define linear functional.
9. Define reflexive and give example.

10. If N^{**} is complete then N is complete if N is reflexive.

11. Define Natural Imbedding of N into N^{**} .

Unit –II

12. Prove $S(x, r) = x + S_r$

13. Prove $S_r = rS_1$

14. In any Hilbert space prove that $\|x + y\|^2 + \|x - y\|^2 = 2(\|x\|^2 + \|y\|^2)$

15. If S is a non – empty subset of a Hilbert space then show that $S^\perp = S^{\perp\perp\perp}$.

16. State and prove Parallelogram law.

17. State Schwarz inequality.

18. Define idempotent and projection.

19. Define Graph of a transformation.

20. State the uniform boundedness principle.

21. Define Hilbert space.

22. State and Prove Pythagorean Theorem.

23. Define Orthogonal complement.

24. Define complete orthonormal set.

25. Define orthonormal set.

Unit –III

26. Define adjoint of an operator.

27. Define relation on a Hilbert space H .

28. Prove that 0 and I are self – adjoint on H .

29. Define Positive operators and Prove that 0 and I are positive operators.

30. Prove that Every self – adjoint operator is normal.

31. Define self adjoint for A .

32. If T is an arbitrary operator in a Hilbert space H , then $T = 0 \Rightarrow (Tx, y) = 0 \forall x, y$.

33. Define Unitary operators.

34. If N is a normal operator on H then show that $\|N\|^2 = \|N^2\|$.

Unit –IV

35. State spectral Theorem.

36. Define Spectrum of an operator.

37. Define spectral resolution of T .

38. Prove that Z is a subset of S .
39. Define Banach algebra.
40. The multiplication in Banach algebra is jointly continuous.
41. Define regular and singular element.
42. Define topological divisor of zero.
43. Prove that every divisor of zero is a topological divisor of zero.

Unit –V

44. Define spectrum of T .
45. Define spectrum of x .
46. Define resolvent set.
47. Define spectral radius.
48. Define radical of A .
49. Define singular and regular elements.
50. Define semisimple.
51. Define Maximal left ideal.

Section – C (6 Marks)

Unit - I

1. Let N be an arbitrary normed linear space. Then prove that for each vector x in N , the scalar valued function F_x defined by $F_x(f) = f(x)$, for all $f \in N^*$ a continuous linear functional and the mapping $\varphi: x \rightarrow F_x$ is an isometric isomorphism of N into N^{**} .
2. If N is a normed linear space and x_0 is a non-zero vector in N , then prove that there exists a functional f_0 in N^* such that $f_0(x_0) = \|x_0\|$ and $\|f_0\| = 1$. In particular show that if $x \neq y$ then there exists $f_0 \in N^*$ such that $f_0(x) \neq f_0(y)$.
3. If M is a closed linear subspace of a normed linear spaces N and x_0 is a vector not in M , then prove that there exists a functional f_0 in N^* such that $f_0(M) = 0$ and $f_0(x_0) \neq 0$.
4. Prove that $C(X)$ is a Banach space.
5. If N is a normed linear space, then prove that the closed unit sphere S^* is a compact Hausdorff space in the weak* topology.
6. Prove that the space R is a Banach space.

7. Prove that the space l_p^n is a Banach space.
8. Let N be a non-zero normed linear space and prove that N is a Banach Space iff $\{x: \|x\|=1\}$ is complete.
9. Let N and N' be a normed linear space and let $T: N \rightarrow N'$ be a continuous linear transformation. Then prove that $\|Tx\| \leq \|T\| \|x\|$ by using the definition of $\|T\|$.
10. Let a Banach space $B = M \oplus N$ where M and N are linear spaces. If $z = x + y$ is the unique expression of a vector z in B as the sum of vectors x and y in M and N , then a new norm can be defined on the linear space B by $\|z\|' = \|x\| + \|y\|$. Then prove that B' is a Banach space if M and N are closed in B .
11. Let N be a normed linear space, S^* be the compact Hausdorff space obtained by imposing the weak* topology on the closed unit sphere in N^* . Then prove that the mapping $x \rightarrow F_x$ where $F_x(f) = f(x)$ for each f in S^* is an isometric isomorphism of N into $C(S^*)$. Also prove that if N is a Banach space, this mapping is an isomorphism of N onto a closed linear subspace of $C(S^*)$.

Unit – II

12. Prove that a closed convex subset C of a Hilbert space H contains a unique vector of the smallest norm.
13. If M is a proper closed subspace of a Hilbert space H , then prove that there exists a non-zero vector z_0 in H such that $z_0 \perp M$.
14. State and prove Schwarz inequality.
15. State and prove polarization identity.
16. State and prove Bessel's inequality for finite orthonormal sets.
17. If P is a projection on a Banach space B and if M and N are its range and null spaces respectively, then show that M and N are closed linear subspaces of B such that $B = M \oplus N$.
18. State and prove Closed graph theorem.
19. Prove that every non-zero Hilbert space contains a complete orthonormal set.
20. Prove that T^* is an operator on H .
21. Prove that a non-empty subset X of a normed linear space N is bounded iff $f(x)$ is bounded set of numbers for each $x \in N$.
22. If S is a non-empty subset of a Hilbert space H , then prove that S^\perp is a closed linear subspace of H and hence a Hilbert space.
23. State and prove Riesz Fisher Theorem.
24. State and Prove Gram Schmidt Orthogonalisation Process

Unit – III

25. Let y be a fixed vector in a Hilbert space H and let f_y be a function defined as $f_y(x) = \langle x, y \rangle$ for every $x \in H$. Then prove that f_y is a functional on H and $\|y\| = \|f_y\|$.
26. Prove that an operator T on H is self – adjoint iff (Tx, x) is real for all x .
27. If P is a projection on a closed linear subspace M of H , then prove that M reduces an operator T iff $TP = PT$.
28. If T is an operator on H for which $(Tx, x) = 0$ for all $x \in H$, then show that $T = 0$.
29. If T is an operator on a Hilbert space H , then prove that T is normal iff its real and imaginary parts commute.
30. If N_1 and N_2 are normal operators on H with a property that either commutes with the adjoint of the other then prove that $N_1 + N_2$ and $N_1 N_2$ are normal.
31. If T is an operator on a Hilbert space H then show that the following are equivalent to one another,
- (i) $T^*I = I$ (ii) $(T_x, T_x) = (x, y)$ (iii) $\|T_x\| = \|x\| \forall x$.
32. If P is a projection on a Hilbert space H then, prove the following:
- (i) P is the positive operator
- (ii) $0 \leq P \leq I$
- (iii) $\|P(x)\| \leq \|x\|$
- (iv) $\|P\| \leq 1$.
33. Prove that a closed linear subspace M of a Hilbert space H is invariant under an operator T iff M^\perp is invariant under T^* .
34. Prove that a closed linear subspace of a Hilbert space H reduce an operator T iff M is invariant under both T and T^* .
35. Prove the set of all normal operators on H is a closed subset of $\mathcal{B}(H)$ which contains the set of all self-adjoint operators and is closed under scalar multiplication.

Unit – IV

36. If T is normal, then prove that x is an eigen vector of T with eigen value λ iff x is an eigen Vector of T^* with eigen value $\bar{\lambda}$
37. If T is normal then show that the eigen spaces M_i 's are pairwise orthogonal.
38. If T is normal then show that each M_i reduces T .

39. If T is normal then show that each M spans T .
40. If G is an open set then prove that S is a closed set.
41. Show that the boundary of S is a subset of Z .
42. Show that every element x for which $\|x - 1\| < 1$ is regular, and the inverse of such an element is given by the formula $x^{-1} = 1 + \sum_{n=1}^{\infty} (1 - x)^n$.

Unit – V

43. Prove that if A is division algebra, it equals the set of all multiples of identity.
44. Show that $\sigma(X)$ is nonempty.
45. If r is an element of R , then show that $1 - r$ is regular.
46. If $1 - xr$ is regular, then show that $1 - rx$ is also regular.
47. Show that every maximal left ideal in A is closed.
48. If 0 is the only topological divisor of zero in A , then show that $A = C$.
49. Show that division algebra is an algebra with identity in which every non-zero element is regular.
50. Prove that any Banach algebra which is a division algebra is isometrically isomorphic to C .
51. Show that $(x^n) = (\sigma(x)^n)$.

Section – D(10 Marks)

Unit – I

1. State and prove Hahn Banach Theorem.
2. Let M be a closed linear subspace of a normed linear space N if the norm of a coset $x + M$ in the quotient space $\frac{N}{M}$ is defined by $\|x + M\| = \inf\{\|x + m\| : m \in M\}$ then prove that $\frac{N}{M}$ is a normed linear space. Further if N is a Banach space, then so is $\frac{N}{M}$.
3. If N is a normed linear space and N' is a Banach space then prove that $\mathfrak{B}(N, N')$ is a Banach space.
4. Prove that the space l_p is a Banach space.
5. Prove that Euclidean and unitary spaces are Banach spaces.

Unit – II

6. State and Prove Bessels inequality.
7. State and prove Open mapping Theorem.
8. Prove that a one-one continuous linear transformation of one Banach space onto another is a homeomorphism. In particular, if a one-one linear transformation T of a Banach space onto

itself is continuous, then its inverse T^{-1} is automatically continuous.

9. State and Prove uniform boundedness principle.
10. (i) State and prove orthogonal decomposition theorem.
(ii) Prove that M is closed $\Leftrightarrow M = M^{\perp\perp}$.
11. If M and N are closed linear subspace of a Hilbert space H such that $M \perp N$ then prove that the linear subspace $M + N$ is also closed.
12. Prove that a nonempty subset X of a normed linear space N is bounded iff $f(X)$ is bounded set of numbers $\forall f \in N^*$.

Unit – III

13. State and prove Riesz representation theorem.
14. (i) Prove that an operator T on H is normal iff $\|T^*x\| = \|Tx\|$.
(ii) Prove that an operator T on H is unitary iff it is an isometric isomorphism of H onto itself.
15. If P and Q are the projections on closed linear subspaces M and N of H then prove that $M \perp N$ iff $PQ = 0$ iff $QP = 0$.
16. If P is a projection on a Hilbert space H with range M and null space N then prove that $M \perp N \Leftrightarrow P$ is self adjoint, also show that $N = M^{\perp}$.
17. Prove that P is a projection on a closed linear subspace M of $H \Leftrightarrow I - P$ is the projection on M^{\perp} .
18. If P is a projection on the closed subspace M of H then prove that $x \in M \Leftrightarrow px = x \Leftrightarrow \|px\| = \|x\|$.
19. If A is a positive operator on H , then prove that $I+A$ is non-singular. In particular, prove that $I+T^*T$ and $I+TT^*$ are non-singular for an arbitrary operator T on H .

Unit – IV

20. If T is normal then show that the M_i 's span H .
21. Let T be an operator on H , then prove the following statements.
 - a) T is singular iff $0 \in \sigma(T)$
 - b) If T is non-singular, then $\lambda \in \sigma(T)$ iff $\lambda^{-1} \in \sigma(T^{-1})$
 - c) If A is non-singular, then $\sigma(ATA^{-1}) = \sigma(T)$
 - d) If $\lambda \in \sigma(T)$ and if P is any polynomial then $P(\lambda) \in \sigma(P(T))$
22. State and prove Spectral Theorem.
23. If T is an arbitrary operator on H , then prove that the eigen values of T constitute a non empty finite subset of the complex plane. Furthermore a number of points in this set does not exceed the dimension n , of the space H .

24. Show that the spectral resolution of a normal operator on a finite dimensional non zero Hilbert space is unique.
25. Show that the mapping $x \rightarrow x^{-1}$ of G into G is continuous and is therefore a homeomorphism of G onto itself.

Unit – V

26. Derive the spectral radius formula.
27. Prove that the radical R of A is a proper closed two – sided ideal.
28. If I is a proper closed two – sided ideal in A , then show that the quotient algebra $\frac{A}{I}$ is a Banach algebra.
29. If A is a Banach sub algebra of a Banach algebra A' , then prove that the spectra of an element x in A with respect to A and A' are related as follows
- (i) $\sigma'_A(x) \subseteq \sigma_A(x)$.
 - (ii) Each boundary point of $\sigma_A(x)$ is also a boundary point of $\sigma'_A(x)$.
30. (i) Define spectrum of T
- (ii) Prove that $\sigma(x)$ is closed and bounded also show that $\sigma(x)$ is non empty.

Section-A**UNIT-I**

- a/b can be written as _____
 a) $a = bx$ b) $b = ax$ c) $a = b$ d) $b = a^x$
- For any positive integer m , $(ma, mb) =$ _____
 a) (a, b) b) (b, a) c) $m(a, b)$ d) (a, mb)
- If c/ab and $(b, c) = 1$ then _____
 a) c/a b) a/b c) c/b d) ca/b
- If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then _____
 a) $ad \equiv bc \pmod{m}$ b) $ac \equiv b \pmod{m}$ c) $a \equiv bd \pmod{m}$ d) $ac \equiv bd \pmod{m}$
- Division algorithm is defined by _____
 a) $b = qa + r$ b) $r = ba + q$ c) $a = bx$ d) a/b
- An integer 'a' is a common divisor of b & c if _____
 a) b/c & b/a b) a/b & a/c c) b/a & c/a d) b/c & c/b
- If $(a, m) = (b, m) = 1$ then _____
 a) $(a, b) = 1$ b) $(a, m) = 1$ c) $(ab, m) = 1$ d) $ax + my = 1$
- If $a \equiv b \pmod{m}$ and $b \equiv c \pmod{m}$ then _____
 a) $a \equiv c \pmod{m}$ b) $b \equiv a \pmod{m}$ c) $ab \equiv ba \pmod{m}$ d) $ac \equiv ba \pmod{m}$
- If $a \equiv b \pmod{m}$ and $d/m, d > 0$ then _____
 a) $a \equiv b \pmod{m}$ b) $a \equiv b \pmod{d}$ c) $a \equiv d \pmod{m}$ d) $d \equiv a \pmod{m}$
- Let f denote a polynomial with integral coefficient and if $a \equiv b \pmod{m}$ then _____
 a) $f(a) \equiv b \pmod{m}$ b) $f(b) \equiv a \pmod{m}$
 c) $f(a) \equiv f(b) \pmod{m}$ d) $a \equiv b \pmod{m}$

11. If $(a,m)=1$ then fermat's theorem is defined by_____

- a) $a \equiv 1(mod m)$ b) $a^{\varphi(m)} \equiv 1(mod m)$ c) $a \equiv \varphi(m)(mod m)$ d) $a^{\varphi(m)} \equiv 0 mod(m)$

UNIT-II

12. If a is a quadratic residue modulo p then $\left(\frac{a}{p}\right) =$ _____

- a) -1 b) **1** c) 0 d)2

13. If a is a non quadratic residue modulo p then $\left(\frac{a}{p}\right) =$ _____

- a) **-1** b) 1 c) 0 d)2

14. Legendre symbol is _____

- a) $\left(\frac{a}{p}\right)$ b) $\left(\frac{p}{a}\right)$ c) $\frac{a}{p}$ d) $\left[\frac{a}{p}\right]$

15. Lemma of gauss states that _____

- a) $\left(\frac{a}{p}\right) = -1$ b) $\left(\frac{a}{p}\right) = 1$ c) $\left(\frac{a}{p}\right) = (-1)^n$ d) $\left(\frac{a}{p}\right) = (-1)^{2n}$

16. The symbol _____ denotes the greatest integer less than or equal to x.

- a) $[x]$ b) (x) c) x d) $\{x\}$

17. The Jacobi symbol $\left(\frac{P}{Q}\right)$ is defined by_____

- a) $\prod_{j=1}^s \left(\frac{q_j}{p}\right)$ b) $\prod_{j=1}^s \left(\frac{p}{q_j}\right)$ c) $\prod_{j=1}^s \left(\frac{Q}{q_j}\right)$ d) $\prod_{j=1}^s \left(\frac{p_j}{q_j}\right)$

18. If $\left(\frac{P}{Q}\right)\left(\frac{P}{Q'}\right) =$ _____

- a) $\left(\frac{P}{QQ'}\right)$ b) $\left(\frac{P^2}{QQ'}\right)$ c) $\left(\frac{QQ'}{P}\right)$ d) $\left(\frac{P}{Q}\right)$

19. Gaussian Reciprocity law for Jacobi symbol is _____

- a) $\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\{(p-1)|2\}\{(q-1)|2\}}$ b) $\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\{(P-1)|2\}\{(Q-1)|2\}}$
c) $\left(\frac{P}{Q}\right)\left(\frac{Q}{P}\right) = (-1)^{\{(P-1)|2\}\{(Q-1)|2\}}$ d) $\left(\frac{P}{Q}\right)\left(\frac{Q}{P}\right) = (-1)^{\{(p-1)|2\}\{(q-1)|2\}}$

20. Gaussian Reciprocity law for Legendre symbol is _____

- a) $\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\{(p-1)|2\}\{(q-1)|2\}}$ b) $\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\{(P-1)|2\}\{(Q-1)|2\}}$
c) $\left(\frac{P}{Q}\right)\left(\frac{Q}{P}\right) = (-1)^{\{(P-1)|2\}\{(Q-1)|2\}}$ d) $\left(\frac{P}{Q}\right)\left(\frac{Q}{P}\right) = (-1)^{\{(p-1)|2\}\{(q-1)|2\}}$

UNIT-III

21. The symbol _____ denotes the greatest integer less than or equal to x.

- a) $[x]$ b) (x) c) x d) $\{x\}$

22. If m is an integer then $[x + m] =$ _____.
- a) $[x]+[m]$ b) $(x+m)$ c) **$[x]+m$** d) $x+m$
23. If m is a positive integer then $\left[\frac{[x]}{m}\right] =$ _____.
- a) $\frac{[x]}{m}$ b) $\left[\frac{x}{m}\right]$ c) $\frac{x}{m}$ d) $[x]+[m]$
24. _____ is the nearest integer to x .
- a) $[x + 1]$ b) **$[x + \frac{1}{2}]$** c) $[x + \frac{1}{4}]$ d) $[x + \frac{1}{6}]$
25. The largest exponent e such that $p^e | n!$ is $e =$ _____
- a) $\sum_{i=1}^{\infty} \left[\frac{n}{p^i}\right]$ b) $\sum_{i=1}^{\infty} \left[\frac{p}{n^i}\right]$ c) $\sum_{i=1}^{\infty} \left(\frac{n}{p^i}\right)$ d) $\sum_{i=1}^{\infty} \left[\frac{p^i}{n}\right]$
26. What is the highest power of 7 that divides $1000!$?
- a) 165 b) 174 c) **164** d) 163
27. $\tau(1) =$ _____
- a) 0 b) **1** c) -1 d) ± 1
28. If $\sigma(n)$ is the _____ of the positive divisors of n .
- a) product b) divided c) subtract d) **sum**
29. If $(m,n)=1$ then $\tau(mn) =$ _____
- a) mn b) $\tau[mn]$ c) **$\tau(m)\tau(n)$** d) $\tau\left(\frac{m}{n}\right)$
30. If $n = 1$ then $\mu(n) =$ _____.
- a) n b) **1** c) 0 d) $(-1)^r$
31. If $a^2 | n$ for some $a > 1$ then $\mu(n) =$ _____.
- a) n b) 1 c) **0** d) $(-1)^r$
32. If $n = p_1 p_2 p_3 \dots p_r$, p_i are distinct primes then $\mu(n) =$ _____.
- a) n b) 1 c) 0 d) **$(-1)^r$**

UNIT-IV

33. If $N(n)$ is the number of solutions of $x^2 + y^2 = n$, then $N(1) =$ _____.
- a) 1 b) 2 c) 3 d) **4**
34. If $Q(n)$ is the number of primitive solutions of $x^2 + y^2 = n$, then $Q(1) =$ _____.
- a) 1 b) 2 c) 3 d) **4**
35. If $P(n)$ is the number of non – negative primitive solutions of $x^2 + y^2 = n$, then $P(1) =$ _____.
- a) 1 b) **2** c) 3 d) 4

36. For $n > 1$, $Q(n) =$ _____
 a) $P(n)$ b) $2 P(n)$ c) $3 P(n)$ **d) $4 P(n)$**
37. For $n > 1$, $N(n) =$ _____
 a) $\sum_{d^2/n} Q\left(\frac{n}{d^2}\right)$. b) $\sum_{d/n} Q\left(\frac{n}{d^2}\right)$. c) $\sum_{d^2/n} Q\left(\frac{d^2}{n}\right)$. d) $\sum_{d^2/n} Q\left(\frac{n}{d}\right)$.
38. The function $R(n)$ and $\frac{N(n)}{4}$ are _____ functions.
 a) arithmetic b) odd c) **multiplicative** d) even
39. When e is _____ $N(p^e) = \begin{cases} 4e + 4 & \text{if } p \equiv 1 \pmod{4} \\ 4 & \text{if } p \equiv 3 \pmod{4} \end{cases}$
 a) **even** b) odd c) even and odd c) zero
40. When e is _____ $N(p^e) = \begin{cases} 4e + 4 & \text{if } p \equiv 1 \pmod{4} \\ 0 & \text{if } p \equiv 3 \pmod{4} \end{cases}$
 a) even b) **odd** c) even and odd c) zero

UNIT V

41. Data that can be read and understood without any special measures is called _____.
 a) ciphertext **b) plaintext** c) Secret key d) Private Key
42. The method of disguising plaintext in such a way as to hide its substance is called _____.
 a) **encryption** b) decryption c) cryptosystem d) cryptographic algorithm
43. Encrypting plaintext results in unreadable gibberish called _____.
 a) **ciphertext** b) plaintext c) Secret key d) Private Key
44. The process of reverting ciphertext to its original plaintext is called _____.
 a) encryption **b) decryption** c) cryptosystem d) cryptographic algorithm
45. _____ is the science of using mathematics to encrypt and decrypt data.
 a) Cryptanalysis b) Cryptology **c) Cryptography** d) Cryptographic algorithm
46. _____ enables us to store sensitive information or transmit it across insecure networks so that it cannot be read by anyone except the intended recipient.
 a) Cryptanalysis b) Cryptology **c) Cryptography** d) Cryptographic algorithm
47. _____ is the science of securing data.
 a) Cryptanalysis b) Cryptology **c) Cryptography** d) Cryptographic algorithm
48. _____ is the science of analyzing and breaking secure communication.
 a) **Cryptanalysis** b) Cryptology c) Cryptography d) Cryptographic algorithm

49. Cryptology embraces _____ both cryptography and cryptanalysis.
 a) Cryptography b) Cryptanalysis **c) both a and b** d) none
50. Digital Signature Algorithm was invented by _____.
 a) Ron Rivest b) Adi Shamir c) Leonard Adleman **d) David Kravitz.**
51. _____ is the encrypted message produced as output.
 a) Plaintext b) **Ciphertext** c) Secret key d) Private Key
52. _____ attack exploits properties of the RSA algorithm.
 a) Mathematical b) Timing c) Hardware fault-based d) **Chosen ciphertext**
53. _____ attack depends on the running time of the decryption algorithm.
 a) Mathematical b) **Timing** c) Hardware fault-based d) Chosen ciphertext

Section-B

UNIT – I

1. Prove that if $c \mid ab$ and $(b, c) = 1$, then $c \mid a$.
2. Prove that if $x \equiv y \pmod{m}$ then $(x, m) = (y, m)$.
3. Define greatest common divisor.
4. Prove that for any positive integer m , $(ma, mb) = m(a, b)$.
5. Define Relatively prime.
6. Prove that if $a/b \ \& \ a/c$ then $a/(bx + cy)$ for any integer x and y .
7. Prove that if p is a prime number such that $p \mid ab$ then $p \mid a$ or $p \mid b$.
8. Define complete residue system modulo m .
9. Define reduced residue system modulo m and $\phi(m)$.
10. Prove that if $d \mid m$, $d > 0$ and if u is a solution of $f(x) \equiv 0 \pmod{m}$ then u is a solution of $f(x) \equiv 0 \pmod{d}$.
11. Define congruence of degree one.
12. Prove that if $a/b \ \& \ b/a$ then $a = \pm b$.

UNIT-II

13. Define quadratic residue and quadratic non residue modulo m .
14. Define Legendre Symbol.
15. Let p be an odd prime and let a and b denote integers relatively prime to p . Then prove that

$$\left(\frac{a}{p}\right) \equiv a^{\frac{p-1}{2}} \pmod{p}.$$

16. Let p be an odd prime and let a and b denote integers relatively prime to p . Then prove that

$$\left(\frac{a}{p}\right)\left(\frac{b}{p}\right) = \left(\frac{ab}{p}\right)$$

17. Define Jacobi symbol.

18. Prove that $\left(\frac{p}{q}\right) = \left(\frac{q}{p}\right) (-1)^{\{(p-1)|2\}\{(q-1)|2\}}$

19. Prove that $\left(\frac{p^2}{q}\right) = \left(\frac{p}{q}\right) = 1$.

UNIT-III

20. Define $\tau(n), \sigma(n), \sigma_k(n)$.

21. If $n = 6$ then find $\tau(6), \sigma(6), \sigma_2(6)$.

22. Prove that if $n = p_1^{e_1} \cdot p_2^{e_2} \dots p_r^{e_r}$ then $\tau(n) = (e_1 + 1)(e_2 + 1) \dots (e_r + 1)$ also $\tau(1) = 1$.

23. If $(m, n) = 1$ then $\tau(mn) = \tau(m)\tau(n)$.

24. Define multiplicative function.

25. Define completely multiplicative function.

26. Define Moebius function.

27. State the Moebius inversion formula.

28. Define $I(n), U(n), E(n)$.

29. What is the highest power of 7 that divides 1000!?

UNIT-IV

30. Define primitive solution.

31. Define $N(n), P(n), Q(n)$.

32. Prove that $N(n)$ is four times the excess of the number of divisors of n of the form $4j + 1$ over those of the form $4j + 3$.

33. Prove that the equation $x^2 + y^2 = n$ is solvable iff the canonical factoring of n into prime powers contains no factor p^e with p of the form $4j+3$ and e odd.

34. Write short note on sum of two squares.

UNIT-V

35. What is cryptography?

36. How does cryptography work?

37. What is conventional cryptography?

38. Draw a figure to illustrate the process of conventional encryption.

39. Give the benefits of conventional encryption.

40. Write the benefit of public key cryptography.
41. Name the inventors of RSA.
42. How does PGP work?
43. Name the two different certificate formats.
44. What is a passphrase?
45. Write the five possible approaches to attack the RSA algorithm.

Section – C

UNIT – I

1. State and prove the division algorithm.
2. Prove that if d/a & d/b and $d > 0$ then $(a/d$ & $b/d) = \frac{1}{d}(a, b)$. If $(a, b) = g$ then $(a/g$ & $b/g) = 1$.
3. Prove that if $(a, m) = (b, m) = 1$ then $(ab, m) = 1$.
4. Prove that for any x , $(a, b) = (b, a) = (a, -b) = (a, b + ax)$.
5. State and prove unique factorization theorem.
6. Prove that if $a \equiv b \pmod{m}$ & $c \equiv d \pmod{m}$ then $ax + cy \equiv bx + dy \pmod{m}$ and prove that if $a \equiv b \pmod{m}$ & $c \equiv d \pmod{m}$ then $ac \equiv bd \pmod{m}$.
7. Prove that $x \equiv ay \pmod{m}$ iff $x \equiv y \pmod{\frac{m}{(a,m)}}$.
8. State and prove Euler's generalization of Fermat's theorem.
9. State and prove Chinese remainder theorem.
10. If p/ab & p being a prime then p/a or p/b . More generally if $p/a_1 a_2 \dots a_n$ then p divides atleast one factor a_i of the product.

UNIT – II

11. Let p be an odd prime and let a and b denote integers relatively prime to p . Then
 - a) $\left(\frac{a}{p}\right) \equiv a^{\frac{p-1}{2}} \pmod{p}$
 - b) $\left(\frac{a}{p}\right)\left(\frac{b}{p}\right) = \left(\frac{ab}{p}\right)$
12. Let p be an odd prime and let a and b denote integers relatively prime to p . Then Prove that i) $a \equiv b \pmod{p} \Rightarrow \left(\frac{a}{p}\right) = \left(\frac{b}{p}\right)$.

$$\text{ii) } \left(\frac{a^2}{p}\right) = 1, \quad \left(\frac{a^2 b}{p}\right) = \left(\frac{b}{p}\right)$$

$$\left(\frac{1}{p}\right) = 1, \quad \left(\frac{-1}{p}\right) = (-1)^{(p-1)/2}$$

13. State and prove Lemma of Gauss.

14. Let Q & Q' are odd and positive and that $(PP', QQ') = 1$ then prove that

$$\text{i) } \left(\frac{P}{Q}\right) \left(\frac{P}{Q'}\right) = \left(\frac{P}{QQ'}\right).$$

$$\text{ii) } \left(\frac{P}{Q}\right) \left(\frac{P'}{Q}\right) = \left(\frac{PP'}{Q}\right)$$

$$\text{iii) } \left(\frac{P'P^2}{Q'Q^2}\right) = \left(\frac{P'}{Q'}\right)$$

$$\text{iv) } P' \equiv P \pmod{Q} \Rightarrow \left(\frac{P'}{Q}\right) = \left(\frac{P}{Q}\right)$$

15. State and Prove Gaussian Reciprocity law for Jacobi Symbol.

UNIT-III

16. Let x and y be real numbers. Then prove that

$$\text{i) } [x] \leq x < [x] + 1, x - 1 < [x] \leq x, 0 \leq x - [x] < 1$$

$$\text{ii) } [x] = \sum_{1 \leq i \leq x} 1 \text{ if } x \geq 0$$

$$\text{iii) } [x + m] = [x] + m \text{ if } m \text{ is an integer}$$

17. Let x and y be real numbers. Then prove that

$$\text{i) } [x] + [y] \leq [x + y] \leq [x] + [y] + 1$$

$$\text{ii) } [x] + [-x] = \begin{cases} 0 & \text{if } x \text{ is an integer} \\ -1 & \text{otherwise} \end{cases}$$

$$\text{iii) } \left[\frac{[x]}{m}\right] = \left[\frac{x}{m}\right] \text{ if } m \text{ is a positive integer}$$

18. Let x and y be real numbers. Then prove that

$$\text{i) } x - [x] \text{ is the fractional part } x$$

$$\text{ii) } -[-x] \text{ is the least integer greater than or equal to } x.$$

$$\text{iii) } \left[x + \frac{1}{2}\right] \text{ is the nearest integer to } x. \text{ If two integers are equally near to } x, \text{ it is the largest of the two.}$$

19. State and prove Moebius inversion formula.

$$20. \text{ If } n = p_1^{e_1} p_2^{e_2} \dots p_r^{e_r} \text{ then } \sigma(n) = \prod_{i=1}^r \frac{p_i^{e_i+1} - 1}{p_i - 1} \text{ and } \sigma(1) = 1.$$

$$21. \text{ If } f(n) = \sum_{d|n} \mu(d) F\left(\frac{n}{d}\right) \text{ for every positive integer } n, \text{ then prove that } F(n) = \sum_{d|n} f(d).$$

22. Write the properties of Dirichlet multiplication of arithmetic function.
23. Prove that the functions μ and U are multiplicative inverses, thus $\mu * U = U * \mu = I$,
 $\mu = U^{-1}$ and $U = \mu^{-1}$.
24. Prove that if f and F are any arithmetic functions such that $F = U * f$, then $f = \mu * F$ and conversely.
25. Let $f(n)$ be a multiplicative function and let $F(n) = \sum_{d|n} f(d)$. Then prove that $F(n)$ is multiplicative.
26. Prove that an arithmetic function f has a multiplicative inverse if and only if $f(1) \neq 0$. If an inverse exists it is unique.

UNIT-IV

27. Let p denote any odd prime. There is an integer m such that $1 \leq m < p$ and
 $mp = x_1^2 + x_2^2 + x_3^2 + x_4^2$ for some integers x_1, x_2, x_3, x_4 .
28. Let p denote the odd prime. If m is the least integer satisfying $1 \leq m < p$ and
 $mp = x_1^2 + x_2^2 + x_3^2 + x_4^2$ for some integers x_1, x_2, x_3, x_4 then $m=1$.
29. Prove that the functions $R(n)$ and $N(n)/4$ are multiplicative functions.
30. Prove that suppose $n > 1$, each non-negative primitive solution of $x^2 + y^2 = n$ determines a unique s modulo n .
31. Explain Waring's problem.
32. Prove that $N(1)=Q(1)=4$, $P(1)=2$, and for $n > 1$, $Q(n)=4P(n)$ and $N(n)=\sum_{d^2|n} Q\left(\frac{n}{d^2}\right)$.
33. Let $R(n)$ denote the number of roots of $s^2 \equiv -1 \pmod{n}$. Then prove that $P(n)=R(n)$ for $n > 1$,
 $P(1)=2$, $R(1)=1$, $Q(1)=4$, $Q(n)= 4R(n)$ for $n \geq 1$ and $N(n) = 4 \sum_{d^2|n} R\left(\frac{n}{d^2}\right)$.

UNIT-V

34. Explain - PGP certificate format.
35. Explain – X.509 certificate format.
36. Explain three different trust models.
37. Outline the requirements for Public - Key Cryptography
38. Explain the six ingredients of public key encryption.
39. Compute the applications for Public – Key Cryptosystems.
40. Outline the different levels of trust in PGP.

Section-D

UNIT – I

1. Prove that if g is the greatest common divisor of b and c then there exists integer x_0 & y_0 such that $g = (b, c) = bx_0 + cy_0$.
2. Prove that if $m > 0$, $[ma, mb] = m[a, b]$ and also $a, b = |ab|$.
3. State and prove Euclidean algorithm.
4. State and prove Wilson's theorem.
5. Prove that let p denote a prime. Then $x^2 \equiv -1 \pmod{p}$ has solutions if and only if $p = 2$ or $p \equiv 1 \pmod{4}$.
6. Prove that let g denote (a, m) . Then $ax \equiv b \pmod{m}$ has no solutions if $g \nmid b$. If $g \mid b$ it has g solutions, $x \equiv (b/g)x_0 + t(m/g) \pmod{m}$, $t = 0, 1, \dots, g-1$ where x_0 is any solution of $(a/g)x \equiv 1 \pmod{m/g}$.
7. State and prove Fermat's theorem.
8. Prove that if g is the gcd of b and c then
 - (i) g is the least positive value of $bx + cy$ where x and y range over all integers.
 - (ii) g is the positive common divisor of b and c which is divisible by every common divisor.

UNIT-II

9. Prove that if p is an odd prime and $(a, 2p) = 1$ then $\frac{a}{p} = (-1)^t$ where $t = \sum_{j=1}^{(p-1)/2} \left[\frac{ja}{p} \right]$ and also $\frac{2}{p} = (-1)^{(p^2-1)/8}$.
10. State and Prove Gaussian Reciprocity law for Legendre symbol.
11. Prove that if p and q are the distinct odd primes then $\left(\frac{p}{q}\right)\left(\frac{q}{p}\right) = (-1)^{\{(p-1)/2\}\{(q-1)/2\}}$.
12. Prove that if Q is odd and $Q > 0$, then $\left(\frac{-1}{Q}\right) = (-1)^{(Q-1)/2}$ and $\left(\frac{2}{Q}\right) = (-1)^{(Q^2-1)/8}$.
13. State and prove Lemma of Gauss.

UNIT-III

14. Let p denote a prime, then prove that the largest exponent e such that $p^e/n!$ is $e = \sum_{i=1}^{\infty} \left[\frac{n}{p^i} \right]$.
15. The set of all arithmetic functions f with $f(1) \neq 0$ forms a group under Dirichlet multiplication. Similarly the set of all multiplicative arithmetic function is a group.

16. Define Moebius function. Prove that the function $\mu(n)$ is multiplicative

$$\text{and } \sum_{d|n} \mu(d) = \begin{cases} 1, & \text{if } n = 1 \\ 0, & \text{if } n > 1 \end{cases}$$

17. Prove that let $\beta(x)$ and $\gamma(x)$ be complex-valued functions defined for all $x \geq 1$. If

$$\beta(x) = \sum_{j=1}^{[x]} \gamma\left(\frac{x}{j}\right) \text{ for all } x \geq 1, \text{ then } \gamma(x) = \sum_{j=1}^{[x]} \mu(j)\beta\left(\frac{x}{j}\right) \text{ for all } x \geq 1, \text{ and conversely.}$$

18. Prove that the following relation hold among the function $I, U, E, \mu, \tau, \varphi, \sigma$

$$\begin{array}{lll} \text{a) } \mu = U^{-1} & \text{(b) } \tau = U * U & \text{(c) } \phi = \mu * E \\ \text{d) } \sigma = U * E & \text{(e) } \sigma = \varphi * \tau & \text{(f) } \sigma * \phi = E * E \end{array}$$

UNIT-IV

19. Prove that the only integral solutions of $x^4 + y^4 = z^2$ are the trivial solutions $x = 0, y, z = \pm y^2$ and $x, y = 0, z = \pm x^2$.

20. Let $h(1) = 1, h(2^e) = 0, h(p^e) = (-1)^{((p-1)/2)e}$, p be an odd prime, $e \geq 1$. Let $h(n)$ for composite n be determined in such a way that $h(n)$ is a multiplicative function. Then

$$N(n) = 4 \sum_{d|n} h(d).$$

21. Prove that the positive primitive solutions of $x^2 + y^2 = z^2$ with y even are $x = r^2 - s^2, y = 2rs, z = r^2 + s^2$, where r and s are arbitrary integers of opposite parity with $r > s > 0$ and $(r, s) = 1$.

22. Prove that suppose $n > 1, s^2 \equiv -1 \pmod{n}$. There is a non-negative primitive solution x, y of $x^2 + y^2 = n$ such that $sy \equiv x \pmod{n}$.

UNIT-V

23. Analyze the principles of public key cryptosystems.

24. Explain – Digital certificates.

25. Explain RSA algorithm.

26. Analyze the security of RSA.

ST.MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI – 628001.

QUESTION BANK

II M.Sc Mathematics Subject Code: 21PMAE41

Semester IV

Core Elective – Differential Geometry

Section : A

Unit:I

1. The unit vector along a tangent t is.....
a) \vec{r} b) \vec{r}' c) \vec{t}' d) \vec{t}
2. The necessary and sufficient condition for a curve to be a plane curve is.....
a) $\tau = 0$ b) $\kappa = 0$ c) $\gamma = 0$ d) $\sigma = 0$
3. The parametric form of circular helix is
a) $(a\cos u, b\sin u, bu)$ b) $(b\cos u, a\sin u, bu)$
c) $(a\cos(u/a), b\sin(u/a), b(u/a))$ d) $(a\cos(s/c), b\sin(s/c), b(s/c))$
4. The tangent at the point of inflection is called
a) orthogonal b) perpendicular c) **inflectional** d) osculating
5. At a point of inflection on the curve the curve is a
a) **straight line** b) circle c) plane d) tangent
6. The reciprocal of the curvature is called
a) torsion b) **radius of curvature** c) radius of torsion d) binormal
7. The reciprocal of the torsion is called
a) torsion b) radius of curvature c) **radius of torsion** d) binormal
8. The rate of change of direction of principal normal is called
a) torsion b) curvature c) **screw curvature** d) binormal

9. The necessary and sufficient condition for a curve to be a straight line is.....
 a) $\tau = 0$ b) $\kappa = 0$ c) $\gamma = 0$ d) $\sigma = 0$
10. The rate of change of direction of tangent is called
 a) torsion b) **curvature** c) screw curvature d) binormal

Unit:II

11. If $\tau = 0$ or $\kappa = 0$ then the plane curve has atleast.....point of contact.
 a) 5 b) 2 c) 3 d) **4**
12. The osculating sphere is a sphere which haspoint of contact with the curve.
 a) **4** b) 3 c) 2 d) 5
13. The tangent makes a constant angle with a fixed line is called
 a) axis b) axis of rotation c) **axis of helix** d) helix
14. The necessary and sufficient condition for the curve to be a helix is that.....
 are in constant ratio.
 a) \vec{t} and γ b) \vec{t}' and σ c) κ and γ d) **κ and τ**
15. The involutes of the circular helix is a
 a) circle b) **plane curve** c) straight line d) axis
16. The locus of the centre of curvature of a curve is if a curve is a
 plane curve.
 a) **evolutes** b) involutes c) helix d) circle
17. If $\vec{r}_1 = \vec{t}$ then it is the spherical indicatrices of
 a) binormal b) normal c) **tangent** d) principal normal
18. If $\vec{r}_1 = \vec{n}$ then it is the spherical indicatrices of
 a) binormal b) normal c) tangent d) **principal normal**
19. If $\vec{r}_1 = \vec{b}$ then it is the spherical indicatrices of
 a) **binormal** b) normal c) tangent d) principal normal
20. The spherical indicatrices of a curve is a circle iff the curve is a
 a) plane curve b) **helix** c) straight line d) circle

Unit: III

21. A point p is called a regular point if
- a) $\vec{r}_1 \cdot \vec{r}_2 = 0$ b) $\vec{r}_1 \cdot \vec{r}_2 \neq 0$ c) $\vec{r}_1 \times \vec{r}_2 = 0$ d) $\vec{r}_1 \times \vec{r}_2 \neq \mathbf{0}$
22. A point p is called a singular point if
- a) $\vec{r}_1 \cdot \vec{r}_2 = 0$ b) $\vec{r}_1 \cdot \vec{r}_2 \neq 0$ c) $\vec{r}_1 \times \vec{r}_2 = \mathbf{0}$ d) $\vec{r}_1 \times \vec{r}_2 \neq 0$
23. The condition for a proper transformation is
- a) $J = 0$ b) $J \neq \mathbf{0}$ c) $J = 1$ d) $J \neq 1$
24. The proper parametric transformation leaves every unchanged.
- a) vector b) **normal** c) tangent d) constant
25. The first order fundamental magnitudes are.....
- a) E , F , H b) **E , F , G** c) E , L , G d) H , L , G
26. Metric is a quadratic form in
- a) (u , v) b) (∂u , ∂v) c) (**du** , **dv**) d) (∂u , ∂u)
27. In invariance property remains the same.
- a) parameter b) tangent c) E d) **metric**
28. The value of $EI^2 + 2Flm + Gm^2 =$
- a) **1** b) 0 c) 3 d) 2
29. The condition for the parametric curve to be orthogonal is.....
- a) $L = 0$ b) $E = 0$ c) **F = 0** d) $G = 0$
30. The area for the anchor ring is.....
- a) **$4\pi^2 ab$** b) $4\pi ab$ c) $4\pi a^2 b$ d) $4\pi ab^2$

Unit: IV

31. The two direction given by $Pdu^2 + 2Qdudv + Rdv^2 = 0$ are orthogonal iff.....
- a) **$ER - 2FQ + GP = 0$** b) $EP - 2FR + GQ = 0$
c) $EF - 2RQ + GP = 0$ d) $EG - 2FQ + RP = 0$

32. The value of T^2 is.....

- a) $LN - M^2$ b) $\sqrt{LN - M^2}$ c) $EG - F^2$ d) $\sqrt{EG - F^2}$

33. The value of N in the right helicoid is.....

- a) 1 b) 0 c) $u^2 \sin^2 v + u^2 \cos^2 v$ d) $v^2 \sin^2 u + v^2 \cos^2 u$

34. The curve possessing stationary length for small variation is called.....

- a) **geodesic** b) parametric curve c) u - curve d) v - curve

35. The necessary and sufficient condition for a curve to be geodesic is.....

- a) $EE_1 + FE_2 - 2EF_2 = 0$ b) $EE_2 + FE_2 - 2EF_2 = 0$ c) $EE_1 + FE_1 - 2EF_1 = 0$ d) **$EE_2 + FE_1 - 2EF_1 = 0$**

36. The parametric curve $u = c$ is geodesic iff.....

- a) **$GG_1 + FG_2 - 2GF_2 = 0$** b) $GE_2 + FG_2 - 2GF_2 = 0$ c) $GE_1 + FG_1 - 2GF_1 = 0$ d) $GE_2 + FG_1 - 2GF_1 = 0$

37. The canonical geodesic equation is

- a) $Uu' + V = 0$ b) $Vu' + U = 0$ c) **$Uu' + Vv' = 0$** d) $Uu' + Vu' = 0$

38. Every meridian v is

- a) **constant** b) 0 c) negative d) ∞

39. A curve $u = \text{constant}$ is geodesic iff its radius is.....

- a) ∞ b) 0 c) negative d) **constant**

40. A curve on a surface is geodesic iff rectifying plane is to the surface.

- a) normal b) **tangent** c) binormal d) perpendicular

Unit: V

41. The condition for the parametric curve $v = c$ to be geodesic is.....

- a) $E_2 = 0$ b) $E_1 = 0$ c) $E_2 \neq 0$ d) $E_1 \neq 0$
42. The orthogonal trajectories are called.....
- a) geodesic b) **geodesic parallel** c) geodesic parameter d) surface
43. If a surface admit two orthogonal family of geodesic then it is with the plane.
- a) different b) orthogonal c) parallel d) **isometric**
44. The limiting case of polar co-ordinates is.....
- a) 0 b) 3 c) **1** d) ∞
45. A curve on a surface is geodesic iff is zero.
- a) geodesic b) **geodesic curvature** c) geodesic parallel d) geodesic parameter
46. The geodesic curvature vector of any curve is to the given curve.
- a) **orthogonal** b) parallel c) perpendicular d) normal
47. For any curve on a surface geodesic curvature vector is
- a) parallel b) **intrinsic** c) orthogonal d) zero
48. Geodesic curvature at any point on the curve is denoted by
- a) κ_g b) K_g c) H_g d) H_g
49. Geodesic curvature of a geodesic on a surface is
- a) one b) parallel c) orthogonal d) **zero**
50. If L, M, N vanishes at all points of a surface then the surface is
- a) normal b) **plane** c) zero d) parallel

Section B

Unit - I

1. Define function of class m.
2. Define arc length.
3. Define osculating plane.
4. Define curvature.

5. Define torsion.
6. Write Serret - Frenet formulae.
7. Define inflexion.
8. Define principal normal.
9. Define binormal line.
10. Define rectifying plane.
11. Define normal plane.

Unit - II

12. Define osculating circle.
13. Define osculating sphere.
14. Define involutes.
15. Define evolutes.
16. Define intrinsic equation.
17. Define cylindrical helix.
18. Define Circular helix.

Unit - III

19. Define a surface.
20. Define proper parametric transformation.
21. Define essential and artificial singularities.
22. Define ordinary point.
23. Define parametric curve.
24. Define orthogonal of two parametric curve.
25. Define normal .
26. Define anchor ring.
27. Define right helicoid.
28. Define direction coefficient of a surface .
29. Define direction ratios of a surface.

Unit - IV

30. Define helicoid.
31. Define a family of curves.
32. Define a orthogonal trajectories.
33. Define double family of curves.
34. Define geodesics.

Unit - V

35. Define Normal Curvature.
36. Define geodesic parallel.
37. Define geodesic curvature.
38. Define II fundamental form.
39. Define Principal Curvature.
40. Define Mean Curvature.
41. Define umbilic.
42. Define Gaussian Curvature.
43. Define Umbilic.
44. Define Line of Curvature.

45. Define Dupin Indicatrix.

Section - C

Unit - I

1. Find the length of the curve given as the intersection of the surface $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, $x = a \cosh(z/a)$ from the point $(a, 0, 0)$ to the point (x, y, z) .
2. Derive the equation of osculating plane.
3. Show that a necessary and sufficient condition that a curve be a straight line is that $\kappa = 0$ at all points.
4. Show that a necessary and sufficient condition that γ be a plane curve is that $\tau = 0$ at all points.
5. Show that $[\dot{r} \ddot{r} \ddot{\ddot{r}}] = 0$ is a necessary and sufficient condition that the curve be a plane.
6. State and prove the Serret - Frenet formulae.
7. Derive the formula for arc length
8. Calculate the curvature and torsion of the cubic curve $\vec{r} = (u, u^2, u^3)$

Unit - II

9. State and prove the equation of osculating circle.
10. If a curve lies on a sphere show that ρ and σ are related by $\frac{d}{ds}(\sigma\rho') + \frac{\rho}{\sigma} = 0$.
11. State and prove the equation of Involute.
12. Show that the involutes of a circular helix are plane curves.
13. State and prove the uniqueness theorem
14. Find the involute of the circular helix.
15. Prove the necessary and sufficient condition for a curve to be a helix is that its curvature and torsion are in a constant ratio.

Unit - III

16. Prove that a proper parametric transformation either leaves every normal uncharged or reverses every normal.
17. Prove that a Metric is a positive quadratic form in (du, dv) .
18. Explain about the element of area.
19. Find the angle between two parametric curves.
20. Prove that the invariance property of metric.
21. Find the surface area of anchor ring.
22. Find the angle to the direction (du, dv) and the parametric curve $u = \text{constant}$.
23. Find the direction which makes an angle $\pi/2$ with the direction whose coefficients are (l, m) .

Unit - IV

24. Prove that every family of curves on a surface possesses an orthogonal trajectories.
25. Show that the parameters on a surface can always be chosen so that the curves of a given family and their orthogonal trajectories become parametric curves.
26. On the paraboloid $x^2 - y^2 = z$, find the orthogonal trajectories of the sections by the plane $z = \text{constant}$.

27. Prove that if θ is the angle at the point (u, v) between the two directions given by $pdu^2 + 2Qdudv + Rdv^2 = 0$ show that $\tan \theta = \frac{2H(Q^2 - PR)^{1/2}}{ER - 2FQ + GP}$.
28. Prove that a right helicoid is orthogonal to the curve $u \cos v = \text{constant}$ is the family $(u^2 + a^2) \sin^2 v = \text{constant}$.
29. Prove that the parametric curve $v = c$ be a geodesic iff $EE_2 + FE_1 - 2EF_1 = 0$.
30. Prove that the parametric curve $u = c$ be a geodesic iff $GG_1 + FG_2 - 2GF_2 = 0$.
31. Prove that every helix on a cylinder is geodesic.

Unit - V

32. Derive second fundamental form.
33. State and prove Meusnier's Theorem.
34. Prove that the surface is a plane iff L, M, N vanishes at all the points of the surface.
35. State and prove Dubin's theorem.
36. State and prove the necessary and sufficient conditions that the parametric curves be the lines of curvature are $F = 0$ and $M = 0$.
37. Prove that a curve on a surface is a geodesic iff its geodesic curvature vector is zero.
38. Prove that for any curve on a surface the geodesic curvature vector (λ, μ) is intrinsic.
39. Prove that the geodesic curvature vector of any curve is orthogonal to the curve.
40. Prove that the components λ, μ of the geodesic curvature vector are given by following formula with s as parameter
- $$\lambda = \frac{1}{H^2} \frac{U}{v'} \frac{\partial T}{\partial v'} = \frac{-1}{H^2} \frac{V}{u'} \frac{\partial T}{\partial v'} \quad , \quad \mu = \frac{1}{H^2} \frac{U}{u'} \frac{\partial T}{\partial u'} = \frac{-1}{H^2} \frac{U}{v'} \frac{\partial T}{\partial u'}$$
41. Prove that if (λ, μ) is the geodesic curvature vector, then
- $$k_g = \frac{-H\lambda}{Fu' + Gv'} = \frac{H\mu}{Eu' + Fv'}$$
42. Find the geodesic curvature of the parametric curve $v = c$.
43. Prove that if the orthogonal trajectories of the curve $v = c$ are geodesics, then H^2/E is independent of u .

Section - D

Unit - I

- Find the equation and the unit tangent vector of circular helix.
- Derive the formula for curvature and torsion in terms of dot differentiation
- Show that the length of the common perpendicular d between the tangents, at two near points arcual distance s between them is approximately, $d = \frac{\kappa\tau s^3}{12}$
- Derive the formula for curvature and torsion with respect to prime differentiation
- Show that curvature and torsion of a curve given as the intersection of two surfaces.

6. Find the curvature and torsion of the curve of intersection of the two quadric surfaces $ax^2+by^2+cz^2 = 1$; $a'x^2+b'y^2+c'z^2 = 1$.

Unit - II

7. Show that the torsion of an involute of a curve is equal to $\frac{\rho(\sigma\rho' - \sigma'\rho)}{(\rho^2 + \sigma^2)(c - s)}$.

8. Derive the equation of spherical curvature
 9. Derive the equation of evolute.
 10. Prove that the radius of curvature of the locus of the centre of curvature of a curve

$$\text{is given by } \left[\left\{ \frac{\rho^2 \sigma}{R^2} \frac{d}{ds} \left(\frac{\sigma \rho'}{\rho} \right) - \frac{1}{R} \right\}^2 + \frac{\rho' \sigma^4}{\rho^2 R^4} \right]^{-\frac{1}{2}}$$

11. Find the curvature and torsion of the spherical indicatrices of the binormal.
 12. Show that the intrinsic equation of the curve given by $x = ae^u \cos u$, $y = ae^u \sin u$, $z = be^u$ are

$$\kappa = \frac{\sqrt{2} a}{(2a^2 + b^2)^{1/2}} \frac{1}{s}, \quad \tau = \frac{b}{(2a^2 + b^2)^{1/2}} \frac{1}{s}$$

13. Prove the Fundamental existence theorem for space curves.
 14. Prove that the spherical indicatrices of a curve is a circle iff the curve is a helices.

Unit - III

15. Write short notes on Anchor ring. Prove the surface area of the anchor ring is $4\pi^2 ab$ and compute the values of E, F and G.
 16. Explain all the properties of metric.
 17. Find the angle to the direction (du, dv) and the parametric curve $u = \text{constant}$ and $v = \text{constant}$.
 18. i) Prove that the necessary and sufficient condition for the parametric curve on a surface to be orthogonal.
 ii) Find the direction coefficient making an angle 90° with the direction coefficient (l, m) .

Unit - IV

19. Determine the condition that the quadratic differential equation $Pdu^2 + 2Qdudv + Rdv^2 = 0$ represents orthogonal families of curves.
 20. State and prove the normal property of geodesics.
 21. Prove that the curves of the family $v^3/u^2 = \text{constant}$ are geodesics on a surface with metric $v^2 du^2 - 2uvdudv + 2u^2 dv^2$ ($u > 0, v > 0$).
 22. Prove that a curve on a surface is geodesic iff the rectifying plane is tangent to the surface.

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23. State and prove Rodrigue's formula.
 24. If $r(r(s))$ is the position vector of the point p on the surface then prove that:
 i) $K_g = [\bar{N}, \bar{r}', \bar{r}'']$
 ii) $K_g = \dot{S}^{-3} [\bar{N}, \dot{\bar{r}}, \ddot{\bar{r}}]$
 25. State and prove the principal curvature.

26. State and prove Liouville's Formula for Geodesic curvature.
