1.1.2 The Programmes offered by the Institution focus on Employability/ Entrepreneurship/ Skill Development

Courses Focusing on Employability

Total Number of Courses: 551

SEMESTER- III			
ALLIED - III MATHEMATICAL METHODS– I			
Code: 15UECA31	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

- To understand the meaning and importance of mathematical tools and to acquire the knowledge of solving simple problems

UNIT – I NUMBER SYSTEMS AND FUNCTIONS **15 Hrs**

Kinds of Numbers – Algebraic Expression - Functions – Definition – Types of Functions – Polynomial, Exponential, Logarithmic – Nature of Functions

UNIT – II COMMERCIAL ARITHMETICS **15 Hrs**

Percentage – Ratio – Proportion – Simple Interest – Compound Interest – Discount – Banker's Discount and Banker's Gain.

UNIT – III SETS **20 Hrs**

Sets – Types of Sets – Set operations – Cartesian product

UNIT – IV EQUATIONS **20 Hrs**

Equations – One variable – Linear – Quadratic – Polynomial –Homogeneous – Non Homogeneous – Application of equations in Economics.

UNIT – V ANALYTICAL GEOMETRY **20Hrs**

Points and lines – Application in Economics – Iso Product – Iso cost, Market Equilibrium, Indifference Curves etc.

Text Book:

Cyril Kanmony&K. Pazhani, Mathematical Methods –J.P.Publishers, Nagercoil, 2003

Reference Books:

C.S.Agarwal, R.C.Joshi, Mathematics for Economists –The New Academic PublishingCompany, Jalandhar, 1983

S.Peer Mohamed, P.AkbarBatcha, Shazuli Ibrahim &Selvaraj, Business Mathematics- Pass Publication, Madurai, 2004

S.Devairakkam, Mathematical Methods –Jothi Publications, Tirunelvelli, 1993

SEMESTER- III			
CORE V -MACRO ECONOMICS- I			
Code: 15UECC31	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Objective:

-To understand the various macro-economic concepts, theories and policies.

UNIT – I INTRODUCTION AND NATIONAL INCOME 15 Hrs

Macro Economics vs. Micro Economics, Macro-Economic Problems: Unemployment, Inflation and Growth
National Income- meaning – Concepts – methods and problems in measurement

UNIT – II THEORIES OF EMPLOYMENT 20 Hrs

Meaning of full employment – Types of unemployment – Classical theory of output and employment – Say's law of market –Criticisms of Classical theory–Keynesian Theory of employment –Comparison of Classical theory with Keynesian theory of employment

UNIT – III CONSUMPTION FUNCTION 20 Hrs

Consumption and income – Average and Marginal propensity to consume and their relationship –Factors determining consumption function - Importance of consumption function – Theories of Consumption Function – Absolute, Relative

UNIT – IV MULTIPLIER 20 Hrs

Multiplier – Meaning – Relationship with Marginal propensity to consume – Size of Multiplier – Importance – Keynes's Investment Multiplier compared with Khan's Employment Multiplier.

UNIT – V ACCELERATOR 15 Hrs

Acceleration principle – Meaning – Assumptions – Importance – Limitations – Interaction of Acceleration and Multiplier or leverage effect or Super Multiplier

Text Book:

M.Maria John Kennedy, Macro Economics, PHI Learning PVT Ltd, New Delhi, 2011

Reference Books:

Ackley, Macro Economic Theory and Policy –Macmillan Newyork, London, 1978

M.L.Seth, AnIntroduction to Keynesian Economics –Agarwal Educational Publishers, Agra

J.M.Keynes, The General Theory of Employment, Interest and Money, Macmillan, London

SEMESTER- IV			
CORE –VI MACRO ECONOMICS – II			
Code: 15UECC41	**Hours / week :6**	**Hrs / Semester: 75**	**Credits :4**

Objective:

-To understand the various macroeconomic concepts, theories and policies.

UNIT – I THEORIES OF DISTRIBUTION **15 Hrs**

The Ricardian or Classical Theory of Distribution –Criticisms – Marxian Theory of Income Distribution – Critical Evaluation – Kaldor's Theory of Distribution – Critical appraisal of Kaldor's Theory

UNIT – II THE INVESTMENT FUNCTION **15 Hrs**

Meaning of Capital and Investment – Types of Investment – Induced Vs Autonomous – Determinants of Investments – Rate of Interest – Marginal Efficiency of Capital (MEC) – Factors influencing the MEC

UNIT – III GENERAL EQUILIBRIUM **15 Hrs**

Concept of Partial Equilibrium – General Equilibrium – Derivation of IS and LM Functions – Shifts in IS and LM Functions

UNIT – IV MACRO ECONOMIC POLICY **15 Hrs**

Macroeconomic Policy – Policy objectives – Conflicts in policy objectives - Fiscal and Monetary Policies for Internal and External Balance

UNIT – V MONETARY POLICY **15 Hrs**

Monetary Policy –Instruments – Effectiveness - Role of Monetary Policy in Developing Economy – Fiscal Policy – Objectives – Limitations – Fiscal Monetary Policy Mix

Text Book: M.Maria John Kennedy, Macro Economics, PHI Learning PVT Ltd, New Delhi, 2011

Reference Books:

Ackley, Macro Economic Theory and Policy –Macmillan, London, 1978

M.L.Seth, An introduction to Keynesian Economics –Agarwal, Agra

J.M.Keynes, The General Theory of Employment, Interest and Money, Macmillan, London

SEMESTER- V			
CORE VII -FISCAL ECONOMICS			
Code: 15UECC51	**Hours / week :7**	**Hrs / Semester: 105**	**Credits :5**

Objective:

- To enrich the students with the knowledge of Fiscal Economics, Government's income, expenditure, debt and budgeting

UNIT– I INTRODUCTION 20Hrs

Definition, scope and subject matter of Public Finance – Private Finance and Public Finance– Principle of Maximum Social Advantage

UNIT– II PUBLIC REVENUE 25Hrs

Sources of public Revenue – Tax revenue & non-tax revenue– Characteristics of good Tax - Canons of taxation– Direct & Indirect taxes – merits and demerits – progressive and proportional taxes

UNIT – III PUBLIC EXPENDITURE 20Hrs

Meaning and Classification of Public Expenditure –Reasons for the growth of Public expenditure – Effects of public expenditure on production - distribution – other effects.

UNIT-IV PUBLIC DEBT 20Hrs

Meaning, objectives and sources of Public Debt– Comparison between Private debt and Public debt – Classification of public Debt – Methods of Redemption of Public Debt – Principles of Public debt management

UNIT – V BUDGETING 20 Hrs

Meaning and components of Government budget- Revenue and Capital Budget – Characteristics of a sound budget– Budgetary procedure in India - A Review of the latest Union Budget

Text Book: M.Maria John Kennedy, Public Finance, PHI Learning PVT Ltd, New Delhi, 2012

Reference Books:

H.L.Bhatia, Public Finance - Vikas Publishing House Pvt. Ltd, New Delhi, 1999

A.C. Agarwal, Public Finance –Lakshmi Narayan Publications

Musgrave & Musgrave, Public Finance -Theory and Practice –McGraw Hill Book Co., New Delhi, 1981

R.Cauvery – Public Finance, S. Chand& Company Ltd, New Delhi, 2007

SEMESTER- V			
CORE VIII – INDIAN ECONOMY			
Code: 15UECC52	**Hours / week :7**	**Hrs / Semester:105**	**Credits :5**

Objective:

- To give an opportunity to analyze the important sector wise issues in Indian Economy

UNIT I: INTRODUCTION **25Hrs**

Salient features of Indian Economy -Natural Resources – Land, Soil, Water, Forest and Minerals – Human Resources - Problem of Poverty and unemployment – Causes and Remedial Measures- Evaluation of last 2 five year plans (10^{th}& 11^{th})

UNIT II: AGRICULTURE **20Hrs**

Importance of agriculture- Rationale for Second Green Revolution, Agricultural Input, Farm Mechanization – Agricultural Finance –Food Security Act- Agrarian Crisis in India

UNIT III: INDUSTRY **20Hrs**

Role of Industries to economic development, Pattern of Industrialization, Industrial Policy since 1991- Role of Public sector —Performance of Public sector – Short comings of Public sector – Private sector – Role of private in India

UNIT IV: INFRASTRUCTURE **20 Hrs**

Transport Sector: Roads, Railways, Waterways and Airways- Role of Infrastructure in Economic Development- Mode of Infrastructure

UNIT V: SERVICE SECTOR **20 Hrs**

Development Banking Institutions: IFCI, ICICI, IDBI: Features- IT industry: Structure, Growth and contribution to GDP

Text Book:

RuddarDatt and KPM Sundaram, Indian Economy, S.Chand, New Delhi, 2011

Reference Books:

Mishra &Puri – Economics of Development and Planning, 7^{th} Edition, Himalaya Publishing, New Delhi

Ishwar. C. Dhingra – The Indian Economy, Twenty First Edition, Sultan Chand & Sons, New Delhi

Meier, G.M.(1995) Leading Issues in Economic Development, 6^{th} Edition, Oxford University press, New Delhi

SEMESTER- VI			
CORE IX– DEVELOPMENT ECONOMICS			
Code: 15UECC61	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

To familiarize the students with issues, approaches, Theories, Models and Planning for Development.

UNIT – I INTRODUCTION **20 Hrs**

Economic growth and development – Factors affecting Economic Growth – Capital, Labour and Technology - Rostow's stages of Economic Growth –India's stage of Economic Growth

UNIT – II APPROACHES TO ECONOMIC DEVELOPMENT **20 Hrs**

Vicious Circle of Poverty, Circular Causation, Unlimited supply of Labour – Big Push Theory, Balanced Growth Theory - Critical minimum effort thesis – Dualism – Technical, Behavioural, Social and Financial

UNIT – III THEORIES OF ECONOMIC DEVELOPMENT **15 Hrs**

Classical theory of development – Theory of social changes – crisis in capitalism, Schumpeter and Capitalistic development

UNIT – IV GROWTH MODELS **20 Hrs**

Harrod and Domar Model – Solow – Meade – Mrs. Joan Robinson's Models

UNIT – V PLANNING AND DEVELOPMENT **15 Hrs**

Need for Planning – Types – Conditions for successful operation of planning – Planning machinery in India.

Text Book: Theory and Practice of Economic Planning – M.L.Seth.

Reference Books:

Economics of Development and Planning – M.L.Jhingan
Economic Planning – B.C. Tandon
Development and Planning – Misra and Puri
Development and Planning – W.A.Lewis.
Economics of Development – Kindleberger.
Economics of Development – A Regional, Institutional and Historical Approach – Richard

SEMESTER- VI			
CORE XI -INTERNATIONAL ECONOMICS			
Code: 15UECC63	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

To enable the students to gain knowledge about the different aspects of International trade and its significance.

UNIT – I INTRODUCTION **20 Hrs**

Differences between international trade and internal trade, Benefits of international trade and defects, Free trade: Meaning – Arguments for and against- Protection: Meaning -Arguments for and against – Kinds of Protection and Role of Protection in UDCs

UNIT – II THEORIES OF INTERNATIONAL TRADE **15 Hrs**

Classical Theory, Comparative Cost Theory, Modern Theory and Factor-Price Equalization Theory

UNIT – III BALANCE OF PAYMENTS **15 Hrs**

Meaning of Balance of trade and Balance of payments – Meaningand Types, Structure of a Balance of payment, Causes and Remedial measures

UNIT–IV FOREIGN EXCHANGE **20 Hrs**

Meaning of Foreign exchange and Exchange Rate, Determination: Mint parity theory – Purchasing power party theory – Balance of payment Theory– Fixed and Flexible Exchange Rate: Merits and Demerits

UNIT – V INTERNATIONAL FINANCIAL INSTITUTIONS **15 Hrs**

IMF – Objectives– structure– Functions –World Bank (IBRD) –Objectives – structure – Functions - Trade Agreements: GATT, UNCTAD and WTO

Text Book: M.L.Jhingan, International Economics

Reference Books:

D.M. Mithani, International Economics –Himalayas Publishing House, Delhi, 2003
Soderston, International Economics –The Macmillan Press Ltd., London, 2010
Singh &Agarwal, International Economics –SanjeevaPrakashan, Meerut
Devairakkam, International Economics- D.S.R.Publications, Tirunelveli, 2001.
Francis Cherunilam, International Economics, (Fifth Edition) Tata McGraw Hill, New Delhi, 2010

SEMESTER- VI			
CORE - XII- ECONOMICS OF SHIPPING			
Code: 15UECC64	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

To make the students to understand the various components of sea transport and to give an overview of port and shipping industry

UNIT – I WATER TRANSPORT IN ECONOMIC DEVELOPMENT 15 Hrs

Meaning - Modes of Water Transport - Water Transport in India - Share of Different Modes of Transport - port performance - India's Maritime Trade - Development of Port Sector in India - Exports & Imports

UNIT – II PORTS IN ECONOMIC DEVELOPMENT 20 Hrs

Meaning - Type of Ports - Importance of Ports in India - Major ports - Minor Ports - Factors that have led to inefficiencies in the Indian ports - Models for port structuring - History of Ports in India - Global Scenario - economics of port and Port Procedure

UNIT – III SHIPPING IN ECONOMIC DEVELOPMENT 15 Hrs

Shipping economics - Meaning - Shipping Rates, Liners and Tramps, competition and shipping conferences - Development of Indian shipping, current problems - shipping policy and five years plans, chartering business, containerization

UNIT – IV THE ECONOMIC IMPORTANCE OF SHIPPING 20 Hrs

The role of seaborne trade in economic development- technical revolutions in shipping - The demand for sea transport - Seaborne trade by economic activity - Parcel size and transport mode - Definition of 'bulk cargo' - categories of bulk cargo - Transport of bulk and general cargo - Definition of 'general cargo' – classes of general cargo - Limitations of seaborne trade

UNIT - V THE ROLE OF PORTS IN THE TRANSPORT SYSTEM 20 Hrs

Types of ship in the cargo fleet - The supply of sea transport - The bulk shipping industry - The liner shipping industry - levels of port development - Functions of Various Authorities in Shipping - Port Trust – Customs - Mercantile Marine Department - Shipping Policy - Government policy in India & other countries towards shipping

Text Book: Elements of Shipping by Alan E. Branch

Reference Books: Reeds Sea Transport by Patrick Alderton

Maritime Economics – Martin Stopford

Elements of Port Operations & Management – Alan E. Branch

The Maritime Law of India (2000) Bhandarkar Publications, Mumbai

Bunkers –A guide for ship operators – W.D. Ewart

SEMESTER- V			
ELECTIVE I – MONETARY ECONOMICS			
Code: 15UECE51	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

To understand the operations of money and banking in an economy

UNIT – I INTRODUCTION **15 Hrs**

Definition of money, Kinds of money, Functions of money - Monetary Standard: Meaning, Types of Monetary standard- Merits and demerits - Paper currency standard: Meaning, Principles and Methods of paper currency standard

UNIT – II DEMAND FOR AND SUPPLY OF MONEY **20 Hrs**

Supply of Money: Meaning – Determinants of money supply – Measures of money supply

Demand for Money: Meaning – Quantity theory of money- Fisher's Transaction version – Cambridge Cash balance version

UNIT – III BANKING **20 Hrs**

Evolution of banks, Types of Banks – Functions of Commercial Banks, Balance sheet and Credit creation -Central Bank: Functions - Reserve Bank of India – FunctionsandRole in India

UNIT - IV PRACTICAL BANKING **15 Hrs**

Meaning: Current Account and Savings Bank Account — Negotiable Instruments: Features, Types: Cheque, Draft, ATM and E- Banking, Electronic banking

UNIT - V MONEY MARKET AND CAPITAL MARKET 20Hrs

Money market: Meaning, Features, Constituents, Functions and Characteristics of Indian Money Market

Capital Market: Meaning, features, Constituents and Functions of Indian capital market

Text Book: Devairakkam, Monetary Economics- D.S.R.Publications, Tirunelveli, 2001

Reference Books:

M.L.Seth, Money, Banking and International Trade –Educational Publishers, Agra.
S.B.Gupta, Monetary Economics-S.Chand, New Delhi, 1994
S.S.Mishra, Money, Inflation & Economic Growth –Oxford &IBH , New Delhi -1981.
M.L.Jhingan, Money, Banking and International Trade and Finance- 7th Edition, Vrindha Publications, 2005

SEMESTER- V			
ELECTIVE II -ECONOMICS OF HEALTH			
Code: 15UECE52	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :5**

Objective:

To analyze issues in utilization of health services from an economic perspective and to understand the current issues in healthcare

UNIT – I INTRODUCTION **15 Hrs**

Definition and scope of economics of health- Meaning of Public Health - the concept of health and health care- the role of health in economic development – health as human capital: determinants of health- poverty, malnutrition

UNIT – II HEALTH ECONOMICS 20 Hrs

Definition and concept of Health Economics - Significance of Health Economics - Conceptual Background of Health - Good Health – a Fundamental Right - International Covenants, Acts and Rules regarding Public Health - Significance of Good Health

UNIT – III ECONOMIC IMPLICATIONS OF HEALTH **15 Hrs**

Health Dimensions of Development, Determinants of Health, Economic Dimension of Health Care – Demand and Supply of Health Care, Financing of Health Care and Resource Constraints

UNIT – IV HEALTH EXPENDITURE **20 Hrs**

Definition - Significance of Health Expenditure - Expenditure on Health Care - Public Health and Economic Growth - Need for Investment in Public Health - demographic and economic factors - India's Epidemiologic Transition - Income Elasticity of Demand for Healthcare - Disease Burden in India

UNIT – V CURRENT ISSUES IN HEALTHCARE **20 Hrs**

The Concept of Human Life Value, Inequalities in Health – Class and Gender Perspectives its Measurement with Health Indicators - Health Planning - Resources Allocation and Budgeting - Current Issues in Healthcare -Tele health - Health Tourism - Health Insurance and Managed Care - National Health Policies in India - India towards "Right to Health"

Text Book:Henderson, J.W, Health Economics and Policy

Reference Books:

Sherman Folland, Allen C. Goodman and MironStanoThe Economics of Health and Health Care (Prentice-Hall Inc, New Jersy)

Becker, G.S, (1972) - Human Capital, 2ndedn, NBER, New York

Baru, R.V., -Private Health Care in India

Folland- Goodman-Stano- The economics of health and health care

SEMESTER- III			
NME– FUNDAMENTALS OF ECONOMICS			
Code: 15UECN31	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objective

To initiate the students to understand the key concepts of economics.

UNIT-I INTRODUCTION **6 Hrs**

Definitions- Scope of Economics- Basic concepts

UNIT-II CONSUMER'S BEHAVIOUR **6 Hrs**

Consumer's behaviour wants - Utility - Demand Meaning - Law – Exceptions

. **UNIT-III NATIONAL INCOME** **6 Hrs**

National Income: Meaning - Methods of Calculating National Income - Difficulties and methods to overcome them

UNIT-IV ECONOMICS SYSTEM **6 Hrs**

Economics Systems - Capitalism - Socialism, and mixed Economy

UNIT-V INFLATION **6 Hrs**

Meaning – Cost Push Inflation and Demand Pull Inflation-causes and remedies

Text Book: Sankaran.S. : Micro Economics,Margham Publications.

Reference Books:

Ahuja, H.L. : Advanced Economic Theory ,S.Chand & Co

DewettK.K : Modern Economics Theory

Lipsey and Steiner : Economics

Agrawal, A.N. Indian Economy – Vikas Publishing House.

Dewett, Verma, Sharma : Indian Economy – S.Chand & Co

Rudar Datt &Sundaram : Indian Economy – S.Chand & Co

Sankaran.S. : Indian Economy - Margham Publications

SEMESTER- IV			
NME - ECONOMIC DEVELOPMENT OF INDIA			
Code: 15UECN41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objective:

To give an opportunity to analyze the important sector wise issues in Indian Economy.

UNIT I: STRUCTURE OF INDIAN ECONOMY 6 Hrs

Salient features of Indian Economy -Natural Resources – Land, Soil, Water, Forest and Minerals

UNIT II – POVERTY 6 Hrs

Meaning of Poverty and Poverty line, Causes of poverty and Poverty Alleviation Measures

UNIT III – UNEMPLOYMENT 6 Hrs

Meaning, Types of Unemployment, Causes and Remedial Measures of Unemployment

UNIT IV – AGRICULTURE 6 Hrs

Importance of agriculture- Green Revolution, Agricultural Inputs: HYV Seeds, Chemical Fertilizers, Water management and Irrigation

UNIT V- INDUSTRY 6 Hrs

Importance of Industries, Large Scale Industries & Small-scale and Cottage Industries: Meaning, problems and measures

Text Book:P.A.Maraikumar, Economic Development of India, Immanuel Publications,

Palayamkottai, 2003

Reference Books:

Mishra &Puri – Economics of Development and Planning, 7th Edition, Himalaya Publishing, New Delhi

Ishwar. C. Dhingra – The Indian Economy, Twenty First Edition, Sultan Chand & Sons, New Delhi

Meier, G.M. (1995) Leading Issues in Economic Development, 6th Edition, Oxford University press, New Delhi

Meier, G.M. and James E. Rauch (2003) Leading Issues in Economic Development, 7th Edition, OUP, New Delhi

Ruddar Datt and KPM Sundaram, Indian Economy, S.Chand, New Delhi, 2011.

SEMESTER- IV			
SKILL BASED ELECTIVE - SALESMANSHIP			
Code: 15UECS41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objective:

To train the students to effectively sell and market any product or service of any industry

UNIT I: SALESMANSHIP 6Hrs

Salesmanship – Definition – features – origin and Development of salesmanship – creative and competitive salesmanship – Is salesmanship a science, art or a profession?

UNIT II: FUNDAMENTALS OF SELLING& KNOWLEDGE OF GOODS 6 Hrs

The sales personality – Important traits – Physical, Mental, Social and Character traits – Improving the personality – Importance and Nature of product - knowledge – Methods

UNIT III: SALES ORGANIZATION 6 Hrs

Organisation of sales Department – Sales Routine – control of sales operations – Duties of salesman – Management of Salesmen's time

UNIT IV: SALES TRAINING AND REMUNERATION 6 Hrs

The selection procedure – Types of training – Training objectives – The training plan and group training – Methods – Centralised and Decentralised training – Remuneration of salesmen – Methods – Allocation of Territories and sales conference

UNIT V: BUYING MOTIVES AND SALES TALK 6 Hrs

Important buying motives – Types of salesmen – Sales Talk – Sales Resistance – Closing the sales

Text Book:

J.C.Sinha, Principles of Marketing and Salesmanship – R.Chand & Co, 1998.

Reference Books:

RustomS.Davar, SohrabR.Dawar, Nub R. Dawar – Salesmanship and publicity.

Mahendra Mohan – Advertising Management Tata Mc. Craw Hill, New Delhi.

P.K.Sahu, K.C.Raut – Salesmanship, and sales management.

S.Jeyalakshmi, J.Jeyasheela&Dr.A.Asok, Salesmanship –I, G.N.Publishers, Kurangani, Thoothukudi District, 2007.

SEMESTER- V			
SKILL BASED ELECTIVE – BASICS OF COMPUTER APPLICATIONS			
Code: 15UECS51	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :3**

Objective:

To understand the elements of Computer System, the management techniques and Word Processing

UNIT – I INTRODUCTION 15Hrs

Introduction to Computers – Block Diagram of Computer – History of Computers – Generation of Computers – Classifications of Computers –Applications of Computers

UNIT – II MS-WORD 10Hrs

Opening, File formation – types – saving – editing – foot note – head note – page Nos. – page setup – printing options – Internet: Browsing – E-mail – down Loading.

UNIT – III MS-EXCEL 15Hrs

Creating a New Work book – Entering data into the work sheet – Editing work sheet – Adding Cell Boarders and Shading – working with Ranges -Managing and Printing work book – Simple Calculations – Copying Formula – Creating charts – Bar – Stacked Bar – XY graph – Line graph – Pie chart – Tools – Data.

UNIT – IV POWER POINT 10Hrs

Creating a New Presentation – Working with Slides in different views – Printing presentations - Inserting, Deleting and copying slides – Rearranging Slides – Adding and Modifying Slides Text – Adding animation to the Slides – Cascading Presentation

UNIT – V MS-ACCESS 10 Hrs

Creating a new database – creating and editing tables – entering and editing data in a table – creating simple relationship between tables – creating and modifying a form sorting, filtering and indexing Data – creating a query – creating and customizing a report.

Text Book: Russel.A.Stultz, MS Office 97, First Indian Edition, BPBP Publications

Reference Books:

Kerns, Essentials of Microsoft Windows, Word and Excel, Prentice Hall of India, New Delhi, 1993.

Rajaraman, V., Fundamentals of Computers, Prentice Hall, New Delhi

Sanjay Saxena – A First Course in Computer, 1997.

SEMESTER- IV	
SELF-STUDY PAPER- ECONOMICS OF MARKETING	
Code : 15UECSS2	**Credit : 2**

Objective

-To enable the students to gain deep knowledge in marketing

UNIT-I

Marketing - Meaning, Definition, Nature and Scope - Evolution of Marketing - Approaches to the Study of Marketing - Role of Marketing inEconomic Development

UNIT-II

Marketing Mix - Meaning - Definition - Elements - Marketing Process -Functions of Marketing - Buying Assembling - Selling

UNIT-III

Transportation - Storage and Warehousing - Warehouses in India – Causesof slow growth - suggestions

UNIT-IV

Standardization and Grading - Labelling - Grading vs. Standardization -Agricultural Produce - Extractive Industries and Manufactured Product – ISIand AGMARK

UNIT-V

Marketing Finance - Working Capital - Institutions in Marketing Finance -Role of STC, MMTC and EXIM Bank - Marketing Risks - Causes - Handling- Prevention, Reduction and Shifting.

Text Book:

Modern Marketing by R.S.N. Pillai, S. Chand and Company Ltd., New Delhi.

Reference Books:

Marketing by Rajan Nair, Sultan Chand & Sons

Marketing Management in Indian Perspective by Jha and Singh, Himalaya

Fundamentals of Marketing by William J. Stanton, MC Graw - Hill

Principles of Marketing by Philip Kotler, Prentie Hall

SEMESTER- V	
SELF-STUDY- ECONOMIC DEVELOPMENT OF TAMILNADU (Compulsory)	
Code: 15UECSS3	**Credit :2**

Objective:

To give a basic knowledge about the availability of resources, infrastructure and sectoral development in Tamil Nadu

UNIT I: INTRODUCTION

The geographical features of Tamil Nadu – Natural Resources – Land – Forest – Water – Fisheries – Mineral, Energy , power – Infrastructure –Transport: Railways, Roadways, Airways

UNIT II: AGRICULTURE

Agricultural growth – Land use pattern – Cropping pattern – Agricultural inputs: Irrigation, Fertilizer — Green Revolution.

UNIT III: INDUSTRY

Industrial growth - Large scale Industries – Cotton Textiles – Sugar-Cement – Fertilizer – Leather and Electronics-Small scale Industries – Handloom Industry – Cottage Industries

UNIT IV: SERVICE SECTOR

Banking – Insurance – Health Infrastructure – Educational Infrastructure – IT Sector

UNIT V: PLANNING

Economic planning and development in Tamil Nadu – Planning: Achievements and failures

Text Book: A.G. Leonard, Tamil Nadu Economy, Macmillan , New Delhi, 2006

Reference Book:

N. Rajalakshmi, Tamilnadu Economy

S.Manickam, Panorama of Indian Economy, 2010

P.Srinivasan, A Road Guide to Tamil Nadu, TTK Healthcare Limited – Printing Division, 2001..

P.A. Maraikumar, Tamil Nadu Economy, Immanuvwl Publications, Palayamcottai, 2001.

N.V.Balu&V.V.K.Subburasu, Tamil Nadu Yearbook, Sura College of Competition,

SEMESTER- I			
ALLIED I – PRINCIPLES OF COMMERCE			
Code: 18UECA11	**Hours / week :3**	**Hrs / Sem.: 45**	**Credits :3**

UNIT I - INTRODUCTION

Nature and Scope of Business – Objectives- Concepts of Business – Importance and Essentials of Business - Essentials of Successful Business

UNIT II - FORMS OF BUSINESS ORGANIZATION

Sole trade - Partnership - Company – Joint Hindu Family System - Co-Operatives- Chamber of Commerce

UNIT III –LOCATION AND BUSINESS

Plant - Location - Localization of Industries- Decentralisation

UNIT IV- BANKS

Meaning, Types and functions –Commercial bank- Central bank – Functions

UNIT V - STOCK EXCHANGE

Meaning of Stock Exchange - Functions — SEBI and Stock exchange in India - BSE and NSE

Text Book:

J.K.Mitra, Principles of Commerce, Abs Publishing House

Books for Reference:

1. Bhushan, Y.K. (2010), *Fundamentals of Business Combinations and Management*, Sultan Chand & Sons, New Delhi.

2. Shukla,M.C.(2006), *Business Organisation and Management,* Sultan Chand & Company Ltd, New Delhi.

3. Gupta, C.B. (2012), *Business Organisation and Management*, Sultan Chand & Sons, New Delhi.

4. Yogendra Prasad Verma, (2008), *Elements and Organisation of Commerce*, Sultan Chand & Company Ltd, New Delhi

SEMESTER- I			
CORE – I Micro Economics – I			
Code: 18UECC11	**Hours / week : 5**	**Hrs / Sem.: 75**	**Credits :4**

Vision:
To develop the understanding of basic Micro Economic concepts

Mission:
To promote critical thinking skills and enhance decision making abilities, which help students become productive and informed citizens.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	describe and illustrate basic economic concepts of scarcity, choice and opportunity cost	4	Ev
CO - 2	identify and apply relevant terminology and concepts to economic issues and problems	3	Ap
CO – 3	use the theory of consumer choice to explain and to predict consumer behaviour.	5	Cr
CO – 4	understand the broader social consequences of economic decisions making	3	Ap
CO - 5	represent demand and supply, in graphical form, including the downward and upward slope of the demand and supply curves and the shifts in demand and supply curves.	2, 4	Cr
CO – 6	identify the major factors affecting demand for and supply of commodities	4	An
CO – 7	apply the concept of elasticity of demand and supply	4, 3	Ap
CO – 8	analyse the behavioral patterns of different economic agents like consumers and producers	1	An

SEMESTER- I			
CORE – I Micro Economics – I			
Code: 18UECC11	**Hours / week : 5**	**Hrs / Sem.: 75**	**Credits :4**

UNIT I INTRODUCTION TO THE CONCEPTS OF ECONOMICS **15 hrs**

Definition: Adam Smith, Alfred Marshall, Lionel Robbins and Samuelson approaches – Nature and scope of Economics -Micro and Macro Economics – Basic Concepts and types of Goods and Utility

UNIT II CARDINAL UTILITYANALYSIS **20 hrs**

Meaning of Cardinal Utility – Human Wants and Utility– Law of Diminishing Marginal utility– Law of Equi-Marginal Utility- Law of Demand – Illustration, Assumption and Determinates of Demand – Elasticity of Demand – Meaning, Types and Measurement – Consumer Surplus

UNIT III ORDINAL UTILITY ANALYSIS **15 hrs**

Meaning of Ordinal Utility – Indifference Curves – Properties – Diminishing Marginal Rate of Substitution– Consumer's Equilibrium – Price Effect, Income Effect and Substitution Effect

UNIT IV FACTORS OF PRODUCTION **15 hrs**

Meaning and Features: Land, Labour, Capital and Organisation – Production Function: Law of Variable Proportions and Laws of Returns to Scale – Economies and Diseconomies of Scale

UNIT V COST AND REVENUE ANALYSIS **10 hrs**

Cost Concepts – Short Run and Long Run Cost Curves - Concepts of Revenue – Revenue in different market conditions

Text Book:

Maria John Kennedy, Micro Economic Theory

Books for Reference:

1. M.L.Jhingan, *Micro Economic Theory* – Delhi, Vrinda Publications, 1998
2. M.L.Seth, *Principles of Economics* – Lakshmi Nara Publication, 1997
3. Pazhani, *Micro Economics,* Nagercoil, J.P.Publishers, 2004
4. S.Sankaran - *Economic Analysis*, Margham Publications, Madras,1991 2. Salvatore - Micro
Economics, 4/e, OUP, New Delhi, 2002.

SEMESTER- I			
CORE II – Indian Economy – I			
Code: 18UECC12	**Hours / week : 5**	**Hrs / Semester: 75**	**Credits :4**

Vision:

Develop an in-depth understanding of the Indian economy

Mission:

Become proficient in understanding and analyzing Indian Economic Issues, developments and policies.

Course Outcome:

CO No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO - 1	understand the various aspects of India's economy	4	Un
CO – 2	develop ideas of the basic characteristics of Indian economy and its potential on natural resources.	4	Ev
CO – 3	provide an analytical discussion of various sectoral issues relating to Indian economy	1	An
CO – 4	acquire knowledge on the history, recent developments, and impending challenges of Indian Economy	5	Un
CO – 5	develop a perspective on the different problems and approaches to economic planning and development in India	3	An
CO – 6	understand the role of the Indian Economy in the global context, and examine how different factors have affected the process of development.	4, 5	Un
CO – 7	understand the economic problems and measures in their contextual perspective.	4	Un
CO – 8	understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.	4	Un

SEMESTER- I			
CORE II – Indian Economy – I			
Code: 18UECC12	**Hours / week : 5**	**Hrs / Semester: 75**	**Credits :4**

UNIT I - ECONOMIC DEVELOPMENT SINCE INDEPENDENCE 15 hrs

Meaning of Economic Development -- Determinants of Development, Indian Economy since Independence – Features of Indian Economy

UNIT II - RESOURCES AND DEVELOPMENT 15 hrs

Natural Resources: Land, Water, Forest, Mineral and Energy Resources- Natural resources and Economic Development

UNIT III - BASIC PROBLEMS OF INDIAN ECONOMY 15 hrs

Poverty: Meaning, Causes, Remedial Measures – Unemployment: Meaning, Causes and Remedial Measures-Deficit Balance of Payment

UNIT IV - HUMAN RESOURCES 15 hrs

Demographic features –Demographic Transition-Causes and measures of controlling population. Human Development Index (HDI) – Meaning and measurement.

UNIT V - AGRICULTURE 15 hrs

Agriculture – Role in the National Economy – Crop pattern – Causes for low productivity – Green Revolution

Text Book:

Ruddar Datt and Sundharam K.P.M., Indian Economy, Sultan Chand, New Delhi, 2009

Books for Reference :

1. Uma Kapila, *Indian Economy,* 9th Edition, ISBN:8171887902, Published by Academic Foundation, 2010.
2. Ishwar.C.Dhingra -*The Indian Economy, Twenty first edition,* New Delhi: Sultan Chand, 2009. 2.
3. Mishra & Puri - *Economics of Development and Planning,* Mumbai: Himalaya, 7th edition, 2005.
4. Meier, G.M. *Leading Issues in Economic Development*, New Delhi: O U P, 6th edition, 1995.

SEMESTER- II			
CORE III - Micro Economics -II			
Code: 18UECC21	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision:

Promote critical thinking skills and enhance decision making abilities among students to enable them to become productive and informed citizens.

Mission:

To develop the understanding of basic Micro economic concepts

Course Outcome:

CO. No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO - 1	explain how competitive markets organise the allocation of scarce resources and the distribution of goods and services	1, 5	Ap
CO - 2	understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of a good produced.	4, 5	Un
CO – 3	explain the factors that affect the production of an individual firm, and the relationship between a firm's productivity and its costs	3, 4, 5	An
CO - 4	understand the meaning of marginal revenue and marginal cost and their relevance for firm profitability	4	Un
CO – 5	describe the behaviour of the profit maximizing firm under various types of market structures: pure competition, monopoly, oligopoly and monopolistic competition	4, 5	Ev
CO –6	deal with the advanced theoretical issues and their practical applications like Theory of Firm, Theories of Distribution.	1, 5	Un
CO – 7	relate the basic economic theory and principles to current microeconomic issues and evaluate related public policy	1, 3	An
CO- 8	describe the incomes earned by the factors of production (land, labour, capital, entrepreneurship) wages, interest, rents, and profit	4	Ev

SEMESTER- II			
Core III - Micro Economics -II			
Code: 18UECC21	**Hours / week :5**	**Hrs / Sem.: 75**	**Credits :4**

UNIT I MARKETSTRUCTURE **15 hrs**

Time Element -– Equilibrium of the Firm and Industry – Perfect Competition – Price Output Determination

UNIT II MONOPOLY AND MONOPOLISTIC MARKETS **15 hrs**

Meaning and features: Monopoly, Discriminating Monopoly and Price – Output Determination–Meaning and features of Monopolistic Competition

UNIT III FACTOR PRICING I **15 hrs**

Theories of Distribution - Wages: Meaning and Types of Wages – Theories of Wages: Subsistence Theory and Wage Fund Theory

UNIT IV FACTOR PRICING II **20 hrs**

Concept of Rent – Ricardian Theory of Rent, Quasi Rent, Modern Theory of Rent – Concept of Interest: Classical Theory, Loanable Fund Theory and Keynes' Liquidity Preference Theory.

UNIT V FACTOR PRICING III **10 hrs**

Concept of Profit – Gross Profit and Net Profit – Theories of Profit: Dynamic Theory, Innovation Theory and Uncertainty Bearing Theory

Text Book:

Maria John Kennedy, Micro Economic Theory

Books for Reference :

1. M.L.Jhingan, *Micro Economic Theory* – Delhi: Vrinda Publications, 1998

2. M.L.Seth, *Principles of Economics* –Lakshmi Nara Publication, 1997

3. Pazhani, *Micro Economics,* Nagercoil: J.P.Publishers, 2004

4. S.Sankaran - *Economic Analysis,* Madras: Margham Publications, 1991

2. Salvatore - Micro Economics, 4/e, New Delhi: OUP, 2002.

SEMESTER- II			
CORE IV – Indian Economy – II			
Code: 18UECC22	**Hours / week : 5**	**Hrs / Semester: 75**	**Credits : 4**

Vision:
Develop an in-depth understanding of the Indian economy

Mission:

Become proficient in understanding and analyzing Indian Economic Issues, developments and policies.

Course Outcome:

CO No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO – 1	be familiar with the current dominant thoughts and tools used for economic policy making and research.	4	Re
CO – 2	understand agriculture as the foundation of economic growth and development, analyse the progress and changing nature of agricultural sector and its contribution to the economy as a whole.	1, 4	Un
CO – 3	evaluate "Green Revolution" because it has reached its limits and needs to be extended.	1	Ev
CO – 4	understand the issues and challenges of Demographic Change, Transition and Human Development Index measurement in India:	3, 4	Un
CO – 5	understand Important features of five year plans and their growth rates	4	An
CO – 6	understand the issues relating to industries, including industrial policy and growth, industrial Structure, Industrial sickness and labour reforms	4, 5	Un
CO – 7	explain the issues like economic reforms and WTO which deals with the contemporary issues relating to liberalization, privatization, disinvestment and globalization	1, 5	Ap
CO – 8	grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.	1, 4	Cr

SEMESTER- II

CORE IV – Indian Economy – II			
Code: 18UECC22	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

UNIT I INDUSTRIES **15 hrs**

Role of Industries in Economic Development - Cottage, Small Scale, MSME and Large Scale Industries (Cotton, Iron & Steel and Cement) Industrial Policy-1991, 2001 & 2011

UNIT II PLANNING **15 hrs**

Definition and Scope of Planning-Objectives of Planning in India-A brief resume of Five year Plans in India – Recent Five year Plan.

UNIT III TRANSPORT **15 hrs**

Types of Transport - Importance (Railway, Roadways, Shipping and Civil Aviation

UNIT IV FOREIGN TRADE **15 hrs**

Importance of Foreign Trade in Economic Development, Balance of Payments – Recent EXIM Policy- WTO and Indian Economy- Government Financial Support for foreign trade

UNIT V IT & ITES IN INDIA **15 hrs**

Meaning – Structure – Role and Importance of IT & ITES in India- Recent Developments

Text Book:

Ruddar Datt and Sundharam K.P.M., *Indian Economy*, New Delhi: Sultan Chand, 2009

Books for Reference:

1. Uma Kapila, *Indian Economy, 9th Edition,* ISBN:8171887902, Published by Academic

   Foundation, 2010.

2. Ishwar.C.Dhingra -*The Indian Economy, Twenty first edition*, New Delhi: Sultan Chand,

   2009. 2.

3. Mishra & Puri - *Economics of Development and Planning,* Himalaya , Mumbai: 7th edition, 2005.

4. Meier, G.M. *Leading Issues in Economic Development,* O U P, New Delhi: 6th edition, 1995.

Semester- III			
Core V-Tamilnadu Economy			
Code: 18UECC31	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :4**

Unit I: Introduction **20 Hours**

Tamil Nadu – Salient Features – Land Area – Distribution of Occupational Structure in Tamil Nadu- Demographic trends in Tamil Nadu – Land Use – Forest Resources – Human Resources – Infrastructure: Education, Health, Banking, Power, Transport and Communication.

Unit II: Agriculture **15 Hours**

Agriculture – Land Use – Cropping Pattern – Principal Commodities – Irrigation – Green Revolution – Agricultural Marketing – Defects - Remedial Measures – Agricultural Finance – Agencies – Government Role – Self Help Groups and Micro Finance

Unit III: Industry **20 Hours**

Major Industries – Automobile, Leather, Cotton, Sugar, Cement – Small-Scale Industries - Cottage Industries – Ancillary Industries – Handloom Industries –Role of Government in Industrial Development - Industrial Finance – Agencies-TIIC, SIDCO, SIPCOT, Industrial Estate, DIC– Special Economic Zones

Unit IV: State Finance **15 Hours**

State Finance – Revenue – Expenditure – Tamil Nadu Recent Budget

Unit V: Planning and State Finance **20 Hours**

Economic planning and development in Tamil Nadu –Achievements and failures –State Finance in Tamil Nadu- Poverty Alleviation Programmes in Tamil Nadu: PDS – MGNREGS – Tribal Area Development Programme (TADP) –current economic issues- Current Economic Issues - Welfare Programmes in Tamil Nadu

Text Book:

A.G. Leonard, *Tamil Nadu Economy*, New Delhi: Macmillan Publishers, 2006

Books for Reference:

1. N. Rajalakshmi, *Tamilnadu Economy*, Business Publications Incorporated, 1999
2. S.Manickam, *Panorama of Indian Economy*, 2010, S. Manickam OLDSELF 1994
3. P.Srinivasan, *A Road Guide to Tamil Nadu*, TTK Healthcare Limited – Printing Division, 2001
4. P.A. Maraikumar, *Tamil Nadu Economy*, Palayamkottai: Immanuel Publications, 2001

Semester- IV			
Core VI – Monetary Economics			
Code: 18UECC41	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :4**

Unit-I Money **15 Hours**

Money - meaning, evolution, functions and classification; Gresham's law; role of money in capitalist, socialist and mixed economies; plastic money

Unit-II Monetary Standards **20 Hours**

Monetary standards- features, merits and demerits; Metallic and Paper System of Note Issue - principles and methods of note issue. The supply of money: the velocity of circulation; Demand for money; Value of money: Fisher's equation; Cambridge version.

Unit-III Commercial Banking **20 Hours**

Commercial banking: Nature; structure; functions - The process of credit creation-purpose and limitations - Liabilities and assets of Banks - Recent Reforms in Banking Sector in India.

Unit-IV Central Banking **15 Hours**

Role of central banks in developed and developing countries; Functions of a central bank; Role and functions of the Reserve Bank of India; Methods of credit control: Quantitative and qualitative Methods - Recent monetary policy of RBI.

Unit-V Money Market And Capital Market **20 Hours**

Financial markets: Money market: characteristics and constituents - Capital market: characteristics and constituents - unregulated credit markets - credit instruments - Working of Capital Markets in India.

Text Book

Jhinghan, M.L. *Monetary Economics.* New Delhi: Virinda Publications, 2012

Books for Reference:

1. Mithani, D. *Money, Banking and International Trade.* Mumbai: Himalaya Publications House, 2016.

2. Dr. Cauvery, etal.*Monetary Economics*. New Delhi: S Chand & Company, (2010)

3. Sankaran, S.M*onetary Economics*. Chennai: Margham Publications, 2015

4. Vaish, M.C. *Monetary Theory*. Vikas Publishing, 2005

Semester- V			
Core VIII -Macro Economics- I			
Code: 18UECC52	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

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Vision: To acquire the knowledge of important concepts of Macro Economics

Mission: To develop and practice economic theories in present life

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	explain what economics is and explain why it is important	1,3,6	An
CO - 2	describe the relationships among GDP, net domestic product, national income, personal income and disposable income.	6	An
CO- 3	identify and differentiate the different types of unemployment	3	Ev
CO-4	identify the strengths and weaknesses of the Keynesian and classical model.	2,3,4	Ev
CO-5	explain and graph the consumption function	1, 6	An
CO-6	explain what would cause the consumption function to grow steeper or flatter or to shift up or down	2, 6	An
CO-7	know the multiplier and identify the leakages of multiplier	1,6,8	An
CO-8	understand the acceleration principles	1	Un

Semester- V			
Core VIII -Macro Economics- I			
Code: 18UECC52	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit – I Introduction and National Income **15 Hours**

Macro Economics vs. Micro Economics, Macro-Economic Problems: Unemployment,Inflation-National Income- meaning – Concepts – methods and problems in measurement

Unit – II Theories of Employment **20 Hours**

Meaning of full employment – Types of unemployment – Classical theory of output and employment – Say's law of market –Criticisms of Classical theory–Keynesian Theory of employment –Comparison of Classical theory with Keynesian theory of employment

Unit – III Consumption Function **20 Hours**

Consumption and income – Average and Marginal propensity to consume and their relationship –Factors determining consumption function - Importance of consumption function – Theories of Consumption Function – Absolute, Relative

Unit – IV Multiplier **20 Hours**

Multiplier – Meaning – Relationship with Marginal propensity to consume and save– Importance – Leakages - Keynes's Investment Multiplier compared with Khan's Employment Multiplier.

Unit – V Accelerator **15 Hours**

Acceleration principle – Meaning – Assumptions – Importance – Limitations – Interaction of Acceleration and Multiplier or leverage effect or Super Multiplier

Text Book:

M.L.Seth. *An Introduction to Keynesian Economics*. Agra: Agarwal EducationalPublishers, 1957.

Books for Reference:

1. Ackley. *Macro Economic Theory and Policy.* London, New York : Macmillan, 1978
2. J.M.Keynes. *The General Theory of Employment.* London: Interest and Money,Macmillan, 1936
3. M.Maria John Kennedy. *Macro Economics*, New Delhi: PHI Learning PVT Ltd, 2011

Semester- V			
Core IX -Fiscal Economics			
Code: 18UECC53	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision: Provide the knowledge on basic financial procedure of the government.

Mission: To develop the ability of the students to understand and to make research in finance and economics and the skills to apply those concepts to the making of intelligent decisions for themselves in public sector and business life.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	differentiate between public finance and private finance	6	Ap
CO - 2	explain tax and non- tax revenue, differentiate between direct and indirect tax, explain shifting of taxation and effects of taxation	1, 2, 6	An
CO- 3	classify the public revenue and its various sources; revenue receipts and non- revenue receipts, understand the tax and non-tax revenue.	1,3	Ev
CO- 4	describe how and in which manner government spends, the causes of increasing public expenditure in the modern economies, explain the varying effects of public expenditure on the economy and role of public expenditure in a developing economy.	2, 3	Ev
CO - 5	identify the measures to reduce public expenditure.	3	Ev
CO - 6	explain the types of public debt and how debt is repaid	1,2,5	An
CO -7	describe the government budget, explain different types of budgets such as balanced and unbalanced budget and know the budgetary procedure.	3	Ev
CO-8	analyse the latest government budget allotment	6,8	An

Semester- V			
Core IX -Fiscal Economics			
Code: 18UECC53	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Introduction **15 Hours**

Meaning and Definition of Public finance – Public finance and Private finance Principle of Maximum Social advantage

Unit II Public Revenue **20 Hours**

Tax and non-tax revenues – Canons of Taxation – Types of tax – Direct and indirect taxes – Progressive, Proportional and Regressive taxation, Effects of taxation – Taxable Capacity: Determinants

Unit III Public Expenditure **20 Hours**

Classification of Public Expenditure – Causes and Growth of Public Expenditure – Effects of Public Expenditure on production, employment and distribution – Measures to reduce Public Expenditure in India.

Unit IV Public Debt **15 Hours**

Meaning and Classification – Need for Public Borrowing – Effects of Public Debt on production, consumption and distribution - Burden of Public Debt– Redemption of PublicDebt – Growth of Public Debt in India.

Unit V Financial Administration **20 Hours**

Centre state relations –Role of Finance commissions- Meaning and components of Government budget- Revenue and Capital Budget – Characteristics of a sound budget– Budgetary procedure in India - A Review of the latest Union Budget- Local finance

Text Book: B.P.Tyagi. *Public finance* JAI Prakash Nath& Co., 2007

Books for Reference:

1. H.L.Bhatia. *Public Finance.* New Delhi: Vikas Publishing House Pvt. Ltd, 1999
2. R.C. Agarwal. *Public Finance: Theory and Practice.* Agra: Lakshmi NarayanPublications, 2006.
3. Musgrave & Musgrave. *Public Finance -Theory and Practice.* New Delhi: McGraw HillBook Co.,1981
4. R.Cauvery. *Public Finance*. New Delhi: S. Chand & Company, Ltd, 2007

Semester- VI			
Core –X Macro Economics – II			
Code: 18UECC61	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To enable the students to have basic knowledge on macro-economic theories and policies

Mission:

To interpret the forces that cause fluctuations in capital and investment and to familiarize the issues associated with monetary & fiscal policy**.**

Course Outcome:

CO. No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	describe theories of distribution	1	Un
CO-2	evaluate macroeconomic performance using indicators that include output measures and unemployment	1, 4	Ev
CO-3	understand the concepts used, methods to measure and difficulties encountered in the calculation of National Income	1, 3	Un
CO-4	identify, compare, and apply key features of Neoclassical and Keynesian economic models	4	Ap
CO-5	analyse fiscal and monetary policy decisions to counter business cycle swings by using macro-economic models.	6	Un
CO-6	evaluate macroeconomic performance using indicators that include inflation.	1, 2	Ev
CO-7	know about Macroeconomic Policies	1	Un
CO-8	identify the fiscal and monetary policies for internal and external balance	1	Un

Semester- VI			
Core –X Macro Economics – II			
Code: 18UECC61	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Theories of Distribution **15 Hours**

Classical Theory of Distribution– Marxian Theory of Income Distribution –Kaldor's Theory of Distribution – Critical appraisal

Unit II Investment Function **20 Hours**

Meaning of Capital and Investment – Types of Investment – Induced Vs Autonomous – Determinants of Investments – Rate of Interest – Marginal Efficiency of Capital (MEC) –Factors influencing MEC

Unit III General Equilibrium **15 Hours**

Concept of Partial Equilibrium – General Equilibrium – Derivation of IS and LM Functions – Shifts in IS and LM Functions

Unit IV Macro Economic Policy **20 Hours**

Macroeconomic Policy – Policy objectives – Conflicts in policy objectives - Fiscal and Monetary Policies for Internal and External Balance

Unit V Monetary & Fiscal Policy **20 Hours**

Monetary Policy –Instruments – Effectiveness - Role of Monetary Policy in Developing Economy – Fiscal Policy – Objectives – Limitations – Fiscal Monetary Policy Mix

Text Book:

M. Maria John Kennedy. *Macro Economics*. New Delhi: PHI Learning PVT Ltd, 2011

Books for Reference:

1. Ackley. *Macro Economic Theory and Policy.* London; Macmillan, 1978
2. M.L.Seth. *An introduction to Keynesian Economics.* Agra: Agarwal, 1974.
3. J.M.Keynes. *The General Theory of Employment, Interest and Money*, London:Macmillan, 1936.

Semester- VI			
Core XI– Development Economics			
Code: 18UECC62	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To relate theoretical concepts in economic development and growth

Mission:

To grasp how the planning contributes to the growth of the Indian Economy.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of economic growth and development	1	Un
CO-2	know about India's stage of Economic Growth	4	Un
CO-3	identify the Achievements and Failures of Five Year plans in India	1	Un
CO-4	describe the nature and meaning of economic development or underdevelopment, both in general, and as applied to people in specific developing countries.	1	An
CO-5	illustrate how economics can be used to create or analyse alternative approaches to promote development.	4	Ap
CO-6	explain the major development problems, choices and opportunities currently faced by developing countries.	6	Un
CO-7	select, assess and justify specific policy choices that developing countries might make to achieve their economic and social objectives.	1	Ev
CO-8	analyse, synthesise and evaluate information drawn from the available data and appropriate theoretical tools, and to express their ideas orally and in writing.	6	An, Ev

Semester- VI			
Core XI– Development Economics			
Code: 18UECC62	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit – I Introduction **20 Hours**

Economic growth and development – Factors affecting Economic Growth – Capital, Labour and Technology - Rostow's stages of Economic Growth –India's stage of Economic Growth

Unit – II Approaches to Economic Development **20 Hours**

Vicious Circle of Poverty, Circular Causation, Unlimited supply of Labour – Big PushTheory, Balanced Growth Theory - Critical minimum effort thesis – Dualism – Technical, Behavioural, Social and Financial

Unit – III Theories of Economic Development **15 Hours**

Classical theory of development – Theory of social changes – crisis in capitalism,Schumpeter and Capitalistic development

Unit – IV Growth Models **20 Hours**

Harrod and Domar Model – Solow – Meade – Mrs. Joan Robinson's- Romer's andArrow's Models

Unit – V Measures for Economic Development **15 Hours**

Need for Planning – Types – Conditions for successful operation of planning – Planningmachinery in India - Achievements and Failures of Five Year plans

Text Book:

M.L.Seth. *Theory and Practice of Economic Planning*, New Delhi: S.Chand & Co., 1969

Books for Reference:

1. M.L.Jhingan. *Economics of Development and Planning.* New Delhi: Vrinda PublicationsP.Ltd (2016)
2. B.C. Tandon. *Economic Planning: Theory and Practice*, Allahabad: ChaitanyaPublishing House, 1971.
3. Misra and Puri. *Economics of Development and Planning*, Himalaya Publishing House,2014
4. W.A.Lewis. *Development and Planning,* George Allen & Unwin, 1963.
5. Kindleberger. *Economic Development*, New York: McGraw Hill, 1965

Semester- VI			
Core XI I– Labour Economics			
Code: 18UECC63	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To understand labour as a unique factor of production

Mission:

To help students to understand the working of the labour welfare agencies, social security measures in India and to observe the nature of industrial relations in India.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe efficiency of Indian labour	1	An
CO-2	know about characteristics & objectives of trade unions	1	Un
CO-3	elaborate the detailed study on worker's participation in management in India	4	Un
CO-4	explain the relationship of the labour market to other markets.	4	Un
CO-5	understand the basic mechanism of the labour market, in particular with how unemployment, wage and productivity differences can arise as equilibrium phenomena.	1	Re
CO-6	perform supply and demand analysis in the labour market.	2	Ap
CO-7	show the causes and changes in the productivity of labour.	4	Ap
CO-8	analyze the effect of labour unions.	3	An

Semester- VI			
Core XII– Labour Economics			
Code: 18UECC63	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Labour as a factor of Production: 15 Hours

Meaning and Definition of Labour - Peculiarities of labour- Factors affecting labour –Migration & absenteeism – causes, effects and remedial measures – Efficiency of Indianlabour.-knowledge workers

Unit II Trade Unions: 20 Hours

Trade Unionism – Meaning, Definitions- Types – Characteristics & Objectives of Trade Unions – Functions – Industrial Disputes – Causes – Impact – Suggestions for improving industrial relations - Collective Bargaining – Objectives – Process of Collective Bargaining.

Unit III Workers' Participation in Management 20 Hours

Works Committees – Joint Management Councils – Worker's Participation inManagement in India – Worker's Education – Objectives – Worker's Education in India.

Unit IV Labour Welfare 15 Hours

Meaning- Definitions – Features – Concepts –Intra Mural and Extra Mural Labour – Labour Welfare Agencies – Aims and functions of ILO-India and ILO.

Unit V Social Security 20 Hours

Meaning – Definition – Importance – Social Insurance – Social Assistance – CommercialInsurance- Social Security measures in India.

Text Book:

Dr.S.Ramakrishna Moorthy - *Labour Economics*, Tirunelveli: D.S.R.Publications – 2002.

Books for Reference:

1. Dr.M.M.Varma and R.K.Aggarwal, *Labour Economics.* New Delhi: – Kings Bookspublisher –1994.
2. Bhagoliwal T.N. *Economics of Labour and Industrial Relations*, Agra: Sahitya Bhavan,1983.
3. Reynolds, Lloyd. *Labour Economics and Labour Welfare.* New Delhi: Prentice. Hall ofIndia Pvt. Ltd. 1978.

Semester- V			
Core Integral I - Rural Economics			
Code: 18UECI51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision: Learn rural economic development conceptual frameworks

Mission: Prepare the students for appropriate participation in preparing and implementation of the rural area and agricultural development

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	discuss the importance and Significance of rural development	1, 2	Ap
CO - 2	know the aims and features of National Agricultural Policy.	2	An
CO- 3	apply their knowledge and understanding, and problem-solving abilities, to independently identify rural development issues from a geographical perspective	2, 6	Ap
CO - 4	analyze present problems and provide solutions based on a rural industrial environment.	6	An
CO - 5	identify and analyse specific problems of agricultural labour.	3,6	Cr
CO- 6	describe the current problems of rural marketing & regulate the market structure.	2,3	Ev
CO-7	know the Community Development Programme	2	An
CO-8	understand rural development programme	1,4	Un

SEMESTER- V			
Core Integral I - Rural Economics			
Code: 18UECI51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I Nature of Rural Economy **15 Hours**

Concepts and Definition of rural economy- Characteristics of rural economy-Rural Development: Objectives and Scope of rural development- Importance and Significance of rural development in India-Problems of Rural economic development

Unit II Rural Farm Economy **15 Hours**

Importance of agricultural sector in the development of rural economy-Role of agricultural sector in GDP- Problems of Indian agriculture- Main aims and features of National Agricultural Policy - Current scenario of agricultural labour in India

Unit III Rural Non-Farm Economy **15 Hours**

Concepts and definitions of rural industries- needs and economic significance of ruralindustries- rural industries and poverty alleviation- role of KVIC in the development ofrural industries-present problems of rural industries in India – remedies.

Unit IV Rural Marketing **15 Hours**

Introduction to rural products and marketing- nature - importance and significance - 4Ps -recent trends - current problems of rural marketing-suggestion for improving ruralmarketing- meaning of regulated market-objectives-features-benefits-problems and remedies of regulated marketing in India-e-marketing

Unit V Approaches to Rural Development **15 Hours**

Introduction of rural development programmes- Community Development Programmes-Intensive Agricultural District Programme- Employment Guarantee Scheme- TRYSEM--JRY-NABARD programmes etc.

Text Book:

Vasant Desai. *Rural Development in India*, Mumbai: Himalaya Publishing House, 2012.

Books for Reference:

1. Venkata Reddy. K. *Agriculture and Rural Development* Himalaya Publication house,2012.
2. Dutt and Sundaram. *Indian Economy.* New Delhi; S.Chand Publications, 2013-07-02.
3. MishraS.K. and PuriV.K. *Economics of Development and Planning.* Mumbai: HimalayaPublishing House, 2012.
4. Mukundan.N.*Rural Development and Poverty Eradication in India*, 2009.
5. Katar Singh. R*ural Development Principles, Policies and Management, New* Delhi: SagePublications, 1986.

Semester- V			
Core Integral II - Tourism Economics			
Code: 18UECI52	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision: Understand the economic significance of the tourism industry and tourism services

Mission: To create the knowledge in the field of tourism industry and its impacts on the economy

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	know the structure and scope of tourism industry	1,2	An
CO – 2	demonstrating knowledge and understanding of the basic principles of tourism in all its dimensions and areas.	5	Ap
CO – 3	discuss trends in and analyze problems of supply and demand for tourism services	1,2	Ap
CO – 4	planning and management of projects in Tourism	1,2	Ap
CO – 5	understand the travel agency and its functions	1	Un
CO – 6	plan, lead, organize and control resources for effective andefficient tourism operations.	5,8	Ap
CO – 7	develop and evaluate tourism policy and planning initiatives	7, 4	Ev
CO – 8	analyse the effects of economic policies implemented by the government on the overall performance of the economy and on the tourism sector in particular.	6	An

Semester- V			
Core Integral II - Tourism Economics			
Code: 18UECI52	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I Importance of Tourism **15 Hours**

Definition – Concepts – Scope – Classifications – Challenges -Socio – Economic benefitsof tourism - Factors influencing the growth of Tourism

Unit II Tourism Industry **15 Hours**

Tourism as an Industry – Components of Tourism -Structure of Tourism Industry - Global Status of Tourism Industry - Sustainable Tourism- Indian Tourism Industry -Scope of Tourism in India

Unit III Tourism Product **15 Hours**

Concepts of Tourism product – Characteristics of tourism product - Types -Tourism Demand - Motivation of Tourism Demand - Measuring Tourism Demand- Pattern andCharacteristics of tourism supply - Factors influencing tourism supply.

Unit IV Tourism Planning **15 Hours**

Planning and development of tourism in India – Techniques of tourism planning - Tourism Marketing – Market segmentation and Tourism market mix –Travel documents and procedures - Travel agency andTour operators – Types – Functions of a travel agency

Unit V Tamil Nadu Tourism **15 Hours**

General Performance of the State Tourism Development in Tamil Nadu– Role of Local bodies – Tourism administration – Tourism Policy–Ports – Trade – Commerce - Popular tourist places in Tamilnadu – Promotion of Tourism in Tamilnadu - Environmental Protection measures in Tamil Nadu-Developing tourism potential of local area

Text Book:

Viswanath Ghosh.*Tourism and Travel Management.* New Delhi: Vikas Publishing House, Pvt., Ltd., 2000

Books for Reference:

1. Bhatia A.K. *International Tourism Management.* New Delhi: Sterling Publishers Pvt,Ltd.2001.
2. Cooper, C, Flethor, J.D. and Wanhill, S. *Tourism: Principles and Practices,* London:Pitman. 1993.
3. Johan M. Bryder. *Tourism and Development.* London: Cambridge University Press,1973.
4. Michael Peters. *International Tourism.* London: Hutchinson, 1969.
5. Rajasekara Thangaman. *Tourism Development*, Chennai: Madras art printers, 2003.

Semester- VI			
Core Integral III - International Economics			
Code: 18UECI61	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision:
To understand the theories governing international trade

Mission:
To evaluate the policies pursued by various economic bodies in international economic transactions.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describing the benefits of international trade and defects	1	Un
CO-2	elaborate the detailed study on balance of trade and balance of payments	4	Un
CO-3	elaborate the procedure to be implemented for GATT, UNCTAD and WTO	1	Ap
CO-4	familiar with the main economic theories and models of international trade.	1	Un
CO-5	aware of the likely distributional consequences of trade and thus of conflicting interests within an economy regarding trade liberalization.	3	Un
CO-6	understand economists' arguments concerning trade policy and its analysis.	4	Un
CO-7	apply economic reasoning to issues of the day surrounding globalization.	6	Ap
CO-8	have an elementary understanding of open-economy macroeconomics and the determinants of exchange rates and the balance of payments.	4	Un

Semester- VI			
Core Integral III-International Economics			
Code: 18UECI61	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit – I Introduction **15 Hours**

Differences between international trade and internal trade - Benefits of international tradeand defects, Free trade: Meaning - Arguments for and against - Protection: Meaning - Arguments for and against – Kinds of Protection and Role of Protection in UDCs

Unit – II Theories of International Trade **15 Hours**

Classical Theory, Comparative Cost Theory, Modern Theory and Factor-Price Equalization Theory

Unit – III Balance of Payments **15 Hours**

Meaning of Balance of trade and Balance of payments – Meaning and Types, Structure ofa Balance of payment, Causes and Remedial measures

Unit–IV Foreign Exchange **15 Hours**

Meaning of Foreign exchange and Exchange Rate, Determination: Mint parity theory – Purchasing power party theory – Balance of payment Theory– Fixed and Flexible Exchange Rate: Merits and Demerits

Unit – V International Financial Institutions **15 Hours**

IMF – Objectives– structure– Functions –World Bank (IBRD) – Objectives – structure – Functions - Trade Agreements: GATT, UNCTAD and WTO-Regional Blocks

Text Book: M.L.Jhingan. *International Economics.* New Delhi: Vrinda Publications P.Ltd -2016.

Books for Reference:

1. D.M. Mithani. *International Economics.* New Delhi:Himalayas Publishing House, 2003
2. Soderston. *International Economics.* London: The Macmillan Press Ltd., 2010
3. Singh & Agarwal. *International Economics.* Meerut: Sanjeeva Prakashan, 2012.
4. Devairakkam. *International Economics*. Tirunelveli: D.S.R.Publications, 2001.
5. Francis Cherunilam. *International Economics*, New Delhi. (Fifth Edition) Tata McGrawHill, 2010

Semester – V			
Part III Core XI (Common Core) Human Resource Management			
Code:18UMCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit : 4**

Vision:

To enable students to understand the basic concepts in HRM

Mission:

To familiarize students on the various aspects of HRM

Course Outcome:

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Cognitive Level
CO – 1	gain knowledge on the basic concepts of planning human resource and help them to understand basic techniques of business.	1,2	Un
CO – 2	understand the basic selection process in HR.	1,2,3	Un
CO – 3	know the importance of training and development in HR.	2,3,4	Ap
CO – 4	know about the transfer policies	2,3,5	Un, Re
CO – 5	gain knowledge on compensation methods.	3,4	Un, An
CO – 6	understand the promotional policies in business	3,4	Un, Re
CO – 7	know about the significance and problems in performance appraisal.	3,4,5	Ap
CO – 8	know about the methods of performance appraisal	3,4,5	Ap

Semester V			
Part –III	**Core – XI (Common Core)**	**Human Resource Management**	
Code: 18UMCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Unit-I: Introduction **15 Hours**

Human Resource Management: Meaning - Objectives - Nature and Scope - Importance – Functions - and Problems of HRM - Personnel Management Vs. HRM - Qualities and Qualifications of Human Resource Managers.

Unit-II: Human Resource Planning, Recruitment and Selection **20 Hours**

Human Resource Planning: Meaning - Need and Importance - Objective - Problems - Process – Recruitment: Meaning - Factors Influencing Recruitment - Sources of Recruitment - Problems in Recruitment – Selection: Meaning - Factors Affecting Selection Decisions - Selection Policy - Steps in Selection.

Unit-III: Training and Development **20 Hours**

Training: Need and Importance - Objective - Types - Steps in Training Programme – Methods of Training - Evaluation of Training Programmes – Development: Meaning - Concept and Essentials of Management Development Programmes.

Unit-IV: Transfer, Promotion & Compensation **15 Hours**

Transfer: Objective - Transfer Policy - Promotion: Purpose - Promotion Policy – Demotion - Compensation: Objective – Principles.

Unit-V: Performance Appraisal **20 Hours**

Performance Appraisal: Meaning - Need and Importance - Objective - Problems in Performance Appraisal - Factors Influencing Performance Appraisal – Methods of Performance Appraisal.

Text Book:

Chitra,Atmaram, Naik. *Human Resource Management.* Ane Books Pvt., 2016.

Books for Reference:

1. Dr.C.B.Gupta. *Human Resource Management.* New Delhi: Sultan Chand & Sons, 2018.
2. C.P.Memoria, *Personnel Management*, Himalaya Publishing House, 2011
3. L.M.Prasad., *Human Resources Management.* New Delhi: Sultan Chand & Sons,2014.
4. Gary Dessler. *Human Resource Management.* Prentice Hall, 2013.
5. Michael Armstrong. *A Handbook of Human Resource Management Practice.* Kogan Page,2012.

Semester- V			
Core VIII -Macro Economics- I			
Code: 18UECC52	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

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Vision: To acquire the knowledge of important concepts of Macro Economics

Mission: To develop and practice economic theories in present life

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	explain what economics is and explain why it is important	1,3,6	An
CO - 2	describe the relationships among GDP, net domestic product, national income, personal income and disposable income.	6	An
CO- 3	identify and differentiate the different types of unemployment	3	Ev
CO-4	identify the strengths and weaknesses of the Keynesian and classical model.	2,3,4	Ev
CO-5	explain and graph the consumption function	1, 6	An
CO-6	explain what would cause the consumption function to grow steeper or flatter or to shift up or down	2, 6	An
CO-7	know the multiplier and identify the leakages of multiplier	1,6,8	An
CO-8	understand the acceleration principles	1	Un

Semester- V			
Core VIII -Macro Economics- I			
Code: 18UECC52	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit – I Introduction and National Income **15 Hours**

Macro Economics vs. Micro Economics, Macro-Economic Problems: Unemployment, Inflation-National Income- meaning – Concepts – methods and problems in measurement

Unit – II Theories of Employment **20 Hours**

Meaning of full employment – Types of unemployment – Classical theory of output and employment – Say's law of market –Criticisms of Classical theory–Keynesian Theory of employment –Comparison of Classical theory with Keynesian theory of employment

Unit – III Consumption Function **20 Hours**

Consumption and income – Average and Marginal propensity to consume and their relationship –Factors determining consumption function - Importance of consumption function – Theories of Consumption Function – Absolute, Relative

Unit – IV Multiplier **20 Hours**

Multiplier – Meaning – Relationship with Marginal propensity to consume and save– Importance – Leakages - Keynes's Investment Multiplier compared with Khan's Employment Multiplier.

Unit – V Accelerator **15 Hours**

Acceleration principle – Meaning – Assumptions – Importance – Limitations – Interaction of Acceleration and Multiplier or leverage effect or Super Multiplier

Text Book:

M.L.Seth. *An Introduction to Keynesian Economics*. Agra: Agarwal Educational Publishers, 1957.

Books for Reference:

1. Ackley. *Macro Economic Theory and Policy.* London, New York : Macmillan, 1978
2. J.M.Keynes. *The General Theory of Employment.* London: Interest and Money, Macmillan, 1936
3. M.Maria John Kennedy. *Macro Economics*, New Delhi: PHI Learning PVT Ltd, 2011

Semester- V			
Core IX -Fiscal Economics			
Code: 18UECC53	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision: Provide the knowledge on basic financial procedure of the government.

Mission: To develop the ability of the students to understand and to make research in finance and economics and the skills to apply those concepts to the making of intelligent decisions for themselves in public sector and business life.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	differentiate between public finance and private finance	6	Ap
CO - 2	explain tax and non- tax revenue, differentiate between direct and indirect tax, explain shifting of taxation and effects of taxation	1, 2, 6	An
CO- 3	classify the public revenue and its various sources; revenue receipts and non- revenue receipts, understand the tax and non-tax revenue.	1,3	Ev
CO- 4	describe how and in which manner government spends, the causes of increasing public expenditure in the modern economies, explain the varying effects of public expenditure on the economy and role of public expenditure in a developing economy.	2, 3	Ev
CO - 5	identify the measures to reduce public expenditure.	3	Ev
CO - 6	explain the types of public debt and how debt is repaid	1,2,5	An
CO -7	describe the government budget, explain different types of budgets such as balanced and unbalanced budget and know the budgetary procedure.	3	Ev
CO-8	analyse the latest government budget allotment	6,8	An

Semester- V			
Core IX -Fiscal Economics			
Code: 18UECC53	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Introduction **15 Hours**

Meaning and Definition of Public finance – Public finance and Private finance Principle of Maximum Social advantage

Unit II Public Revenue **20 Hours**

Tax and non-tax revenues – Canons of Taxation – Types of tax – Direct and indirect taxes – Progressive, Proportional and Regressive taxation, Effects of taxation – Taxable Capacity: Determinants

Unit III Public Expenditure **20 Hours**

Classification of Public Expenditure – Causes and Growth of Public Expenditure – Effects of Public Expenditure on production, employment and distribution – Measures to reduce Public Expenditure in India.

Unit IV Public Debt **15 Hours**

Meaning and Classification – Need for Public Borrowing – Effects of Public Debt on production, consumption and distribution - Burden of Public Debt– Redemption of Public Debt – Growth of Public Debt in India.

Unit V Financial Administration **20 Hours**

Centre state relations –Role of Finance commissions- Meaning and components of Government budget- Revenue and Capital Budget – Characteristics of a sound budget– Budgetary procedure in India - A Review of the latest Union Budget- Local finance

Text Book: B.P.Tyagi. *Public finance* JAI Prakash Nath& Co., 2007

Books for Reference:

1. H.L.Bhatia. *Public Finance.* New Delhi: Vikas Publishing House Pvt. Ltd, 1999
2. R.C. Agarwal. *Public Finance: Theory and Practice.* Agra: Lakshmi Narayan Publications, 2006.
3. Musgrave & Musgrave. *Public Finance -Theory and Practice.* New Delhi: McGraw Hill Book Co.,1981
4. R.Cauvery. *Public Finance*. New Delhi: S. Chand & Company Ltd, 2007

Semester- V			
Core Integral I - Rural Economics			
Code: 18UECI51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision: Learn rural economic development conceptual frameworks

Mission: Prepare the students for appropriate participation in preparing and implementation of the rural area and agricultural development

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	discuss the importance and Significance of rural development	1, 2	Ap
CO - 2	know the aims and features of National Agricultural Policy.	2	An
CO- 3	apply their knowledge and understanding, and problem-solving abilities, to independently identify rural development issues from a geographical perspective	2, 6	Ap
CO - 4	analyze present problems and provide solutions based on a rural industrial environment.	6	An
CO - 5	identify and analyse specific problems of agricultural labour.	3,6	Cr
CO- 6	describe the current problems of rural marketing & regulate the market structure.	2,3	Ev
CO-7	know the Community Development Programme	2	An
CO-8	understand rural development programme	1,4	Un

SEMESTER- V			
Core Integral I - Rural Economics			
Code: 18UECI51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I Nature of Rural Economy **15 Hours**

Concepts and Definition of rural economy- Characteristics of rural economy-Rural Development: Objectives and Scope of rural development- Importance and Significance of rural development in India- Problems of Rural economic development

Unit II Rural Farm Economy **15 Hours**

Importance of agricultural sector in the development of rural economy- Role of agricultural sector in GDP- Problems of Indian agriculture- Main aims and features of National Agricultural Policy - Current scenario of agricultural labour in India

Unit III Rural Non-Farm Economy **15 Hours**

Concepts and definitions of rural industries- needs and economic significance of rural industries- rural industries and poverty alleviation- role of KVIC in the development of rural industries- present problems of rural industries in India – remedies.

Unit IV Rural Marketing **15 Hours**

Introduction to rural products and marketing- nature - importance and significance - 4Ps - recent trends - current problems of rural marketing- suggestion for improving rural marketing- meaning of regulated market- objectives-features-benefits-problems and remedies of regulated marketing in India-e-marketing

Unit V Approaches to Rural Development **15 Hours**

Introduction of rural development programmes- Community Development Programmes- Intensive Agricultural District Programme- Employment Guarantee Scheme- TRYSEM--JRY-NABARD programmes etc.

Text Book:

Vasant Desai. *Rural Development in India*, Mumbai: Himalaya Publishing House, 2012.

Books for Reference:

1. Venkata Reddy. K. *Agriculture and Rural Development* Himalaya Publication house, 2012.
2. Dutt and Sundaram. *Indian Economy.* New Delhi; S.Chand Publications, 2013-07-02.
3. MishraS.K. and PuriV.K. *Economics of Development and Planning.* Mumbai: Himalaya Publishing House, 2012.
4. Mukundan.N.*Rural Development and Poverty Eradication in India*, 2009.
5. Katar Singh. R*ural Development Principles, Policies and Management, New* Delhi: Sage Publications, 1986.

Semester- V			
Core Integral II - Tourism Economics			
Code: 18UECI52	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision: Understand the economic significance of the tourism industry and tourism services

Mission: To create the knowledge in the field of tourism industry and its impacts on the economy

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	know the structure and scope of tourism industry	1,2	An
CO – 2	demonstrating knowledge and understanding of the basic principles of tourism in all its dimensions and areas.	5	Ap
CO – 3	discuss trends in and analyze problems of supply and demand for tourism services	1,2	Ap
CO – 4	planning and management of projects in Tourism	1,2	Ap
CO – 5	understand the travel agency and its functions	1	Un
CO – 6	plan, lead, organize and control resources for effective and efficient tourism operations.	5,8	Ap
CO – 7	develop and evaluate tourism policy and planning initiatives	7, 4	Ev
CO – 8	analyse the effects of economic policies implemented by the government on the overall performance of the economy and on the tourism sector in particular.	6	An

Semester- V			
Core Integral II - Tourism Economics			
Code: 18UECI52	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I Importance of Tourism **15 Hours**

Definition – Concepts – Scope – Classifications – Challenges -Socio – Economic benefits of tourism - Factors influencing the growth of Tourism

Unit II Tourism Industry **15 Hours**

Tourism as an Industry – Components of Tourism -Structure of Tourism Industry - Global Status of Tourism Industry -Sustainable Tourism- Indian Tourism Industry - Scope of Tourism in India

Unit III Tourism Product **15 Hours**

Concepts of Tourism product – Characteristics of tourism product -Types -Tourism Demand - Motivation of Tourism Demand - Measuring Tourism Demand- Pattern and Characteristics of tourism supply - Factors influencing tourism supply.

Unit IV Tourism Planning **15 Hours**

Planning and development of tourism in India – Techniques of tourism planning - Tourism Marketing – Market segmentation and Tourism market mix –Travel documents and procedures - Travel agency andTour operators – Types – Functions of a travel agency

Unit V Tamil Nadu Tourism **15 Hours**

General Performance of the State Tourism Development in Tamil Nadu– Role of Local bodies – Tourism administration – Tourism Policy–Ports – Trade – Commerce - Popular tourist places in Tamilnadu – Promotion of Tourism in Tamilnadu - Environmental Protection measures in Tamil Nadu-Developing tourism potential of local area

Text Book:

Viswanath Ghosh.*Tourism and Travel Management.* New Delhi: Vikas Publishing House, Pvt., Ltd., 2000

Books for Reference:

1. Bhatia A.K. *International Tourism Management.* New Delhi: Sterling Publishers Pvt,Ltd. 2001.
2. Cooper, C, Flethor, J.D. and Wanhill, S. *Tourism: Principles and Practices,* London: Pitman. 1993.
3. Johan M. Bryder. *Tourism and Development.* London: Cambridge University Press, 1973.
4. Michael Peters. *International Tourism.* London: Hutchinson, 1969.
5. Rajasekara Thangaman. *Tourism Development*, Chennai: Madras art printers, 2003.

Semester- V	
Self-Study or On-line Course (Compulsory)– Economics of Insurance	
Code: 18UECSS3	**Credits :2**

Vision: To know the basic concepts of Insurance.

Mission: To train the students in the field of insurance and auxiliary services thus highly developing efficient and skilled insurance professionals to serve

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	know the importance of insurance	1,2	An
CO – 2	understand the classification of risks	1	Un
CO – 3	identify and apply the insurance policies procedures and benefits with present situation	1,3	Ap
CO – 4	understand the calculation of premium	1	Un
CO – 5	enhance the knowledge of Life and fire insurance.	7	Ap
CO – 6	describe the motor insurance	1, 2	Un
CO – 7	identify the role of insurance in economics	1,3	Ap
CO – 8	understand the IRDA	1	Un

Semester- V	
Self-Study or On-line Course (Compulsory)– Economics of Insurance	
Code: 18UECSS3	**Credits :2**

Unit-I Introduction

The quest for Economic Security - Classification of Risks - Demand for Insurance- Definition and Nature - Evolution and Importance of Insurance

Unit-II Life Insurance

Life Insurance Contract: Nature and Classification of Policies - Selection of Risk - Calculation of premium - Investment of Funds - Surrender Value – Term Insurance

Unit-III Fire Insurance

Fire Insurance: Nature and uses - Kinds of Policies - Policy Conditions - Rate Fixation - Payment of claim - Motor Insurance - Personal Accident - Health and Medical Insurance

Unit-IV Insurance & Economic Development

Insurance in Economic Development: Insurance and Mobilisation of savings - Insurance Institutions as Investment Institutions and their role in capital market -Privatisation of Insurance Sector

Unit-V Insurance & Social Welfare

Insurance as social welfare and security: Insurance - an Investment - Tax and Non - Tax Advantages - Retirement Planning - pension plans - Insurance Regulation and Development Authority (IRDA).

Text Book:

S.Devairakkam. *Insurance Principles and Practice.* Tirunelveli: DSR Publications, 2000

Books for Reference:

1. M.N.Mishra. *Insurance*, New Delhi: S.Chand & Company Ltd, 1999
2. Prof.Muthaya.S. *Life Insurance,* Palayamkottai: Ramalakshmi Publication, 2000.
3. IRDA: *Insurance Regulations and Development.* New Delhi: Authority Regulations.
4. Govt of India: *Old age and Income Security Report (Dave Committee Report)* New Delhi: *Govt of India*,

Semester- VI			
Core –X Macro Economics – II			
Code: 18UECC61	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To enable the students to have basic knowledge on macro-economic theories and policies

Mission:

To interpret the forces that cause fluctuations in capital and investment and to familiarize the issues associated with monetary & fiscal policy**.**

Course Outcome:

CO. No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	describe theories of distribution	1	Un
CO-2	evaluate macroeconomic performance using indicators that include output measures and unemployment	1, 4	Ev
CO-3	understand the concepts used, methods to measure and difficulties encountered in the calculation of National Income	1, 3	Un
CO-4	identify, compare, and apply key features of Neoclassical and Keynesian economic models	4	Ap
CO-5	analyse fiscal and monetary policy decisions to counter business cycle swings by using macro-economic models.	6	Un
CO-6	evaluate macroeconomic performance using indicators that include inflation.	1, 2	Ev
CO-7	know about Macroeconomic Policies	1	Un
CO-8	identify the fiscal and monetary policies for internal and external balance	1	Un

Semester- VI			
Core –X Macro Economics – II			
Code: 18UECC61	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Theories of Distribution **15 Hours**

Classical Theory of Distribution– Marxian Theory of Income Distribution –Kaldor's Theory of Distribution – Critical appraisal

Unit II Investment Function **20 Hours**

Meaning of Capital and Investment – Types of Investment – Induced Vs Autonomous – Determinants of Investments – Rate of Interest – Marginal Efficiency of Capital (MEC) – Factors influencing MEC

Unit III General Equilibrium **15 Hours**

Concept of Partial Equilibrium – General Equilibrium – Derivation of IS and LM Functions – Shifts in IS and LM Functions

Unit IV Macro Economic Policy **20 Hours**

Macroeconomic Policy – Policy objectives – Conflicts in policy objectives - Fiscal and Monetary Policies for Internal and External Balance

Unit V Monetary & Fiscal Policy **20 Hours**

Monetary Policy –Instruments – Effectiveness - Role of Monetary Policy in Developing Economy – Fiscal Policy – Objectives – Limitations – Fiscal Monetary Policy Mix

Text Book:

M. Maria John Kennedy. *Macro Economics*. New Delhi: PHI Learning PVT Ltd, 2011

Books for Reference:

1. Ackley. *Macro Economic Theory and Policy.* London; Macmillan, 1978
2. M.L.Seth. *An introduction to Keynesian Economics.* Agra: Agarwal, 1974.
3. J.M.Keynes. *The General Theory of Employment, Interest and Money*, London: Macmillan, 1936.

Semester- VI			
Core XI– Development Economics			
Code: 18UECC62	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To relate theoretical concepts in economic development and growth

Mission:

To grasp how the planning contributes to the growth of the Indian Economy.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of economic growth and development	1	Un
CO-2	know about India's stage of Economic Growth	4	Un
CO-3	identify the Achievements and Failures of Five Year plans in India	1	Un
CO-4	describe the nature and meaning of economic development or underdevelopment, both in general, and as applied to people in specific developing countries.	1	An
CO-5	illustrate how economics can be used to create or analyse alternative approaches to promote development.	4	Ap
CO-6	explain the major development problems, choices and opportunities currently faced by developing countries.	6	Un
CO-7	select, assess and justify specific policy choices that developing countries might make to achieve their economic and social objectives.	1	Ev
CO-8	analyse, synthesise and evaluate information drawn from the available data and appropriate theoretical tools, and to express their ideas orally and in writing.	6	An, Ev

Semester- VI			
Core XI– Development Economics			
Code: 18UECC62	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit – I Introduction **20 Hours**

Economic growth and development – Factors affecting Economic Growth – Capital, Labour and Technology - Rostow's stages of Economic Growth –India's stage of Economic Growth

Unit – II Approaches to Economic Development **20 Hours**

Vicious Circle of Poverty, Circular Causation, Unlimited supply of Labour – Big Push Theory, Balanced Growth Theory - Critical minimum effort thesis – Dualism – Technical, Behavioural, Social and Financial

Unit – III Theories of Economic Development **15 Hours**

Classical theory of development – Theory of social changes – crisis in capitalism, Schumpeter and Capitalistic development

Unit – IV Growth Models **20 Hours**

Harrod and Domar Model – Solow – Meade – Mrs. Joan Robinson's- Romer's and Arrow's Models

Unit – V Measures for Economic Development **15 Hours**

Need for Planning – Types – Conditions for successful operation of planning – Planning machinery in India - Achievements and Failures of Five Year plans

Text Book:

M.L.Seth. *Theory and Practice of Economic Planning*, New Delhi: S.Chand & Co., 1969

Books for Reference:

1. M.L.Jhingan. *Economics of Development and Planning.* New Delhi: Vrinda Publications P.Ltd (2016)
2. B.C. Tandon. *Economic Planning: Theory and Practice*, Allahabad: Chaitanya Publishing House, 1971.
3. Misra and Puri. *Economics of Development and Planning*, Himalaya Publishing House, 2014
4. W.A.Lewis. *Development and Planning,* George Allen & Unwin, 1963.
5. Kindleberger. *Economic Development*, New York: McGraw Hill, 1965

Semester- VI			
Core XI I– Labour Economics			
Code: 18UECC63	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Vision:

To understand labour as a unique factor of production

Mission:

To help students to understand the working of the labour welfare agencies, social security measures in India and to observe the nature of industrial relations in India.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe efficiency of Indian labour	1	An
CO-2	know about characteristics & objectives of trade unions	1	Un
CO-3	elaborate the detailed study on worker's participation in management in India	4	Un
CO-4	explain the relationship of the labour market to other markets.	4	Un
CO-5	understand the basic mechanism of the labour market, in particular with how unemployment, wage and productivity differences can arise as equilibrium phenomena.	1	Re
CO-6	perform supply and demand analysis in the labour market.	2	Ap
CO-7	show the causes and changes in the productivity of labour.	4	Ap
CO-8	analyze the effect of labour unions.	3	An

Semester- VI			
Core XII– Labour Economics			
Code: 18UECC63	**Hours / week :6**	**Hrs / Semester: 90**	**Credits :4**

Unit I Labour as a factor of Production: 15 Hours

Meaning and Definition of Labour - Peculiarities of labour- Factors affecting labour – Migration & absenteeism – causes, effects and remedial measures – Efficiency of Indian labour.-knowledge workers

Unit II Trade Unions: 20 Hours

Trade Unionism – Meaning, Definitions- Types – Characteristics & Objectives of Trade Unions – Functions – Industrial Disputes – Causes – Impact – Suggestions for improving industrial relations - Collective Bargaining – Objectives – Process of Collective Bargaining.

Unit III Workers' Participation in Management 20 Hours

Works Committees – Joint Management Councils – Worker's Participation in Management in India – Worker's Education – Objectives – Worker's Education in India.

Unit IV Labour Welfare 15 Hours

Meaning- Definitions – Features – Concepts –Intra Mural and Extra Mural Labour – Labour Welfare Agencies – Aims and functions of ILO- India and ILO.

Unit V Social Security 20 Hours

Meaning – Definition – Importance – Social Insurance – Social Assistance – Commercial Insurance- Social Security measures in India.

Text Book:

Dr.S.Ramakrishna Moorthy - *Labour Economics*, Tirunelveli: D.S.R.Publications –2002.

Books for Reference:

1. Dr.M.M.Varma and R.K.Aggarwal, *Labour Economics.* New Delhi: – Kings Books publisher –1994.
2. Bhagoliwal T.N. *Economics of Labour and Industrial Relations*, Agra: Sahitya Bhavan, 1983.
3. Reynolds, Lloyd. *Labour Economics and Labour Welfare.* New Delhi: Prentice. Hall of India Pvt. Ltd. 1978.

Semester- VI			
Core Integral III - International Economics			
Code: 18UECI61	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Vision:
To understand the theories governing international trade

Mission:
To evaluate the policies pursued by various economic bodies in international economic transactions.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describing the benefits of international trade and defects	1	Un
CO-2	elaborate the detailed study on balance of trade and balance of payments	4	Un
CO-3	elaborate the procedure to be implemented for GATT, UNCTAD and WTO	1	Ap
CO-4	familiar with the main economic theories and models of international trade.	1	Un
CO-5	aware of the likely distributional consequences of trade and thus of conflicting interests within an economy regarding trade liberalization.	3	Un
CO-6	understand economists' arguments concerning trade policy and its analysis.	4	Un
CO-7	apply economic reasoning to issues of the day surrounding globalization.	6	Ap
CO-8	have an elementary understanding of open-economy macroeconomics and the determinants of exchange rates and the balance of payments.	4	Un

Semester- VI			
Core Integral III-International Economics			
Code: 18UECI61	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit – I Introduction **15 Hours**

Differences between international trade and internal trade - Benefits of international trade and defects, Free trade: Meaning - Arguments for and against - Protection: Meaning - Arguments for and against – Kinds of Protection and Role of Protection in UDCs

Unit – II Theories of International Trade **15 Hours**

Classical Theory, Comparative Cost Theory, Modern Theory and Factor-Price Equalization Theory

Unit – III Balance of Payments **15 Hours**

Meaning of Balance of trade and Balance of payments – Meaning and Types, Structure of a Balance of payment, Causes and Remedial measures

Unit–IV Foreign Exchange **15 Hours**

Meaning of Foreign exchange and Exchange Rate, Determination: Mint parity theory – Purchasing power party theory – Balance of payment Theory– Fixed and Flexible Exchange Rate: Merits and Demerits

Unit – V International Financial Institutions **15 Hours**

IMF – Objectives– structure– Functions –World Bank (IBRD) –Objectives – structure – Functions - Trade Agreements: GATT, UNCTAD and WTO-Regional Blocks

Text Book: M.L.Jhingan. *International Economics.* New Delhi: Vrinda Publications P.Ltd - 2016.

Books for Reference:

1. D.M. Mithani. *International Economics.* New Delhi:Himalayas Publishing House, 2003
2. Soderston. *International Economics.* London: The Macmillan Press Ltd., 2010
3. Singh & Agarwal. *International Economics.* Meerut: Sanjeeva Prakashan, 2012.
4. Devairakkam. *International Economics*. Tirunelveli: D.S.R.Publications, 2001.
5. Francis Cherunilam. *International Economics*, New Delhi. (Fifth Edition) Tata McGraw Hill, 2010

Semester- VI			
Core Integral IV-Energy Economics			
Code: 18UECI62	**Hours / week : 7**	**Hrs / Semester: 105**	**Credits :7**

Vision:

To understand the energy and environmental issues

Mission:

To grasp how the energy sector contributes to the growth of the Indian Economy.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	deliver the importance of nature & scope of Energy Economics	1	Un
CO-2	give sound information on ONGC, OPEC, OAPEC, IEA and World Bank.	3	Un
CO-3	prepare and evaluate energy intensity and elasticity	5	Ap
CO-4	understand the basics of energy resources	1	Un
CO-5	understand the classification and importance of energy resources	3	Un
CO-6	know about the consequences and remedial measures of environmental crisis	1	Un
CO-7	know about the impact of energy consumption on production and environment.	4	Ap
CO-8	understand the usage of energy supply and demand	1	Un

Semester- VI			
Core Integral IV-Energy Economics			
Code: 18UECI62	**Hours / week : 7**	**Hrs / Semester: 105**	**Credits :7**

Unit I Natural Resources **15 Hours**

Classification & Importance of Energy Resources - Types and classification - Emergence of Energy Economics - Its nature & scope

Unit II Institutional Role Of Energy **15 Hours**

Development Role of Energy in Economic Development - Energy intensity and Elasticity - National and International Comparison - Role of Institutions like ONGC, OPEC, OAPEC, IEA and World Bank.

Unit III Environment Energy Crisis **15 Hours**

Energy Crisis: causes - Consequences and Remedial Measures - Environmental Crisis - Causes - Consequences - Impact of Energy consumption on production and on Environment.

Unit IV Indian Energy Sector **15 Hours**

Organisational structure - Energy Supply (Coal & Lignite, Oil & Gas, Hydro, Thermal, Nuclear) Energy Demand (From Agricultural, Industry, Transport, Domestic etc.,)

Unit V Energy Sources **15 Hours**

Renewable (Solar, Wind, Tidal, Wave, Bio-gas, Biomass, Hydrogen etc) Renewable Energy Programmes under 5 year plans - Energy issues and Policy options for India.

Text Book:

Karpagam. M *Environmental economics.* New Delhi: Sterling, 1991

Books for Reference:

1. Agarwal, M.C., and Mongo, J.R. *Economic and Commercial Geography* . New Delhi: (National Publishing House, 1992
2. Agarwal, S.K. *Environment and Natural Resources Economics* London: Scott Foresman & Co., 1985
3. Common, M. *Environmental and Resource Economics.* London: Longman, 1996
4. Paul Stevens (Ed) *The economics of Energy, Vol. 1 and II* . Edward Elgar 2000
5. Raikhy P.S. and Parminder Singh, *Energy Consumption in India.* New Delhi: Patter and Determinants (Deep and Deep, 1990.
6. Richard Eden. *Energy Economic*s. Growth, Resources and Policies London: (Cambridge University Press,1981

Semester- VI			
Core Integral IV–Group Project			
Code: 18UECP61	**Hours / week :7**	**Hrs / Semester: 105**	**Credits :7**

Vision: Facilitate quick understanding of complex data.

Mission: Applies the research strategy in real life situation

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the research design	4	Un
CO-2	critically assess contributions to the literature.	4, 5	An
CO-3	attain the skills needed to formulate and analyse models used in the particular field of Economics.	5	Ap
CO-4	prepare and present original research papers in the particular field.	4	Cr
CO-5	improve generic skills like oral communication and written communication.	8	Ap
CO-6	perform the interpretation and analysis of data.	3	An
CO-7	originate clarification and present the research report.	4, 5	Ev
CO-8	identify about the universe from a sample	1	Un

Semester- VI			
Core Integral IV–Group Project			
Code: 18UECP61	**Hours / week :7**	**Hrs / Semester: 105**	**Credits :7**

Group Project work submitted by the students would be evaluated by external examiner appointed by the University for Marks of 100; remaining 100 marks would be given by internal examiner as per the rules and regulation of the university.

Guidelines for the project work of the UG programme in Economics

The students are expected to carry out a project work in the last Semester. It is equivalent to a core course. For maintaining uniformity and quality in its preparation, the Board of Studies has prepared clear guidelines.

The scheme and syllabus of the B.A. Programme in Economics under the CBCS suggests that students shall do a final research project for attaining intellectual maturation. The project is a major document that reflects the skills of the student to investigate critically a topic/problem, the ability to gather and analyze information, and to present and discuss the results/investigation concisely and clearly. The guidelines to be followed in the preparation and submission of the project are as given here under.

1. The students may choose any topic from the subject she has studied, including the social and economic issues in the local/regional context.
2. The project work should be supervised by a faculty.
3. The students shall prepare and submit the project report to the Institution
4. The report with around 40 A4 size pages (excluding preliminary pages) with at least 20 lines per page on one side of the paper only. The report should be bound (spiral or other ways).
5. The project report should be submitted to the Department within the date announced by the Controller of Examinations
6. The student shall prepare two copies of the report; one copy for submitting to the Institution and one copy for personal reference.
7. **Structure of the project report**:

- Title page
- Certificate by the students
- Acknowledgements
- Contents
- List of Tables and graphs
- List of Acronyms used
- Chapter 1: Introduction (which includes importance of the study, objectives of the study, methodology and data source, Chapter frame, Concepts used, limitations of the study etc.)
- Chapter II: Review of Literature
- Chapter III: Profile of the study area (Optional)
- Chapter IV: Data Analysis (Core of the report)
- Chapter V: Summary of Findings and Conclusions
- Appendix: Questionnaire/Schedule, other exhibits, case etc.
- Select Bibliography (In referencing and bibliographic preparation, the APA (American Psychological Association) style sheet is recommended.

9. A project work must be the student's own work and must not contain any plagiarized material.

10. Evaluation of the project report: The project report shall be subject to both internal and external evaluation.

11. The internal as well as external evaluation shall be done by the Guide and External Examiners. This component is examined on the basis of the students' awareness in the research process and its methodology. An objective multiple choice Question Bank developed for the course may be used for internal evaluation.

12. The external assessment of the project is based mainly on the written material. Hence, the objective evaluation of it demands clear procedure. Accordingly, the examiners' assessment of the project work will be based on a variety of features. These include amongst others:

- Understanding of the topic
- Methodology used, the standard of presentation
- the adequacy of the literature survey and data search
- Integration with literature; interpretation of data and results
- Ability to explain findings; originality the correct usage of referencing system

Semester- III			
Non Major Elective I Tourism and Economic Development			
Code: 18UECN31	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Vision: To make the students aware of the nature and forms of tourism.

Mission: To expose the students regarding the possibilities of employment potential

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	understand the nature of tourism and explore the reasons for the rapid growth of tourism.	1,2	Un
CO – 2	view how the travel motivators promote social tourism, apply the concept to explore the demand, factors influencing tourism	2, 3	Ap
CO – 3	understand and explore maintenance of tourism products in India and abroad	1,7	Un
CO – 4	assert and apply the method to develop an ideal itinerary and function of tour managers.	1,7	Ap
CO – 5	provide information about tour packages	1	Un
CO – 6	plan, lead and organize the effective and efficient operations through tourism formalities	5, 8	An
CO – 7	know and apply innovative structure in present day tourism operations	1, 7	Ap
CO – 8	analyse and develop the market of tourism product	6,7	An

Semester- III			
Non Major Elective I	**Tourism and Economic Development**		
Code: 18UECN31	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Unit I Introduction **5 Hours**

Meaning and Nature of Tourism -Basic components of Tourism - Elements of Tourism - Factors influencing the growth of Tourism

Unit II Tourism Demand and Supply **5 Hours**

Tourism Demand - Motivation of Tourism Demand - Measuring Tourism Demand- Pattern and Characteristics of tourism supply - Factors influencing tourism supply.

Unit III Significance of Tourism **6 Hours**

Socio-economic importance of Tourism –Revenue Generation- Contribution to GDP- Employment Multiplier- International Agencies

Unit IV: Travel Formalities **7 Hours**

Passport, Visa, Health requirements, Taxes, Customs, Currency, Travel Insurance, Baggage and Airport information, Passenger Documentation, Baggage Rules.

Unit V Marketing of Tourism Product **7 Hours**

Tourism product – Marketing of Tourism product – Visual presentation – Folders – Media advertisement – Image building methods

Text Book

RajasekaraThangaman. *Tourism Development*, Chennai: Madras art printers,2003

Books for Reference:

1. Bhatia A.K. *International Tourism Management*, New Delhi: Sterling Publishers Pvt. Ltd. 2001
2. Viswanath Ghosh. *Tourism and Travel Management*, New Delhi: Vikas Publishing House, Pvt., Ltd., 2000
3. Johan M. Bryder. *Tourism and Development*, London: Cambridge University Press,1973
4. Michael Peters. *International Tourism*, London: Hutchinson, 1969.

Semester- IV			
Non Major Elective II	**Tourism and Economic Development II**		
Code: 18UECN41	**Hours / week :2**	**Hrs / Sem.: 30**	**Credits : 2**

Vision: Learn about sustainable tourism development for inclusive economic development.

Mission: Understand the importance of Tourism sector and having integrity to achieve economic

development through tourism.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	recognize and raise awareness for moral issues and dilemmas in tourism.	1	Re
CO - 2	know about various types of tour packages and also about tourism marketing.	2,6	Un
CO- 3	demonstrating knowledge and understanding the basic principles of tourism in all its dimensions and areas.	2,7	Ap
CO-4	identify and evaluate the elements of the tourism system and its interaction with the environment.	1	Ev
CO-5	describing the demand and supply of tourism, cycles and economic growth.	2	An
CO-6	understand the importance of transport and communication in travel tourism and hospitality industry.	1,4	Un
CO-7	understand and disseminate the global code of ethics for tourism	6	Un
CO-8	create an awareness on the economic impact generated by tourism.	1,7	Cr

Semester- IV			
Non Major Elective II	**Tourism and Economic Development II**		
Code: 18UECN41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Unit I Nature of Tourism **5 Hours**

Historical development of Tourism – Factors responsible for the growth and development of Tourism over the Years-Sustainable Tourism

Unit II Tourism and Tour Package **6 Hours**

Types of Tourism – Concept of Tourist product – Tour Packages and Type of Package – National and International – Tour itinerary.

Unit III Transport & Tourism **6 Hours**

Evolution of tourist transport system - Importance of transport in tourism - Introduction to transport system: air, road, rail and water transport

Unit IV Hospitality & Communication **7 Hours**

Hospitality Industry -Accommodation types -Relevance of Communication – Communication in Hospitality Industry – Nature of Hospitality Communication

Unit V Tourism Marketing **6 Hours**

Issues in Marketing: Global Marketing - Direct Marketing - Marketing on the Web – Green Marketing - Social Responsibility and marketing Ethics- Consumerism and Legal Issues

Text Book

A. K. Bhatia. *Tourism Development: Principles and Practice.* New Delhi: Sterling Publishers Pvt. Ltd.,2012.

Books for Reference:

1. P.N. Seth. *Successful Tourism Management.* New Delhi: Sterling Publishers Private Limited, 1986.
2. Richard Sharpley. *Travel and Tourism* - SAGE, 2006
3. Manoj Dixit. *Tourism products.* Lucknow: New Royal Book Co., 2009.
4. Richard Sharpley, David J. Telfer. *Tourism and Development: Concepts and Issues* - Channel View Publications, 2002
5. P.N. Seth. *Successful Tourism Management Vol 1 Fundamentals Of Tourism.* New Delhi*:* Sterling Publishers Private Limited, 2011.

Semester- V	
Self-Study or On-line Course (Compulsory)– Economics of Insurance	
Code: 18UECSS3	**Credits :2**

Vision: To know the basic concepts of Insurance.

Mission: To train the students in the field of insurance and auxiliary services thus highly developing efficient and skilled insurance professionals to serve

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	know the importance of insurance	1,2	An
CO – 2	understand the classification of risks	1	Un
CO – 3	identify and apply the insurance policies procedures and benefits with present situation	1,3	Ap
CO – 4	understand the calculation of premium	1	Un
CO – 5	enhance the knowledge of Life and fire insurance.	7	Ap
CO – 6	describe the motor insurance	1, 2	Un
CO – 7	identify the role of insurance in economics	1,3	Ap
CO – 8	understand the IRDA	1	Un

Semester- V	
Self-Study or On-line Course (Compulsory)– Economics of Insurance	
Code: 18UECSS3	**Credits :2**

Unit-I Introduction

The quest for Economic Security - Classification of Risks - Demand for Insurance- Definition and Nature - Evolution and Importance of Insurance

Unit-II Life Insurance

Life Insurance Contract: Nature and Classification of Policies - Selection of Risk - Calculation of premium - Investment of Funds - Surrender Value – Term Insurance

Unit-III Fire Insurance

Fire Insurance: Nature and uses - Kinds of Policies - Policy Conditions - Rate Fixation - Payment of claim - Motor Insurance - Personal Accident - Health and Medical Insurance

Unit-IV Insurance & Economic Development

Insurance in Economic Development: Insurance and Mobilisation of savings - Insurance Institutions as Investment Institutions and their role in capital market - Privatisation of Insurance Sector

Unit-V Insurance & Social Welfare

Insurance as social welfare and security: Insurance - an Investment - Tax and Non - Tax Advantages - Retirement Planning - pension plans - Insurance Regulation and Development Authority (IRDA).

Text Book:

S.Devairakkam. *Insurance Principles and Practice.* Tirunelveli: DSR Publications, 2000

Books for Reference:

1. M.N.Mishra. *Insurance*, New Delhi: S.Chand & Company Ltd, 1999
2. Prof.Muthaya.S. *Life Insurance,* Palayamkottai: Ramalakshmi Publication, 2000.
3. IRDA: *Insurance Regulations and Development.* New Delhi: Authority Regulations.
4. Govt of India: *Old age and Income Security Report (Dave Committee Report)* New Delhi: *Govt of India*,

Semester- IV	
Self-Study / On-Line Course (Optional) Social Economics	
Code: 18UESS41	**Credits :2**

Unit I Introduction

Social Economics: Definition – equality in Human Societies (employment) – Principles of Social Doctrines: Gandhi, Marx and Pope.

Unit II Poverty

The World Poverty Situation – causes and consequences – requisites of economic growth – Role of government – Social security – Subsidies – Social banking – Refugees, Slavery and Beggary.

Unit III Human Capital

Human Capital: Problems in Education and Health services – Energy crisis and related issues.

Unit IV Discrimination

Discrimination: Sources, kinds and causes – Consumerism – Provision of information – Protection from business manipulation

Unit V Economic Crimes

Economic Crimes: Causes and consequences – remedial course of action - Economic crimes and their prevention – Violation of Human Rights – Need to control terrorism.

Text Book

Indira Gandhi Memorial Trust. *Redefining the Good Society.* New Delhi: Wiley eastern ltd.1995.

Books for Reference:

1. Culyer, A.J., *The Economics of Social Policy.* London: Martin Robertson and Co. Ltd., 1973.
2. Joan Costa-Font and Mario Macis (Editors), *Social Economics: Current and Emerging Avenues,*CESifo Seminar Series
3. Gary S. Becker, Kevin M. Murphy. *Social Economics: Market Behaviour in a Social Environment,*Belknap Press: An Imprint of Harvard University Press, 2003.
4. Eatwell, John, Milgate, Murray, Newman. Peter(Editors) *Social Economics.* UK: Palgrave Macmillan 1989.
5. Le Grand, Julian and ray Robinson. *The Economics of Social Problems.* London: The Macmillan Press Ltd., 1976.

Websites for reference

http://www.corecentre.org/consumerism_articles
http://www.globalissues.org/TradeRelated/Poverty.asp
http://www.fas.org/irp/threat/terror.htm

Semester – V			
Part III Core XI (Common Core) Human Resource Management			
Code:18UMCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit : 4**

Vision:

To enable students to understand the basic concepts in HRM

Mission:

To familiarize students on the various aspects of HRM

Course Outcome:

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Cognitive Level
CO – 1	gain knowledge on the basic concepts of planning human resource and help them to understand basic techniques of business.	1,2	Un
CO – 2	understand the basic selection process in HR.	1,2,3	Un
CO – 3	know the importance of training and development in HR.	2,3,4	Ap
CO – 4	know about the transfer policies	2,3,5	Un, Re
CO – 5	gain knowledge on compensation methods.	3,4	Un, An
CO – 6	understand the promotional policies in business	3,4	Un, Re
CO – 7	know about the significance and problems in performance appraisal.	3,4,5	Ap
CO – 8	know about the methods of performance appraisal	3,4,5	Ap

Semester V			
Part –III	**Core – XI (Common Core) Human Resource Management**		
Code: 18UMCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Unit-I: Introduction **15 Hours**

Human Resource Management: Meaning - Objectives - Nature and Scope - Importance – Functions - and Problems of HRM - Personnel Management Vs. HRM - Qualities and Qualifications of Human Resource Managers.

Unit-II: Human Resource Planning, Recruitment and Selection **20 Hours**

Human Resource Planning: Meaning - Need and Importance - Objective - Problems - Process – Recruitment: Meaning - Factors Influencing Recruitment - Sources of Recruitment - Problems in Recruitment – Selection: Meaning - Factors Affecting Selection Decisions - Selection Policy - Steps in Selection.

Unit-III: Training and Development **20 Hours**

Training: Need and Importance - Objective - Types - Steps in Training Programme – Methods of Training - Evaluation of Training Programmes – Development: Meaning - Concept and Essentials of Management Development Programmes.

Unit IV: Transfer, Promotion and Compensation **15 Hours**

Transfer: Objective - Transfer Policy - Promotion: Purpose - Promotion Policy – Demotion - Compensation: Objective – Principles.

Unit-V: Performance Appraisal **20 Hours**

Performance Appraisal: Meaning - Need and Importance - Objective - Problems in Performance Appraisal - Factors Influencing Performance Appraisal – Methods of Performance Appraisal.

Text Book:

Chitra,Atmaram, Naik. *Human Resource Management.* Ane Books Pvt., 2016.

Books for Reference:

1. Dr.C.B.Gupta. *Human Resource Management.* New Delhi: Sultan Chand & Sons, 2018.
2. C.P.Memoria, *Personnel Management*, Himalaya Publishing House, 2011
3. L.M.Prasad., *Human Resources Management.* New Delhi: Sultan Chand & Sons,2014.
4. Gary Dessler. *Human Resource Management.* Prentice Hall, 2013.
5. Michael Armstrong. *A Handbook of Human Resource*

Management Practice. KoganPage,2012.

SEMESTER- I			
ALLIED I	**STATISTICS –I**		
Code:21UECA11	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

Objectives:

- Introduce students to basic statistical tools and techniques
- To apply statistical tools for economic problems.
- To make the students understand the significance of Statistics and to develop their research skills.

Course Outcomes:

CO No.	**Upon completion of this course, students will be able to**	**PSO's Addressed**	**CL**
CO 1	Describe and discuss the key terminology, concepts tools and techniques used in statistics. Discuss critically the uses and limitations of statistics.	1	Un
CO 2	Gain knowledge on Organize, manage and present data. Outline the distinct method of using raw data in the form of frequency distribution	1,2	Ev
CO 3	Introduces students to the concepts and techniques of presentation and summarisation of data. It introduces students to basics of sampling and statistical inference	4	An
CO 4	Analyse statistical data using measures of central tendency. Apply knowledge of statistical measures such as Mean, Median and Mode for analysis and interpretation of data.	2,4	Un
CO 5	Analyse statistical data using measures of dispersion and location. Analyse the different measures of dispersion that are useful in the field of psychology and education	1,6	An
CO 6	Develop skills and knowledge to apply different types of data through graphs for analysing different descriptive measures.	4, 5	Cr

SEMESTER- I			
ALLIED I	**STATISTICS –I**		
Code: 21UECA11	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

UNIT I- INTRODUCTION **10 Hrs**

Definitions of Statistics – Meaning – Scope – Functions - Importance– Limitations

UNIT II - STATISTICAL INVESTIGATION & SAMPLING **10 Hrs**

Sources of data – Methods of collecting primary and secondary data – Questionnaire– Census and Sampling: Methods of sampling

UNIT III - STATISTICAL PRESENTATION **15 Hrs**

Classification: Types - Tabulation: Rules, Parts of tabulation and Types of tables, Presentation of statistical data: Bar diagrams, Pie diagram-Graphs: Histogram, Frequency Polygon, Frequency Curve and Ogive Curves

UNIT IV- MEASURES OF CENTRAL TENDENCIES **10Hrs**

Measures of Central Tendency: Meaning –Properties- Mean, Median, Mode, Geometric Mean and Harmonic Mean- Merits and Demerits

UNIT V-MEASURES OF DISPERSION **15 Hrs**

Measures of Dispersion: Meaning - Range, Quartile Deviation, Mean Deviation, Standard Deviation, Variance, Coefficient of variation, Lorenz Curve

Text Book: R.S.N. Pillai & Bhagavathi, Statistics: Theory and Practice, 7th Revised Edition, S. Chand, New Delhi, 2008.

Reference Books:

1. A.M. Gun, M.K.Gupta & B.Dasgupta, Fundamentals of Statistics, 9th Reprinted Edition, The World Press Pvt. Ltd., Kolkata, 2019.
2. S .P.Gupta, Elementary Statistical Methods, 18th Revised Edition, Sultan Chand & Sons, New Delhi, 2017.
3. S. P.Gupta, Statistical Methods, 42nd Revised Edition, Sultan Chand & Sons, New Delhi, 2012.

SEMESTER- IV			
ALLIED II	**STATISTICS II**		
ALLIED: 21UECA22	**HOURS / WEEK: 4**	**HRS / SEM: 60**	**CREDITS :4**

Objectives:

- To provide an understanding on statistical concepts.
- To develop critical and quantitative thinking skills specific to statistics.
- To train students intensively in both theoretical and practical aspects of statistics
- To create a problem-solving attitude with the aid of statistical methodology.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO 1	Explain concept of correlation, analyze and interpret covariance and correlation coefficient, illustrate ordinary least squares and use it to estimate regression coefficient. Find the inter-relation between two or more phenomena with the help of curve fitting and correlation-regression analysis.	4	Un
CO 2	To introduce the fundamental concepts of statistical modelling, particularly linear regression models.	1,2	Ap
CO 3	Describe the components of time series, apply time series analysis in business scenarios, illustrate the different types of index numbers, and calculate index numbers.	1	An, Ev
CO 4	Apply the statistical tools in business, economic and commercial areas with the help of time series, index numbers, etc	1,5	An
CO 5	To provide essential knowledge of the theory and key properties of probability and random variables, and the application of these concepts in practical situations.	2,4,5	Un, An
CO 6	Made a bridge between the elementary statistical tools and probability theory	1,2	Re

SEMESTER- II			
ALLIED– II	**STATISTICS– II**		
Code: 21UECA22	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

UNIT – I CORRELATION **10 Hrs**

Correlation: Types, Scatter diagram – Measurement: Karl Pearson Co-efficient of Correlation, Spearman's Rank correlation and Concurrent Deviation

UNIT – II REGRESSION **10 Hrs**

Regression - Meaning – Differences between Correlation and Regression - Regression lines – Regression equations - Regression Co-efficient

UNIT – III INDEX NUMBERS **15 Hrs**

Definition, Types, Problems in the Construction of Index Numbers, Time and Factor Reversal Test, Fixed Base and Chain Base Index Numbers, Uses and limitations of Index Numbers.

UNIT - IV TIME SERIES **10 Hrs**

Definition, Components of Time Series, Methods of measuring trend: Semi-Average, Moving Average and Method of Least Squares

UNIT - V PROBABILITY AND THEORY OF DISTRIBUTION **15 Hrs**

Definition, Meaning, Concepts, Addition and Multiplication Theorems of probability-Theory of Distribution: Binomial, Poisson and Normal Distributions: Properties only.

Text Book: R.S.N. Pillai & Bhagavathi, Statistics: Theory and Practice, 8th Edition, S. Chand, New Delhi, 2019

Reference Books:

1. Dr.S. P.Gupta, Statistical Methods, 46th Edition, Sultan Chand & Sons, New Delhi, 2021.
2. Mario F. Triola, Elementary Statistical Methods, 13th Edition, Pearson Publications, New Delhi, 2017
3. Freedman, Purves & Pisani, Statistics, 4th Edition, Viva Books Pvt. Ltd., Kerala, 2011.

SEMESTER- III			
Allied -III	**MATHEMATICAL METHODS- I**		
Course Code: 21UECA31	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

Objectives:

- To develop the technical skills of students and faculty, together engaging in research,teaching, and learning
- To get an advanced knowledge in diverse areas of mathematics
- To discover, mentor, and nurture mathematically inclined students, and provide them a supportive environment that fosters intellectual growth.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO - 1	know and apply the skills of commercial arithmetic in business life.	2,4, 7	Un
CO - 2	apply the basic concepts of equations in economics.	5,6	Ap
CO - 3	acquire knowledge about the linkage between mathematical techniques and economics.	5, 6	Ap
CO - 4	use knowledge of content and mathematical procedures to solve problems and make connections between the different areas of mathematics.	5, 7	Un
CO - 5	Demonstrate the use of mathematical reasoning by justifying and generalizing patterns and Relationships	4,5	Un
CO - 6	Apply the Fundamental Theorem of Analytical Geometry	2,5,6	Ap
CO - 7	Explain and apply basic concepts of sets,	4	U

SEMESTER- III			
Allied - III	**MATHEMATICAL METHODS- I**		
Course Code: 21UECA31	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

UNIT-I: Set Theory **10 Hrs**

Meaning of Mathematical Methods in Economics-Importance - Functions and their Properties- Notations of Set - Types of set - Venn diagram - Laws of Set - Operations in Set -Application in Economics.

UNIT-II: Straight Line **15 Hrs**

Slope – Intercept - Equations of Straight Line - Parallel Lines - Perpendicular lines - Point of intersection of two lines - Application of straight lines in Economics: Supply line - Demand line - Determinants of equilibrium price and quantity and elasticity of demand

UNIT-III: Differentiation **15 Hrs**

Process and Rules of Differentiation - Differentiation in polynomials x^n, $(ax+b)^2$; $logx$, e^x, differential coefficient of sum, difference, product, quotient and power - Successive differentiation - Partial derivative - Given $U= f(x,y)$ and $U= f(x,y,z)$ - Higher order partial derivatives – Maxima and Minima with single variable.

UNIT-IV: Application of Differentiation in Economics **10 Hrs**

Marginal utility, cost and revenue curve applications - Marginal Revenue (MR) and Marginal Cost (MC) –Point of Inflection - Revenue maximization and Cost minimization.

UNIT-V: Integral Calculus and its Applications in Economics **10 Hrs**

Rules of Integration – Definite& Indefinite integrals – Application in Economics – Total Revenue and Cost Concepts, Consumer‘s surplus and Producer‘s surplus.

Text Book:

Dr.M. Manoharan, Dr. C. Elango & Prof. K.L. Eswaran. *Business Mathematics.* Tamil Nadu:Palani Paramount Publications. 4th edition 2018

Books for Reference:

1. S.C. Aggarwal R.K.Rana& Leena Gupta. *Mathematics for Economists.* Haryana: V.K.GlobalPublications Pvt Ltd.1st edition 2022

2. Dr. R.Veerachamy. *Quantitative Methods for Economists*. New Delhi: New Age International (P) Ltd. 2nd edition 2018

3.M.B.K. Moorthy & A. Manikandan. *Advanced Mathematical Methods.* Chennai: Yes DePublishing Pvt Ltd. 1st edition 2017

4. Dr. S. Sivaiah. *Applied Mathematical Methods*. Chennai: Laxmi Publications. 2nd edition 2013

4. Bhaskar Dasgupta. *Applied Mathematical Methods*. Chennai: Pearson Education India.1st edition 2006

SEMESTER- IV			
Allied -IV	**MATHEMATICAL METHODS- II**		
Course Code: 21UECA41	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

Objectives:

- To mould the students to acquire skills required for strengthening Mathematics.
- Provide platform to acquire abilities to evaluate problems using analytical/ numerical/graphical techniques.
- Provide a back ground for relating mathematical techniques to solve real life problems.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO - 1	Understand the foundations of mathematics	4	Un
CO - 2	Use equations, formulae, and mathematical expressions and relationships in a variety of contexts.	2,4,5	Un
CO - 3	Analyse and demonstrate mathematical skills required in mathematically intensive areas in Economics and business.	4,57	An
CO - 4	Apply the knowledge in mathematics(Matrices, Calculus)in solving business problems.	4,6	Ap
CO - 5	acquire an introduction to apply a range of mathematical techniques to economic problems.	5,6	Ap
CO - 6	learn and understand the application of integration in economics.	1,4	Un
CO - 7	acquire lifelong skills to understand current economics and to investigate economic models using mathematical techniques.	1,4,6	Un,Ap

SEMESTER- IV			
Allied -IV	**MATHEMATICAL METHODS- II**		
Course Code: 21UECA41	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

UNIT-I: Ratio, Proportion, Relations and Functions **10 Hrs**

Ratio – Proportion – Relations - Progression – Arithmetic progression – Geometric progression, Functions – types of functions – Application in Economics

UNIT-II: Matrix – I **10 Hrs**

Matrix - Meaning and types - Operation of matrix: addition, subtraction, multiplication, division – Determinant – Properties of determinant

UNIT-III: Matrix – II **15 Hrs**

Rank of matrix - trace of matrix - inverse: properties of inverse – solution to linear equations - Cramer‘s rule – Inverse method – Applications in Economics: input - output analysis (introduction and concepts alone)

UNIT-IV: Linear Programming **10 Hrs**

Meaning - Basic concepts – Graphical solution to linear programming problem (onlytwo variables) – Dual Method.

UNIT-V: Introduction to Game Theory **15 Hrs**

Meaning – Concepts – Significance – Types: Pure and Mixed Strategy games – Applications and Limitations of game theory

Text Book:

Sundaresan V. and S.D. Jeyseelan. *An Introduction to Business Mathematics*. New Delhi:Sulthan chand (G/L) & Company Ltd. Revised edition 2018

Books for Reference:

1. T.R. Jain & SC. Aggarwal. *Mathematical Methods for Economic*s. Haryana: V.K.GlobalPublications Pvt., Ltd., India. 1st edition 2021

2. Dr. Dipjyoti Sarma & Romen Kalita. *Mathematical Methods*. Madhya Pradesh: MahaveerPublications. 1st edition 2020.

3. Alpha C. Chiang & Kevin Wainright. *Fundamental Methods of Mathematical Economics*.U.K: McGraw Hill Publications. 4th edition 2013.

4. D. Bose, *An Introduction to Mathematical Methods*. New Delhi: Himalaya PublishingHouse. 1st edition2007.

SEMESTER- I			
CORE – I	**MICRO ECONOMICS – I**		
Code: 21UECC11	**Hours / week :5**	**Hrs / Sem.: 75**	**Credits :4**

Objectives:

- To develop the understanding of basic Micro economic concepts
- To equip the students with micro economic theories with graphic illustrations
- To develop the skills of analysis and application of the principles to the real -world problems

Course Outcomes

CO. No	**Upon completion of this course, students will be able to**	**PSO's addressed**	**CL**
CO 1	Describe and illustrate basic concepts such as Nature, Scope and Subject matter of Economics, The basics of Micro Economics and Macro Economics.	2, 4	Un
CO 2	identify and apply the important concepts and terminologies such as Utility analysis, law of demand and consumer surplus.	1,6	Ap
CO 3	To understand the application of indifference curves and describe consumer equilibrium with the help of law of equi-marginal utility.	4	Cr
CO 4	analyse the operation of the law of variable proportions and identify the three stages of production	6	Ap
CO 5	state the concept of total product, average product and marginal product; explain the nature and relationship of total, average and marginal product curves;	2, 1	Cr
CO 6	Describe the basic economic analysis and laws of production and consumer behaviour	7	An

SEMESTER- I			
CORE – I	**MICRO ECONOMICS – I**		
Code: 21UECC11	**Hours / week :5**	**Hrs / Sem.: 75**	**Credits :4**

Unit I -Introduction to the Concepts of Economics **15 hrs**

Definition: Adam Smith, Alfred Marshall, Lionel Robbins and Samuelson approaches – Nature and scope of Economics -Micro and Macro Economics – Basic Concepts and types of Goods and Utility

Unit II - Cardinal Utility Analysis **15 hrs**

Meaning of Cardinal Utility – Human Wants and Utility– Law of Diminishing Marginal utility– Law of Equi-Marginal Utility- Law of Demand – Illustration, Assumptions and determinants of Demand – Elasticity of Demand – Meaning, Types and Measurement –Consumer Surplus

Unit III - Ordinal Utility Analysis **15 hrs**

Meaning of Ordinal Utility – Indifference Curves – Properties – Diminishing Marginal Rate of Substitution– Consumer's Equilibrium – Price Effect, Income Effect and Substitution Effect

Unit IV - Factors of Production **15 hrs**

Meaning and Features: Land, Labour, Capital and Organisation – Production Function: Law of Variable Proportions and Laws of Returns to Scale – Economies and Diseconomies of Scale

Unit V - Cost and Revenue Analysis **15 hrs**

Cost Concepts – Short Run and Long Run Cost Curves - Concepts of Revenue – Revenue in different market conditions

Text Book: Pazhani, Micro Economics, 4thEdition, J.P.Publishers, Nagarcoil, 2019.

Books for Reference:

1. Maria John Kennedy, Microeconomics Theory, 3rd Edition, Prentice Hall Pvt Ltd, 2011.
2. Dominick Salvatore – Principles of Micro Economics, 5th Edition, Oxford University Press, New Delhi, 2009.
3. M.L.Seth, Micro Economics, 7thRevised Edition, Lakshmi Narain Agarwal Educational Publishers, Agra, Publication, 2001.
4. M.L.Jhingan, Micro Economic Theory, 7th Edition, Vrinda Publications, Delhi, 1998.
5. S.Sankaran - Economic Analysis, 3rd Edition, Margham Publications, Madras, 1991.

SEMESTER- I			
CORE II	**INDIAN ECONOMY – I**		
Code: 21UECC12	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Objectives:

- Develop an in-depth understanding of the Indian economy
- Understanding and analysing Indian Economic Issues, developments and policies
- Able to understand the basic Indian Economic problems.

Course Outcomes

CO No.	**Upon completion of this course, students will be able to**	**PSO's Addressed**	**CL**
CO 1	understand the growth process in the Indian Economy since independence. various aspects of economic development. To comprehend the basic characteristics of economic development and economic growth.	1,2,7	Un
CO 2	Develop ideas of the basic characteristics of Indian economy, its potential on natural resources.	1	Un
CO 3	provide an analytical discussion of various economic and social issues of the Indian economy. To realize the causes and measures of poverty inequalities and unemployment.	4	An
CO 4	To analyse the demographic trends in India. The importance of controlling population.	2,8	Ev
CO 5	Understand agriculture as the foundation of economic growth and development, analyse the progress and changing nature of agricultural sector and its contribution to the economy as a whole.	4,6	An
CO 6	To understand the Economic Development of Indian Economy. Population and Human Development	6,7	Un

SEMESTER- I			
CORE II	**INDIAN ECONOMY – I**		
Code: 21UECC12	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I - Economic Development since Independence **15 hrs**

Meaning of Economic Development -- Determinants of Development, Indian Economy since Independence – Features of Indian Economy

Unit II - Resources and Development **15 hrs**

Natural Resources: Land, Water, Forest, Mineral and Energy Resources- Natural resources and Economic Development

Unit III - Basic Problems of Indian Economy **15 hrs**

Poverty: Meaning, Causes, Remedial Measures – Unemployment: Meaning, Causes and Remedial Measures-Deficit Balance of Payment -Inflation

Unit IV - Human Resources **15 hrs**

Demographic features –Demographic Transition-Causes and measures of controlling population. Human Development Index (HDI) – Meaning and measurement.

Unit V - Agriculture **15 hrs**

Agriculture – Role in the National Economy – Crop pattern – Causes for low productivity – Green Revolution- Later developments - Rural development Subsidy-

Text Book: Ruddar Datt and K.P.M Sundharam, Indian Economy, 60th Edition, Sultan Chand, New Delhi, 2009.

Books for Reference:

1. Dr.D.Rathi, Indian Economy, First Edition, Archers & Elevators Publishing House, Bangalore, 2017.
2. Uma Kapila, Indian Economy, 9th Edition, Academic Foundation, 2010.
3. Ishwar.C.Dhingra, The Indian Economy, 21st Edition, Sultan Chand, New Delhi, 2009.
4. Mishra &Puri- Economics of Development and Planning, 7th Edition, Himalaya, Mumbai, 2005.
5. Meier, G.M. Leading Issues in Economic Development, 6th Edition, O U P, New Delhi,1995.

SEMESTER- II			
CORE III	**MICRO ECONOMICS -II**		
Code: 21UECC21	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Objectives:

- To understand the behaviour of a consumer, a producer, a factor owner.
- To understand the market structure.
- An Enhance decision making abilities among students to enable them to become productiveand informed citizens.

Course Outcomes:

CO. No	**Upon completion of this course, students will be able to**	**PSO's addressed**	**CL**
CO 1	Identify and appraise various models of how markets are organized, and the price and output decisions for maximizing profit. Understand the difference between the firm and the industry; explain and illustrate the differences between the demand curve for a perfectly competitive firm and that for a perfectly competitive industry	1, 2	Ap
CO 2	Describe characteristics of monopolies and a monopolistically competitive industry. Calculate and graph a monopoly's and monopolistic firm's costs, revenues, profit and losses	2,4	Un
CO 3	Design and develop an appropriate wage structure for a firm	1,6	An
CO 4	To make the student understand different types of market and levels of competition prevailing in the market.	1,2	Un
CO 5	Analyse the relationship between inputs used in production and the resulting outputs and costs	1,5	Ev
CO 6	To have a better awareness regarding different Factor Pricing Rent, Wages, Interest, Profit.	6,8	Un

SEMESTER- II			
CORE III	**MICRO ECONOMICS –II**		
Code: 21UECC21	**Hours / week :5**	**Hrs / Sem.: 75**	**Credits :4**

UNIT I -MARKETSTRUCTURE **15 Hrs**

Time Element -– Equilibrium of the Firm and Industry – Perfect Competition – Price Output Determination

UNIT II- MONOPOLY AND MONOPOLISTIC MARKETS **15 Hrs**

Meaning and features: Monopoly, Discriminating Monopoly and Price – Output Determination–Meaning and features of Monopolistic Competition – oligopoly & duopoly

UNIT III- FACTOR PRICING I **15 Hrs**

Theories of Distribution - Wages: Meaning and Types of Wages – Theories of Wages: Subsistence Theory and Wage Fund Theory

UNIT IV - FACTOR PRICING II **15 Hrs**

Concept of Rent – Ricardian Theory of Rent, Quasi Rent, Modern Theory of Rent – Concept of Interest: Classical Theory, Loanable Funds Theory and Keynes' Liquidity Preference Theory.

UNIT V- FACTOR PRICING III **15 Hrs**

Concept of Profit – Gross Profit and Net Profit – Theories of Profit: Dynamic Theory, Innovation Theory and Uncertainty Bearing Theory.

Text Book: H.L.Ahuja, Modern Micro Economics, 19th Edition, S.Chand &Co Ltd, New Delhi, 2017.

Books for Reference:

1. Robert Pindyck & Daniel Rubinfeld, Micro Economics, 8th Edition, Pearson Education, U.K, 2017.
2. M.L.Jhingan, Micro Economic Theory, 7th Edition, Vrinda Publications, Delhi, 2014.
3. Dominick Salvatore**,** Principles of Micro Economics, 5thEdition, Oxford University Press,New Delhi, 2009.
4. S. Devairakkam, Micro Economics*,* 2nd Edition, D.S. R. Publications, Tirunelveli, 2001.
5. M.L.Seth, Micro Economics, 7th Revised Edition, Lakshmi Narain Agarwal Publication, 2001.

SEMESTER- II			
CORE IV	**INDIAN ECONOMY – II**		
Code: 21UECC22	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

Objectives:

- Develop an in-depth understanding of the Indian economy
- Understanding and analysing Indian Economic Issues, developments and policies.
- To enable students to have an understanding on the various issues of the Indian economy

Course Outcome:

CO No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**C L**
CO 1	To comprehend the significance, policies and growth of the industrial sector in India.	2,5	Re
CO 2	To enable the students to understand the challenges faced by the Micro, Small and Medium Enterprises.	4,8	Un
CO 3	Providing a solid introduction to transportation demand and various types or modes of transportation.	1,6	Ev
CO 4	To facilitate an understanding of the Balance of Payments. Explain the Foreign Direct Investment and Foreign Portfolio Investment. Evaluate WTO	1,2	An
CO 5	Students will be able to understand how planning can develop an economy. Evaluation of five -year plans.	4, 5,7	Un
CO 6	Students will get knowledge about IT and ITES in India.	1, 2	Ap

SEMESTER- II			
CORE IV	**INDIAN ECONOMY – II**		
Code: 21UECC22	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :4**

UNIT I- INDUSTRIES **15 Hrs**

Role of Industries in Economic Development - Cottage, Small Scale, MSME and Large-Scale Industries (Cotton, Iron & Steel and Cement) Industrial Policy-1991, 2001 & 2011

UNIT II- PLANNING **15 Hrs**

Definition and Scope of Planning-Objectives of Planning in India-A brief resume of Five -year Plans in India – Recent Five- year Plan-Recent developments

UNIT III- TRANSPORT **15 Hrs**

Types of Transport - Importance (Railway, Roadways, Shipping and Civil Aviation

UNIT IV FOREIGN TRADE **15 Hrs**

Importance of Foreign Trade in Economic Development, Balance of Payments – Recent EXIM Policy- WTO and Indian Economy- Government Financial Support for foreign trade-FDI

UNIT V- IT & ITES IN INDIA **15 Hrs**

Meaning – Structure – Role and Importance of IT & ITES in India- Recent Developments

Text Book: Ruddar Datt and Sundharam K.P.M., Indian Economy, 51st Revised Edition, Sultan Chand, New Delhi, 2018.

Books for Reference:

1. Uma Kapila, Indian Economy, 20th Edition, Published by Academic Foundation, New Delhi, 2019.
2. Ishwar.C.Dhingra -Indian Economy, 21st Edition , Manakin Press Pvt. Ltd, New Delhi, 2018.
3. Mishra &Puri - Economics of Development and Planning, 7th edition Himalaya Publication, Mumbai, 2005.
4. Meier, G.M. Leading Issues in Economic Development, 6th edition, O U P, New Delhi, 1995.

SEMESTER- III			
Core – V	**MACRO ECONOMICS – I**		
Course Code: 21UECC31	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :6**

Objectives:

- To develop the understanding of basic Macro concepts
- To promote critical thinking skills and to analyse impacts of policy actions and to evaluatethe advantages and disadvantages of different policies.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO 1	Understand the concepts of Macro Economics and its interrelations with Microeconomics	2, 4	Un
CO 2	Compares calculation methods of national income	1, 4,6	Ap
CO 3	Describe the relationships among GDP, net domestic product, national income, personal income and disposable income	1, 2,4, 6	Ev
CO 4	Categorizes unemployment by types	4,7	Un
CO 5	Identify the strengths and weaknesses of the Keynesian and classical model.	2, 4, 5,6	Cr
CO 6	Construct and graph the consumption function	4,6	Un

SEMESTER- III			
Core – V	**MACRO ECONOMICS – I**		
Course Code: 21UECC31	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :6**

UNIT I - Nature and Scope of Macro Economics **20 Hrs**

Macro Economics – Meaning - Definition - Importance and limitations – National Income – Concepts – Methods of measuring national income – Difficulties- Importance of National IncomeAnalysis – National Income Accounting – Circular flow of Income in two, three and four sector Models.

UNIT II - Classical Theory of Employment **20 Hrs**

Classical Theory of Employment – Say's Law of Market – Fisher's Quantity theory- JohnMaynard Keynes' criticism of classical theory

UNIT III - Keynesian Theory of Employment **15 Hrs**

Keynesian theory of Employment and Output – Aggregate Demand & Aggregate Supply –Effective Demand - comparison and contrast between Classical and Keynesian contributions

UNIT IV - Consumption Function **15 Hrs**

Consumption Function – Meaning – Definition - Attributes – Keynesian ConsumptionFunction – Factors stimulating and influencing Consumption function.

UNIT V - Inflation and Unemployment **15 Hrs**

Inflation – Meaning –Types-Causes -Measures to control Inflation –Deflation and Stagflation – Meaning – Unemployment: Meaning –Types- Employment guarantee programmes.

Text Book:

M.Maria John Kennedy. *Macro Economics*. New Delhi: PHI Learning PVT Ltd. 1st edition 2011

Books for Reference:

1. Dr.D. Amutha. *Fundamentals of Macroeconomics*. New Delhi: Manglam publications. 1stedition 2019.
2. Jhingan, M. L. *Macroeconomic Theory*. New Delhi: Vrinda Publications (P) Ltd. 13thedition 2016.
3. Edward Shapiro. *Macroeconomic Analysis*. New Delhi: Galgotia Publications. 5th edition2013.
4. Ahuja, H. L. *Macro Economics Theory & Policy*. New Delhi: S. Chand & Company Ltd.19th edition 2013.
5. R. Cauvery, Dr.U.K.Sudha Nayak, Dr.M. Girija & Dr. R. Meenakshi. *Macro Economics.*

New Delhi: S.Chand& Company Ltd. 3rd edition 2002.

SEMESTER- IV			
Core – VI	**MACRO ECONOMICS – II**		
Course Code: 21UECC41	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :6**

Objectives:

- It also introduces the students to various theoretical issues related to an open economy.
- Understand the Fiscal policy operations, its tools, and its advantages and drawbacks.
- To enable the students to have basic knowledge on macro-economic theories and policies

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO 1	know the multiplier and identify the leakages of multiplier	1, 2	Un
CO 2	understand the acceleration principles	2,4	Un
CO 3	Analyze different phases of trade cycle, demonstrate various trade cycle theories, understand the impact of cyclical fluctuation on the growth of business, and lay policies to control trade cycle.	2, 4, 6	An
CO 4	Describe the business cycle and its primary phases	2,4	Ev
CO 5	Compare and contrast the circumstances under which it makes sense to apply the Keynesian and Neoclassical perspectives	4,6, 7	Cr
CO 6	Describe the role of financial markets play in an economy.	4,5, 7	Ev

SEMESTER- IV			
Core - VI	**MACRO ECONOMICS – II**		
Course Code: 21UECC41	**Hours / week :6**	**Hrs / Sem.: 90**	**Credits :6**

UNIT I- Investment Function **15 Hrs**

Meaning – Definition – Induced and autonomous investment – Determinants of Investment – MEC and Rate of interest – Factors other than the Interest rate affecting Inducement to Invest

UNIT II - Multiplier and Accelerator **20 Hrs**

The concept of Multiplier – Employment and Investment Multiplier – Limitations and Importance of Multiplier - Leakages – Principles of Acceleration –Interaction between Multiplierand Accelerator (Super Multiplier).

UNIT III - General Equilibrium **20 Hrs**

General Equilibrium- Equilibrium of Commodity Market (IS) and Money Market (LM) – Simultaneous equilibrium of Commodity and Money Market (IS & LM) changes in General equilibrium (Shifts in IS and LM functions)

UNIT IV - Trade Cycle **15 Hrs**

Definition and Phases of Trade Cycle – Control of Trade Cycle – Monetary and Non-Monetary theories of Trade Cycle

UNIT V -Macro Economic Policies **20 Hrs**

Monetary Policy **-** Objectives – Instruments –Effectiveness of Monetary Policy **-** FiscalPolicy - Objectives - Instruments - Monetary and Fiscal Policy Mix

Text Book:

M.Maria John Kennedy. *Macro Economics*. New Delhi: PHI Learning PVT Ltd. 1st edition 2011.

Books for Reference:

1. Dr.D. Amutha. *Fundamentals of Macroeconomics*. New Delhi: Manglam publications. 1stedition 2019.
2. A.L. Ahuja. *Macro Economic Theory and Policy*. New Delhi: S. Chand & Company Ltd.20th edition 2019.
3. Hubbard R. Glenn &O'Brien Anthony P. U.K: Pearson Publications. 5th edition 2017.
4. Jhingan, M. L. *Macro Economic Theory*. New Delhi: Vrinda Publications (P) Ltd. 12thedition 2014.

SEMESTER- III			
Non-Major Elective Economics for Competitive Examinations – I			
Course Code: 21UECN31	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objectives:

- To initiate the students to understand the key concepts of economics.
- To prompt students to have economic way of thinking.
- To induce critical thinking skills within the contest of subject matter of economics.

CO No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO 1	describe and illustrate basic economic concepts of scarcity and choice.	1, 2, 4	Ap
CO 2	understand the concepts used, methods to measure and difficulties encountered in the calculation of National Income	2, 4	Un
CO 3	understand the concept of economic growth and development	2, 7	Un
CO 4	illustrate how economics can be used to create or analyse alternative approaches to promote development.	4, 5, 7	Cr
CO 5	analyse both the proximate and deeper factors that trap people in poverty or assist them to escape poverty	4, 6, 7	Ap
CO 6	Identify and differentiate between the different types of unemployment	1, 4,7	An

SEMESTER- III			
Non-Major Elective Economics for Competitive Examinations – I			
Course Code: 21UECN31	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

UNIT I - Micro Economics **7 Hrs**

Definition of Economics – Adam Smith- Alfred Marshall, Lionel Robbins, Paul Samuelson

-Basic Concept in Economics - Micro Economics- Meaning – Importance and Uses of MicroEconomics – Macro Economics – Meaning – Difference between Micro and Macro Economics.

UNIT II - Macro Economics **7 Hrs**

Meaning- Definition – Basic concepts of National Income – Gross National Product – NetNational Product – Personal Income – Per- Capita Income – Methods of Calculation of National Income – Problems of Calculation.

UNIT III- Economic Growth and Economic Development **6 Hrs**

Meaning of Economic Growth – Meaning of Economic Development – Difference between Development and Growth – Determinants of Economic Development and Economic Growth

UNIT IV – Poverty **5 Hrs**

Meaning – Definition – Causes of Poverty –Absolute and Relative Poverty – Poverty Eradication Programmes.

UNIT V – Unemployment **5 Hrs**

Meaning – Causes of Unemployment – Kinds of Unemployment – Employment guarantee programmes.

Text Book: Dr. S. Sankaran. *Micro Economics*. Tamil Nadu: Margham Publications. 1st edition2018

Books for Reference:

1. Dr.D. Amutha. *Economics for UGC Net/Set Examinations*. New Delhi: ManglamPublications. 1st edition 2021.
2. Dr. D. Rathi. *Micro Economics*. Unites States: Lulu Publication. 1st edition 2021.
3. T.R. Jain & V. K. Ohri. *Fundamentals of Economics*. Haryana: VK Global Publications PvtLtd. 1st edition 2020.
4. M.L. Jhingan. *Micro Economic Theory*. New Delhi: Vrinda Publication Pvt. Ltd. 7th edition2012.

SEMESTER- IV			
Non-Major Elective Economics for Competitive Examinations – II			
Course Code: 21UECN41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objectives:

- This course is designed to make the undergraduate students of other disciplines aware of the basic ideas and concepts in economics.
- To make students understand economic ideas and its implications in real time life situation.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO 1	Explain the types of public debt and how debt is repaid	2,4, 6	Un
CO 2	Describe the process of credit creation of a commercial bank, describe the balance sheet of a commercial bank, explain the functions of commercial bank	2,4	An
CO 3	Explain the main objective of monetary policy in under developed countries	4,5, 6	An
CO 4	Explain the functions and constituents of financial system, explain money market, capital market and stock market	1,4,5	An
CO 5	Explain the different concepts of terms of trade	4,7	An
CO 6	Explain the structure of BOP, disequilibrium in BOP, causes of disequilibrium	4, 5, 7	Ap

SEMESTER- IV			
Non-Major Elective	**Economics for Competitive Examinations – II**		
Course Code: 21UECN41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

UNIT I- Public Finance **7 Hrs**

Meaning – Definition – Scope of Public Finance – Public Revenue – Public Expenditure -Causes of increasing Public expenditure in India-Union Budget and its Importance.

UNIT II - Reserve Bank of India **7 Hrs**

Origin of Reserve Bank of India – Functions of Reserve Bank of India – Monetary Policy -Control of Credit – Relationship between RBI and Commercial Banks.

UNIT III -Inflation& Deflation **5 Hrs**

Meaning - Definition – Types – Causes and Effects of Inflation – Controlling Measures -Deflation – Effects of Deflation

UNIT IV - Centre-State Financial Relations **5 Hrs**

Decentralization of power between centre and state-Centre-State Financial relations–Panchayat Raj System and its Importance- 73rd and 74th Amendments

UNIT V - International Trade **6 Hrs**

Meaning - Definition – Difference between Internal and External Trade – Balance ofPayment –Functions of WTO and IMF

Text Book:

H.L.Bhatia. *Public Finance*. New Delhi: Vikas Publishing House Pvt, Ltd. 30th edition, 2020.

Books for Reference:

1. Dominick Salvatore. *International Economics*. United States: Wiley Publisher, 13th edition2021.
2. M.L.Jhingan. *International Economics*. New Delhi: Vrinda Publications Pvt. Ltd. 7thedition 2020.
3. Harvey Rosen. *Public Finance*. UK: McGraw Hill Education. 8th edition 2012.
4. R.Cauvery, N. Kruparani, U.K. Sudha Nayak & A. Manimekalai. *Monetary Economics.* New Delhi: S. Chand & Co Ltd. 2nd Revised edition 2008.

SEMESTER- III			
Core Skill Based	**TOURISM ECONOMICS**- I		
Course Code: 21UECS31	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

Objectives:

- To understand the impact and challenges in the tourism industry.
- Understand the importance of tourism in the service industry.
- Understand the place of tourism in the service industry.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO - 1	understand the nature of tourism and explore the reasons for the rapid growth of tourism.	2, 5	Un
CO - 2	assert and apply the method to develop an ideal itinerary and function of tour managers.	4,6	Ap
CO - 3	plan, lead and organize the effective and efficient operations through tourism formalities	2, 5, 6	Cr
CO - 4	view how the travel motivators promote social tourism, apply the concept to explore the demand, factors influencing tourism	5,6	Ap
CO - 5	Better understanding of Travel and Tourism Industry	4,5	Un
CO - 6	Identify and assess relationships and networks relative to building tourism capacity.	4, 6	Ap
CO - 7	Understand the place of tourism in the service industry.	2,4,7	Un

SEMESTER- III			
Core Skill Based	**TOURISM ECONOMICS- I**		
Course Code: 21UECS31	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

UNIT-I: Basic Concepts of Tourism **10 Hrs**

Meaning- Definition - Concepts and Types of Tourism - Tourism and economic development - Importance of tourism - Sustainable Tourism

UNIT-II: Tourism Product and Tourism Marketing **10 Hrs**

Tourism products: Attractions, Availability, Accessibility and Amenities - Tourism Marketing – Various types of tourism marketing in India - Impact of Information Technologyin tourism development.

UNIT-III: Tourism Services **10 Hrs**

Hotels - Motels - Resorts - Boating Clubs - Conducted /Organized Tours - Package Tour - Insurance - Guides - Tour Operators - Tour Promoters - Medical Tourism and its importance.

UNIT-IV: Performance of Tourism **15 Hrs**

Tourism status in global and national -Socio, Economic, Cultural and Political Impactsof tourism development in India - Programmes in Tourism Development - Infrastructure Development Programme – Integrated Development of Tourism Circuits, Product infrastructure and Destination Development

UNIT-V: Tourism Organizations **15 Hrs**

Role and Functions: United Nations World Tourism Organizations (WTO), Pacific Asia Travel Association (PATA), World Tourism and Travel Council (WTTC), International Hotel Association (IHA), Ministry of Tourism, Government of India, Indian Tourism Development Corporation (ITDC) and Federation of Hotel and Restaurants Association of India (FHRAI)

Text Book: Sunetra Roday, Archana Biwal & Vandana Joshi. *Tourism: Operations andManagement*. USA: Oxford University Press. Illustrated edition 2009

Books for Reference:

1. D. Leslie & J. Holland. *Tour operators & Operations: Development, Management andResponsibility.* U.K: CABI Publishers. 1st edition 2017.
2. Geetanjali. *Tourism Policy and Planning*. Jaipur: ABD Publishers. 1st edition 2010.
3. Manish Ratti. *Tourism Planning and Development*. New Delhi: Rajat Publications. 1stedition, 2008.
4. R. Shantha Kumar,. *Facts on Tourism*. Chennai: Shantha Publishers. 1stedition 1996.

SEMESTER- IV			
Core Skill Based	**TOURISM ECONOMICS**- II		
Course Code: 21UECS41	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

Objectives:

- Learn about sustainable tourism development for inclusive economic development.
- Understand the importance of Tourism sector and having integrity to achieve economic development through tourism.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO - 1	identify and evaluate the elements of the tourism system and its interaction with the environment.	2,4	Ev
CO - 2	recognize and raise awareness for moral issues and dilemmas in tourism.	4, 5	An
CO - 3	provide information about tour packages	4,5	Un
CO - 4	assert and apply the method to develop an ideal itinerary and function of tour managers.	1, 7	Ap
CO - 5	understand the importance of transport and communication in travel tourism and hospitality industry.	2,4,5	Un
CO - 6	create an awareness on the economic impact generated by tourism.	2,4	Cr

SEMESTER- IV			
Core Skill Based	**Tourism Economics- II**		
Course Code: 21UECS41	**Hours / week :4**	**Hrs / Sem.: 60**	**Credits :4**

UNIT-I: Travel Agency **10 Hrs**

Travel Agents, Tour operators, Function of a travel agent – Travel information, Ticketing,Tour packages, and Type of Package, Tours and excursion -Travel agency commission How to setup a travel agency-Modern mobile application towards in Tourism.

UNIT-II: Personality Developments Of Travel Agent, Tour Operator, Guide 10 Hrs

Introduction: Meaning of Personality, Personality Factors- externa internal. Effective or winning personality, developing a selling personality

UNIT-III: Guiding Concept **15 Hrs**

Meaning, Concepts &Types of Guides: Conceptual meaning of Tourist Guide, duties andresponsibilities. How guides are appointed in tour.

UNIT-IV: Tourism Development **10 Hrs**

Development of tourism in India - New Policy on Tourism Management strategy-Globaland Indian status of Tourism Industry - International Agencies.

UNIT-V: Indian Art & Architecture **15 Hrs**

Indian Art and Sculptures, Archaeological sites – Monuments – Ancient Temples of India -Forts - Palaces and Museums – Buddhist heritage sites of India, Islamic Art & Architecture -UNESCO, World Heritage Sites in India, conservation & Management.

Text Book: A.K.Bhatia, Tourism Development-Principles & Practices, 4th Revised Edition,Sterling Publishers Pvt., Ltd, Uttar Pradesh, 2020.

Books for Reference:

1. S. Subramania Pillai. *Tourism in Tamil Nadu- Growth and Development*. India: MJPPublishers. 1st edition 2021.
2. Rajat Gupta, Nishant Singh, Ishita Kirar& Mahesh Kumar Bairwa. *Hospitality andTourism*. New Delhi: Vikas Publishing House Pvt, Ltd. 1st edition 2015.
3. Satish Chandra Nigam,. *Eco Tourism and Sustainable Development.* New Delhi: RajatPublications. 1st edition 2008.
4. Biswanath Ghosh. *Tourism & Travel Management.* New Delhi: Vikas Publishing HousePvt, Ltd. 2nd edition 2000.

SEMESTER- I			
ALLIED I	**GENERAL ECONOMICS – I (I HISTORY)**		
Code: 21UHIA11	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

Objectives:

- To understand the various definition of economics and scope of economics.
- To introduce students to basic economics concepts and theories.
- To understand the basic concepts of national income.

Course Outcomes:

CO No.	**Upon completion of this course, students will be able to**	**PSO's Addressed**	**CL**
CO 1	To learn and understand Economics with the help of various definitions	2	Un
CO 2	Get an introduction to supply and demand and determine equilibrium in a market economy. To familiarize the students with the basic concept of economics	2,5	Ev
CO 3	Students will understand general economic concepts such as supply & demand, Utility etc. Demonstrate the measurement of utility or satisfaction and its relationship to the law of demand	1,4	Un
CO 4	Identify the factors of production and production possibilities. Define the term "production" and explain what a production function is; define the term "production inputs," and differentiate between labour, land, capital, entrepreneurship, technology	1,2	An
CO 5	Describe the incomes earned by the factors of production (land, labour, capital, entrepreneurship) wages, interest, rents, and profit	1,2	Un
CO 6	Defines concepts related to national income. Compares calculation methods of national income. To apply the circular flow of income and expenditure	1	An

SEMESTER- I			
ALLIED I	**GENERAL ECONOMICS – I (I HISTORY)**		
Code: 21UHIA11	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

UNIT I - INTRODUCTION **10 Hrs**

Definitions – Wealth, welfare and scarcity - Scope of Economics – Divisions of Economics - Basic concepts –Utility, Goods, Market, and Wealth.

UNIT II - CONSUMPTION **10 Hrs**

Human Wants, Law of Diminishing Marginal Utility — Consumer's Surplus- Law of Demand – Types, Exceptional demand

UNIT III - PRODUCTION **15 Hrs**

Factors of Production – Land, Labour, Capital, Organisation- features- Division of Labour – Localization- Merits and Demerits - Theories of Population – Malthusian Theory – Optimum Theory

UNIT IV - DISTRIBUTION **15 Hrs**

General Theory of Distribution – Theories of Rent – Ricardian Theory – Modern Theory of Rent - Interest – Liquidity Preference Theory - Profit – Schumpeter's Innovation Theory – Theories of Risk and Uncertainty

UNIT V - NATIONAL INCOME **10 Hrs**

Meaning of Macro Economics – Difference between Macro and Micro Economics – National Income- Concept –Meaning – Personal Income, Gross Domestic Product (GDP) – Gross National Production (GNP) and Net National Product (NNP) – Methods of National Income Estimation – Difficulties of Estimation

Text Book: M.L.Seth, Micro Economics, 17th Revised Edition, Lakshmi Narayan Agarwal, Educational Publishers Agra, 2001.

Reference Books:

1. Dr.Pazhani, Micro Economics, 4th Edition, J P Publishers, Nagercoil, 2019
2. H.L.Ahuja, Modern Micro Economics: Theory and Applications, 19th Edition, S. Chand & Company Ltd, New Delhi, 2017.
3. N. Gregory Mankiw, Principles of Economics, 7th Edition, Cengage Learning India PVT. Ltd, New Delhi, 2015.

SEMESTER- II			
ALLIED II	**GENERAL ECONOMICS – II (I HISTORY)**		
Code: 21UHIA22	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

Objectives:

- To develop an in-depth understanding of the concepts of Economics
- Understand and promote financial thinking skills.
- Boost decision making abilities among students to empower them to become business citizens.

Course Outcome:

CO No.	**Upon completion of this course, students will be able to**	**PSO Addressed**	**CL**
CO 1	Students will get exposed to different types of employment and analysis of labour markets	4,7	Un
CO 2	To provide the students with an introduction to understand the concept of money, theories of money supply and money demand	2	Ev
CO 3	Provide the students with a thorough understanding of the importance of money and banking in various economies. It provides an insight into the Banking system	1,4	Un
CO 4	Identify the basic difference between inter-regional and international trade	2	An
CO 5	Show the importance of maintaining equilibrium in the balance of payments and suggests suitable measures to correct disequilibrium as well	1,2	Un
CO 6	Understand the sources of finance both public and private, understand government expenditures and the causes of growing public expenditures	4,6	An

SEMESTER- II			
ALLIED II	**GENERAL ECONOMICS – II (I HISTORY)**		
Code: 21UHIA22	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

UNIT I - EMPLOYMENT **10 Hrs**

Meaning of Full Employment – Types of Unemployment – Seasonal, Frictional, Technological, Structural, Voluntary and Involuntary, Cyclical and Disguised Unemployment

UNIT II - MONEY **15 Hrs**

Barter – Meaning and Difficulties – Money - - Evolution, Kinds & Functions of Money- Monometallism – Bimetallism: Merits and demerits – Paper Currency Standard – Systems of note issue

UNIT III - BANKING **10 Hrs**

Evolution of banks – Kinds of Banks – Functions Commercial Bank - Functions of a Central Bank

Practical: To Open an account, to cross the Cheque and to fill up demand draft form.

UNIT IV - INTERNATIONAL TRADE &BALANCE OF PAYMENT **10 Hrs**

International Trade – Benefits – Difference between International Trade and Internal Trade – Free Trade and Protection – Advantages and Disadvantages

Balance of Payment and Balance of Trade – Structure – Causes of Disequilibrium Balance of payment – Methods of correcting disequilibrium

UNIT V - PUBLIC FINANCE **15 Hrs**

Meaning and Importance of Public Finance –Public Expenditure — Causes for the recent Growth of Public Expenditure- Public Revenue, Sources of Revenue – Public debt, classification of public debt-effects- Methods of debt Redemption

Text Books: Dr. Maria John Kennedy, Macro Economic Theory, 3rd Edition, Prentice Hall Pvt Ltd, New Delhi, 2011

Reference Books:

1. M. L. Jhingan, Macro Economic Theory, 13th Edition, Vrinda Publication Pvt. Ltd, Delhi, 2016.
2. Ackley, Macro Economics: Theory and Policies, 10th Edition, Pearson Education, India, 2013.
3. M. C. Vaish, Monetary Theory, 16th Edition, Vikas Publishing House Pvt. Ltd, Chennai, 2005.
4. Dr. H.L. Bhatia, Public Finance, 30th Edition, S. Chand Publication, 2000.

SEMESTER-V			
Skill Based Elective III Media Writing			
Code:15UENS51	**Hrs/Week: 4**	**Hrs/Semester: 60**	**Credits: 3**

Objectives:

- To expose students to effective media writing
- To develop creative and feature writing skills

Unit I

Introduction to media writing

Characteristics, Techniques, Guidelines

Unit II

Mass Media.

Writing Headlines, News Features, Advertisements

Unit III

Feature writing.

Interview Feature, Profile Feature, Travel Feature

Unit IV

Writing for Broadcasts

Radio, Television, Creating a Blog

Unit V

Writing Reviews

Book, Film, News.

Books for Reference:

Raghavendra Rao Meera N. - Feature Writing, PHI Learning Private limited, New Delhi-1, 2009.

Ceramalla Nick and Lee Elizabeth- Cambridge English for the Media, Cambridge University Press, New Delhi, 2008.

SEMESTER V			
Core Integral I	**Literary Criticism**		
Code:18UEN151	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Vision: To familiarize the students with the literary texts and the various streams in literary criticism.

Mission: To make the students aware that all readers are critics.

Course Outcome:

C.O. No.	Upon Completion of this course students will be able to	PSO addressed	CL
CO-1	practise critical thinking and devise novel ideas.	1	An
CO-2	develop critical sensibility and impart basic knowledge of criticism.	2	An
CO-3	interpret literary compositions to shape their perceptions of the world .	4	Ap, Un, Ev
CO-4	acquaint with the classical and modern theories to compete in the world of higher learning.	5	Un
CO-5	develop literary taste to articulate original ideas.	2	An
CO-6	view literary texts with a critical outlook to compete in the global market.	5	Ev
CO-7	acquaint with the factors involved in criticism like interpretation, elucidation, judgment and appreciation.	1	Un
CO-8	evaluate any work of art to higher perception.	4	Ev

SEMESTER V			
Core Integral I	**Literary Criticism**		
Code: 18UEN151	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Unit I Classical Age
Aristotle (384-322 BC)
Dante (1265-1321)

Unit II Renaissance & Neo Classical Age
Joseph Addison (1670-1790)
Dr. Johnson (1709-1784)

Unit III Romantic Age
William Wordsworth (1770-1850)
S.T. Coleridge (1772-1834)

Unit IV Victorian Age
F.R. Leavis (1895-1978)
I.A. Richards (1893-1979)

Unit V Recent Critical Trends
New Historicism/Cultural Materialism
Hermeneutics

Text Books:

1. Drable, Margaret. *The Oxford Companion to English Literature.* London: Oxford University Press, 2006. Print.
2. Prasad, B. *An Introduction to English.* Delhi. Macmillan India Limited, 1965. Print.
3. Ryan, Michael. *The Encyclopedia of Literary and Cultural Theory*. London: Blackwell, 2011. Print.

Books for Reference:

1. Atkins, J.W.H. *English Literary Criticism 17th 18th Centuries*. Ardent Media, 1963. Print.
2. Barry, Peter. *Beginning Theory: An Introduction to Literary and Cultural Theroy*. Manchester University Press, 2009. Print.
3. Con Davis Robert and Schleifer Ronald. *Contemporary Criticism: Literary and Cultural Studies* .London: Longman, 1998. Print.

SEMESTER – V			
Core VIII	**Essentials in Shakespearean Writings**		
Code : 18UENC52	**Hrs/ week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Vision: To enable the students to acquire knowledge about Shakespeare's sonnets, major tragedies, comedies, historical plays, dramatic techniques and criticism.

Mission: To motivate the students to admire, appreciate and learn the power of Shakespearean Language.

Course Outcome:

CO No.	Upon successful completion of this course students will be able to:	PSO addressed	CL
CO-1	acquaint with Shakespeare's dramatic and poetic genius.	8	Un
CO-2	identify the distinct features of the literary genres of Shakespeare's works.	2	Ev
CO-3	trace the development of Elizabethan theatre.	2,8	Un
CO-4	analyse Shakespeare's works in the modern context.	1,8	An
CO-5	analyse how a writer's tone and voice influence audiences' perception.	1, 2	An
CO-6	find out the difference between the English used during the Elizabethan Age and today.	7	Un
CO-7	understand the universal appeal of Shakespeare's works	8	Un
CO-8	involve themselves in creative writing.	6	Cr

SEMESTER – V			
Core VIII	**Essentials in Shakespearean Writings**		
Code : 18UENC52	**Hrs/ week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit I - Poetry

Sonnets: 18, 30, 65, 108, 116
The Phoenix and the Turtle

Unit II - Historical Play

Antony and Cleopatra

Unit III - Comedy

As You Like It

Unit IV - Tragedy

King Lear

Unit V - General Topics:

(i) Introduction to Shakespearean comedy, tragedy and tragi-comedy
(ii) Theatre and Audience
(iii)Women in Shakespeare
(iv) Fools in Shakespeare Plays
(v) Supernatural Elements

Text Book:

Shakespeare, William. *The Complete Works of William Shakespeare*. New South Wales: Palala Press, 2015. Print.

Books for Reference:

1. Bradley. A.C. *Shakespearen Tragedy*. London: Penguin Random House, 1991. Print.
2. Brown, Russell John. *Shakespeare and His Comedies*. Essex: Methuen & Co Ltd; 1962. Print.
3. Pettet, E.C. *Shakespeare and The Romance Tradition*. London and New York: Staples Press,1949. Print.
4. Tillyard, E.M.G. *Shakespeare's Last Plays*. New York: Bloomsbury Publishing, 2013. Print.

SEMESTER V			
Core IX American Literature			
Code: 18UENC53	**Hrs/Sem:90**	**Hrs/Week: 6**	**Credits:5**

Vision: To familiarise students with the representative writers in American literature.

Mission: To explore the inherent voices of individualism, nature, imagination, creativity, and emotions in American literature.

Course Outcome:

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	highlight the important social condition of each period in order to understand the authors.	1	Re
CO-2	understand the important features of American literature.	2	Un
CO-3	identify and interpret the representative works of American writers.	2	Un
CO-4	assess the significant themes in American Literature.	4	Ev
CO-5	appraise the literary devices employed by the major writers.	2	Ev
CO-6	interpret the historical perspective of American Literature.	4	Un
CO-7	review the dimensions of American literature in the universal context.	8	Ev
CO-8	formulate imagination to a wider range of voices across cultures.	8	Cr

SEMESTER V			
Core IX	**American Literature**		
Code: 18UENC53	**Hrs/Sem:90**	**Hrs/Week: 6**	**Credits:5**

Unit I - Poetry

Walt Whitman (1819-1892) : Out of the Cradle Endlessly Rocking
Robert Frost (1874-1963) : After Apple-Picking
Wallace Stevens (1879-1955) : Of Modern Poetry
Langston Hughes (1902-1967) : The Negro Speaks of Rivers
Sylvia Plath (1932-1963) : Mirror

Unit II - Prose

Ralph Waldo Emerson (1803-1882) : The American Scholar (Duties of the scholar).
Henry David Thoreau (1817-1862) : Where I Lived and What I Lived For

Unit III - Fiction

Ernest Hemingway (1899-1961) : *Across the River and into the Trees*

Unit IV - Drama

Tennessee Williams (1911-1983) : *The Glass Menagerie.*

Unit V - Short-story

Edgar Allan Poe (1809-1849) : The Cask of Amontillado
Mark Twain (1835-1910) : Eve's Diary
Henry James (1843-1916) : The Last of the Valerie

Text Books:

1. Baym, Nina. (ed). *The Norton Anthology of American Literature 5e. V 1*. NewYork: W.W.Norton & Company, 2003. Print.
2. Hemingway, Ernest. *Across the River and into the Trees*. London: Arrow Books, 2004. Print.
3. Williams, Tennesse. *The Glass Menagerie.* New York: Penguin Classics, 2014. Print.

Books for Reference:

1. Burt, Daniel.S. *The Chronology of American Literature: America's Literary Achievements from the Colonial Era to Modern Times*. Boston: Houghton Mifflin Publishers, 2004. Print.
2. Hover, Janet Gabler & Robert Sattelmeyer. *American History through Literature, 1820-1870.* Detroit: Charles Scribner's Sons, 2006. Print.

SEMESTER –VI			
Core X	**Indian Writing in English**		
Code : 18UENC61	**Hrs/ week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Vision: To make the students learn the glorious literary, cultural, biographical and historical background of the greatest English writings written by Indian authors.

Mission: To familiarize students with the major Indian writers in English, Postcolonial literature and its theories.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquaint with the major Indian writers in English.	4	Ev
CO-2	expose to the socio-politico-economic realities of human life.	5, 8	An
CO-3	relate to a wide range of Indian Writing in English.	1, 2	Un
CO-4	define the meaning of 'Indianness' through representative works.	3, 4	Re
CO-5	evaluate closely to determine a writer's purpose and perspective.	3	Ev
CO-6	understand the issues in the contemporary Indian society	8	Un
CO-7	become familiar with the usage of Indian English	7	Un
CO-8	attempt to become creative writers	6	Cr

SEMESTER –VI			
Core X	**Indian Writing in English**		
Code : 18UENC61	**Hrs/ week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit I - Poetry

Sarojini Naidu (1879- 1949) : Palanquin Bearers
Kamala Das (1934- 2009) : Words
Nissim Ezekiel (1924- 2004) : The Professor
A.K. Ramanujan(1929-1993) : A River

Unit II - Prose

Jawaharlal Nehru (1889-1964) : Chandragupta Maurya and the Arthashastra (From *Glimpses of World History*)
Srinivasa Sastri (1869- 1946) : The Joy of Freedom

Unit III - Drama

Girish Karnad (b 1938) : Tuqhlaq

Unit IV - Fiction

Manu Joseph (b 1974) : Serious Man

Unit V - Short Story

R.K. Narayan(1906- 2001) : The White Flower
Jhumpa Lahiri (b 1967) : Mrs. Sen's (from *Interpreter of Maladies*)
Ruskin Bond (b 1934) : The Photograph

Text Books:

1. Bond, Ruskin. *Night Train at Deoli and Other Stories*. New Delhi: 1988. Print.
2. Joseph, Manu. *Serious Man*. Canada: Harper Collins, 2010. Print.
3. Lahiri, Jhumpa. *Interpreter of Maladies*. Boston: Houghton Publishers, 1998. Print.
4. Srinivasa K. Iyengar. *Indian Writing in English*. New Delhi: Sterling Publishers, 2012. Print.

Books for Reference:

1. Lahiri, Jhumpa. *Interpreter of Maladies*: Stories. Boston: Houghton Mifflin, 1999. Print.
2. Nehru, Jawaharlal. *Glimpses of World History*: New Delhi: Penguin Books, 1942. Print.
3. Walsh William. *Indian Literature*. New Delhi: Longman Group Ltd., 1990. Print.

SEMESTER VI			
Core XI	**Women's Writing**		
Code: 18UENC62	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Vision: To enhance the students with a better understanding of Women's writing in English.

Mission: To assess women's studies from a woman's point of view

Course Outcome:

CO No.	Upon completion of this Course, students will be able to	PSO addressed	CL
CO – 1	understand the role of women in Literature	2	Un
CO – 2	recognise the biased social structure of women in the modern era.	3	Un
CO – 3	interpret women's writings across cultures.	3, 5	Ap
CO – 4	analyse the artistic and intellectual contributions of women to literature.	8	An
CO – 5	identify the marginalization of women in society.	8	Un
CO – 6	analyse gender perspectives in writings	3	An
CO – 7	construct their Identity.	4	Cr
CO – 8	appraise the multi-faceted personality of women.	2,6	Ev

SEMESTER VI			
Core XI	**Women's Writing**		
Code: 18UENC62	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Unit I - Poetry

Emily Dickinson (1830-1886)	:	Success is counted Sweetest
Gwendolyn Brooks (1917-2000)	:	The Mother
Carol Ann Duffy (b 1955)	:	Valentine
Maya Angelou (1928-2014)	:	Caged Bird Sings

Unit II - Non- Fictional Prose

Mary Wollstonecraft (1759-1797)	:	A Vindication of the Rights of Woman The Prevailing opinion about sexual differences (Chapter 2, pp: 12-25)
Arundhathi Roy (b 1961)	:	War Talk (from the Algebra of Infinite Justice pp 295-304)

Unit III - Drama

Mahasweta Devi (1926-2016)	:	Mother of 1084

Unit IV - Fiction

Jhumpa Lahiri (b 1967)	:	Interpreter of Maladies

Unit V - Short Story

Anita Desai (b 1937)	:	The Domestic Maid
Cynthia Ozick (b 1928)	:	The Shawl
Kate Chopin (1850- 1904)	:	The Story of an Hour

Text Books:

1. Devi, Mahasweta. *Mother of 1084*. New Delhi: Seagull Publishers, 2011. Print.
2. Lahiri, Jhumpa. *Interpreter of Maladies***.** London: Harper Collins Publishers, 2000. Print.

Books for Reference:

1. Finke, Laurie A. *Feminist Theory, Women's Writing.* Ithaca: Cornell University Press, n.d. Print.
2. Joannou, Maroula, editor. *The History of British Women's Writing, 1920-1945.* Vol. 8. Hampshire: Palgrave Macmillan, 2013. Print.

SEMESTER-VI			
Core XII	**New Literatures in English**		
Code : 18UENC63	**Hrs/ week :6**	**Hrs/ Sem : 90**	**credits :4**

Vision: To introduce students to the literature of the third world nations and make them familiarise with the socio cultural issues

Mission: To expose the students to relate and appreciate the aesthetics expressed in their work of art

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire knowledge about contemporary literature across cultures.	1, 2	Un
CO-2	recognize similarity of experiences of Post-Colonial writers	8	Un
CO-3	identify the various themes presented in New Literatures in English.	1	Ap
CO-4	appreciate the diversity of literary and social voices.	1, 2	Ev
CO-5	develop a penchant for New Literatures in English.	1, 8	Cr
CO-6	understand texts in their cultural and historic contexts.	4	Un
	develop a critical understanding of how literature can both uphold and resist existing structures of power.	8, 10	Un
CO-8	critically analyse different literary texts across cultures	8	An

SEMESTER-VI			
Core XII	**New Literatures in English**		
Code : 18UENC63	**Hrs/ week :6**	**Hrs/ Sem : 90**	**credits :4**

Unit I Poetry

A. D. Hope (1907-2000)	:	Australia
David Diop (1927-1960)	:	Africa
Derek Walcott (1930-2017)	:	A Sea Chantey
Joseph Brodsky (1940-1996)	:	The End of a Beautiful Era

Unit II Prose

E.R. Braithwaite (1912-2016)	:	To Sir, with Love
Ngugi wa Thiong'o (b 1938)	:	Decolonising the Mind- The Language of African Literature
Chimamanda Ngozi Adichie (b1977)	:	The Danger of a Single Story

Unit III Fiction

Orhan Pamuk (b 1952)	:	A Strangeness in My Mind

Unit IV Drama

Wole Soyinka (b 1934)	:	The Swamp Dwellers

Unit V Short Story

Hal Porter (1911-1984)	:	Francis Silver
Lee Kok Liang (1927- 1992)	:	When the Saints Go Marching
Gita Hariharan (b 1954)	:	The Remains of the Feast

Text Books:

1. Pamuk, Orhan. *A Strangeness in My Mind*. India: Penguin Random House, 2016. Print.
2. Thiong'o, Nhugi wa. *Decolonising the Mind: The Politics of Language in African Literature*. Nairobi: East African Educational Publishers, 1986. Print.
3. Soyinka, Wole. Three Short Plays: *The Swamp Dweller, The Trials of Brother Jero, The Strong Breed.* London: Oxford University Press, 1969. Print.

Books for Reference:

1. Gibbs, James, ed. *Critical perspectives on Wole Soyinka*. Washington: Three Continents Press, 1980. Print.
2. McDonald, Ian and Stewart Brown, eds. *Caribbean Poetry*. New Hampshire: Heinemann, 1992. Print.

SEMESTER-VI			
Core Integral III	**World Classics**		
Code : 18UENI61	**Hrs/ week :6**	**Hrs/ Sem : 75**	**Credits :4**

Vision: To familiarize students with literature written across the culture in various languages

Mission: To enable students to analyse, evaluate and appreciate literary texts written across nations

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	relate to the ideologies and psychological impact of diverse people through the classics	1	Un
CO-2	appraise literary texts of great masters	2, 3	Ev
CO-3	analyze the rhetorical pattern and themes of the classics	1,2	An
CO-4	compare and evaluate Literature of diverse cultures	2	Ev
CO-5	improve the skill of analyzing the language used in prose and poetry.	3,7	An
CO-6	evaluate the text against its socio-cultural historic background	1, 8	Ev
CO-7	analyse the literary devices and techniques in different genres of the classics	1	An
CO-8	develop a critical analyses of translations	4, 8	Ev

SEMESTER-VI			
Core Integral III	**World Classics**		
Code : 18UENI61	**Hrs/ week :6**	**Hrs/ Sem : 75**	**credits :4**

Unit I Poetry

Tiruvalluvar	:	Knowing the Fitting Time
Omar Khayyam (1048-1131)	:	The Rubaiyat-1-12 quatrains
Johann Wolfgang Von Goethe (1749-1832)	:	The Dance of the Dead
Tagore (1861-1941)	:	*Gitanjali*- Where the mind is without fear

Unit II Prose

Plutarch (AD 46- AD 120)	:	*Plutarch's Lives* - Antony (Translated by John Dryden)
Montaigne (1533-1592)	:	Of Idleness, Of Constancy

Unit III Drama

Moliere (1622-1673)	:	The Doctor in Spite of Himself

Unit IV Fiction

Kahlil Gibran (1883-1931)	:	The Broken Wings

Unit V - Short Story

Leo Tolstoy (1828-1910)	:	How Much Land Does a Man Need?
Anton Chekhov (1860- 1904)	:	Vanka
Franz Kafka (1883-1924)	:	A Country Doctor

Text Books:

1. Gibran, Kahlil. *The Broken Wings*. New Delhi: Sterling Publishers, 2007. Print.
2. Khayyam, Omar. *Rubaiyat of Omar Khayyam*. New Delhi: Rupa Publications, 2000. Print.
3. Moliere. *The Doctor In Spite of Himself*. Applause Theatre Book Publishers, 1987. Print.
4. Neider, Charles. *Great Short Stories of the Masters*. New York: Cooper Square Press, 2002. Print.
5. Plutarch. *Lives*. Trans. John Dryden. *The Internet Classics Archive*. Web.
6. Tagore, Rabindranath . *Gitanjali.* New Delhi: Sterling Publishers, 2007. Print.
7. Thiruvalluvar. *Tirukural*. Trans. G.U.Pope. New Delhi: Vaigarai Publishing house, 1980. Print.

Books for Reference:

1. Dashti, Ali. *In Search of Omar Khayyam*. Trans. L.P.Elwell-Sutton. New York: Routledge Library edition, 2012. Print.
2. Wright, C. H. C., ed. *Selections from Montaigne*. Boston: D.C. Heath &Co, 1914. Print.

SEMESTER VI			
Core Integral IV	**Diasporic Literature**		
Code: 18UENI62	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits:4**

Vision: To familiarise the students with the various diasporic experiences and questions surrounding multiculturalism, colonialism and post-colonialism, immigration, and varieties of English.

Mission: To enhance students' understanding of contemporary transnational and transcultural themes and issues through a study of the prescribed texts.

Course Outcome:

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	highlight the important social condition of each culture in order to understand the authors.	1	Re
CO-2	understand the important features of diasporic literature.	2	Un
CO-3	identify and interpret the representative works of the writers of diaspora.	2	Un
CO-4	assess the significant themes in diasporic literature.	4	Ev
CO-5	appraise the literary devices employed by the major writers.	2	Ev
CO-6	interpret the historical perspective of diasporic literature.	4	Un
CO-7	review the dimensions of diasporic literature in the universal context.	8	Ev
CO-8	formulate imagination to a wider range of voices across cultures.	8	Cr

SEMESTER VI			
Core Integral IV	**Diasporic Literature**		
Code: 18UENI62	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits:4**

Unit I – Poetry

Psalm 42 : As the hart panteth after the water brooks...
Psalm 137 : By the rivers of Babylon

Unit II – Prose

Edward Said (1935-2003) : The Mind of Winter: Reflections on Life in Exile
William Safran (b 1930) : Diasporas in Modern Societies : Myths of Homeland and Return

Unit III – Drama

Bertolt Brecht (1898-1956) : Fear and Misery of the Third Reich

Unit IV – Fiction

Toni Morrison (b 1931) : Home

Unit – V- Short Stories

Wolfgang Borchert (1921-1947) : The Kitchen Clock
Bharati Mukherjee (1940-2017) : The Tenant
Suneeta Peres Da Costa (b 1976) : The Long Division

Text Books:

1. Brecht, Bertolt. *Fear and Misery of the Third Reich*. London: Bloomsbury Publishing Company, 2000. Print.
2. *Holy Bible King James Version*. Tennessee: World Bible Publishing, 1981.Print.
3. Morrison, Toni. *Home*. London: Vintage Publishers, 2013. Print.
4. Safran, Williams. "Diasporas in Modern Societies: Myths of Homeland and Return." *Diaspora: A Journal of Transnational Studies*1. Spring (1991): 83-99. Print.

Books for Reference:

1. Braziel, J.E. & A. Mannur, *Theorizing Diaspora.* New Jersey: Blackwell Publishing, 2003. Print.
2. Shackleton, Mark. *Diasporic Literature and Theory – Where Now?* Newcastle: Cambridge Scholars Publishing, 2008. Print.

SEMESTER III			
Skill Based Elective	**Employability Skills**		
Code: 18UENS31	**Hrs/Week: 4**	**Hrs/Semester: 60**	**Credits: 4**

Vision: To impart appropriate employment skills and knowledge for the students

Mission: To inform, educate and inspire students to reach their professional goals

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	create an ability to work constructively with others on a common task.	2	Cr
CO-2	analyse own strengths and weaknesses, aims and values.	10	An
CO-3	analysing and responding positively to changing circumstances	1,3	An
CO-4	predict appropriate methods to find solutions	3,5	Co
CO-5	discuss and achieve mutually satisfactory resolution of contentious issues	1,2	Co
CO-6	become original or inventive and apply lateral thinking	3	Ev
CO-7	create an ability to take action unprompted	5	Cr
CO-8	assess the tasks and rank according to the importance	8	Un

SEMESTER III			
Skill Based Elective	**Employability Skills**		
Code: 18UENS31	**Hrs/Week: 4**	**Hrs/Semester: 60**	**Credits: 4**

Vision: To impart appropriate employment skills and knowledge for the students
Mission: To inform, educate and inspire students to reach their professional goals

Unit I - Oral skills

Verbal Communication
Speech for special occasions
Debate
Group Discussion

Unit II - Writing Skills

Pre-Writing
Modes and Forms of Writings

Unit III - Computing Skills

Word Processing

Unit IV- Presentation Skills

Body Language
Effective Speaking

Unit V - Emotional Intelligence

Successful Time Management
Stress Management
Improving Interpersonal Relationship

Text Books:

1. Gupta, Nilanjana. *English for All*. Chennai: Macmillan India Ltd, 1998. Print.
2. Mac Kenzie, Alec, Pat Nickerson. *The Time Trap: The Classic Book on TimeManagement.* Fine Communications, 2002. Print.
3. Mitra, Barun.K. *Personality Development and Soft Skills*. London: Oxford University Press, 2011. Print.
4. Wainer, John E*. English Composition and Grammar (First Course*), Chicago: Harcourt Brace Jovanich Publishers, 1998. Print.
5. Wentz, Fredrick. H. *Soft Skills Training*. Create Space Independent Publishers, 2012. Print.

Semester – V		
Self – Study Paper (Compulsory)		
Code: 18UENSS3	**Science Fiction**	**Credits : 2**

Vision:

- To view the futuristic vision of science fiction literature
- To promote the emerging trends of science fiction

Mission:

- To evince students interest in the genre of science fiction
- To introduce the students to renowned science fiction writers.

Course Outcome:

CO No.	Upon completion of this course students will be able to:	PSO addressed	CL
CO-1	have a critical perspective of the future scene of the world	1	An
CO-2	understand how science and technology influence the world of Literature	1,8	Un
CO-3	analyse the style of science fiction writings of writers	5	An
CO-4	correlate the happenings of the day with the text	5	Ap
CO-5	apply the caution stated in the studies to safeguard interests of the humans and the earth	10	Ap
CO-6	intensify and acknowledge the power of imagination	1	Un
CO-7	compare and contrast the advantages and disadvantage of science in its global context	8	Ap
CO-8	seek solution in humanism as an ultimatum to resolve technological and scientific issues	10	Ap

Semester – V		
Self – Study Paper (Compulsory)		
Code: 18UENSS3	**Science Fiction**	**Credits : 2**

Unit I

Aldous Huxley : Brave New World

Unit II

George Orwell : 1984

Unit III

Kurt Vonnegut : Slaughterhouse- Five

Unit IV

Margaret Atwood : The Handmaid's Tale

Unit V

Lois Lowry : The Giver

Text Books:

1. Atwood, Margaret. *The Handmaid's Tale*. Toronto: McClelland and Stewart, 1985. Print.
2. Huxley, Aldous. *Brave New World*. New York: Perennial Classics, 1932. Print.
3. Lowry, Lois. *The Giver.* Boston, Massachusetts: Houghton Mifflin, 1993. Print.
4. Orwell, George. *1984*. London: Harville Secker ,1949. Print.
5. Vonnegut, Kurt. *Slaughterhouse-Five*. Delacourt, 1965. Print.

SEMESTER V			
Core VII (Common Core) Women Empowerment in India			
Code: 18ULCC51	**Hrs/Sem :90**	**Hrs/ Week: 6**	**Credits : 6**

Vision: To familiarise the students with the existing socialization pattern in the society, functioning of institutions and disseminate gender sensitive approaches.

Mission: To introduce different schools of feminist thought and provide a feminist perspective to understand women's experiences in different parts of India.

Course Outcome:

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	illustrate women's historical, socio economic and political experiences.	1, 2	Un
CO- 2	classify the nature and growth of women's movement in the Modern Age.	8,9	Un
CO- 3	identify the legal rights conferred on women by laws and legislations.	8,5	A
CO- 4	infer a range of issues pertinent to women's emancipation, dignity and status	2,6	An
CO- 5	analyse women's participation in politics from a feminist perspective.	8,8	An
CO- 6	appraise the theoretical outlook on feminism from India and abroad.	4,6	Ev
CO- 7	evaluate various emerging gender issues in contemporary India.	8,10	Ev
CO- 8	assess the Indian feminist traditions that have arisen out of the heterogeneity of Indian experience.	7,10	Ev

SEMESTER V			
Core VII (Common Core) Women Empowerment in India			
Code: 18ULCC51	**Hrs/Sem :90**	**Hrs/ Week: 6**	**Credits : 6**

Unit I – Theories of Feminism

Liberal Feminism – Radical Feminism – Marxist Feminism – Psycho-Analytic Feminism- Socialist Feminism- Third World Feminism – Post Modern Feminism – Eco Feminism

Unit II – Status of Women in India through the Ages

Ancient – Vedic Period – Medieval Period – During the Invasion– Colonial Era – Post Colonial Era

Unit III – Women in National Movements

Social Reform Movements in Pre- independent India: On Women Education – Abolition of Sati – On Widow Remarriage – Abolition of Child Marriage, Polygamy

Women in Freedom Movement: Velu Nachiar – Jhansi Rani Lakshmi Bai – Dr. Annie Besant – Women in Civil Disobedience Movement – Quit India Movement.

Contemporary Women's Movement: Mathura and Nirbhaya Case and Change in Laws against Rape – Roop Kanvar Case and Anti- sati Agitation, Chipco, Narmada and Appico: Women's Movement for Safe Environment

Unit IV – Indian Feminism: Thinkers and Activists

Reformers – Panditha Rama Bai - Sarala Devi Chadhurani — Dr. Muthulakshmi Reddy – Moovalur Ramamirtham – Margaret Elizabeth Cousins – Kamala Devi Chattopadhyay – Dhanvanthi Rama Rau – Medha Patkar – Arundati Roy - Irom Chanu Sharmila

Unit V – Constitutional Protection and Rights for Justice

Indian Constitution Related to Women – Fundamental Rights – 73rd & 74th Amendment - Representation of Women in Local Self Government – Women's Property Rights - Dowry Prohibition Act (1961) – Domestic Violence Act (2005) – Sexual Harassment at the Workplace (2013) – Laws against Violence and Crimes – Eve Teasing, Rape, indecent Representation of Women.

Text Book:

Jeyaraj, Nirmala. (Ed.). *Women and Society.* Madurai: ISPCK & Lady Doak College, 2005. Print.

Books for Reference:

1. Devi K. Uma. *Women's Equality in India: a Myth or Reality.* New Delhi: Discovery Publishing House, 2000. Print.
2. Forbes, Geraldine. *The New Cambridge History of India: Women in Modern India.* Cambridge: Cambridge University Press, 2007. Print.
3. Gonsalves, Lina. *Women and Human Rights.* New Delhi: APH Publishing House, 2011. Print.
4. Tripathi, Prof. Madhusoodan. *Women Rights in India.* New Delhi: Omega Publications, 2011. Print.

SEMESTER – I			
Allied – I	**Social History of England**		
Course Code :21UENA11	**Hrs/ week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Objectives:

To provide a fundamental knowledge of the revolutionary shifts that occurred in the English society over the ages.

To familiarise the students with the historical invasions and expansions, and the consequent social changes in the history of England.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO -1	develop an awareness of the social, historical, religious and cultural politics of England.	4, 7	Un
CO - 2	understand the social changes within the country and in its relationship with other nations.	4, 6	Un
CO - 3	enumerate the importance of the customs and culture followed by the high class British society.	1, 8	Ap
CO - 4	analyse the causes and consequences of civil war and American independence.	8	An
CO - 5	analyse the major trends that shaped the English society and identify the key themes which encapsulate the period.	8	An
CO - 6	evaluate the invasion and expansion of the British colonies all over the world.	1, 7	Ev
CO - 7	evaluate the effects of the revolutions and their impacts in literature in a better perspective.	8	Ev
CO-8	review the reforms and developments of education in the modern era.	7	Ev

SEMESTER – I			
Allied – I	**Social History of England**		
Course Code : 21UENA11	**Hrs/ week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit – I

Introduction (G.M. Trevelyan)
The Renaissance
The Reformation

Unit - II

The East India Company
The Civil War and its Social Significance
Puritanism

Unit – III

Restoration England
Age of Queen Anne
Coffee House Life in London

Unit – IV

The Industrial Revolution
The Agrarian Revolution
The Methodist Movement
The War of American Independence

Unit – V

Effects of the French Revolution
The Reform Bills
The Victorian Age
World Wars and Social Security

Text Books:

4. Trevelyan, G.M. *English Social History*. London. Penguin UK, 1987.
5. Xavier, A.G. *An Introduction to the Social History of England.* Delhi: Viswanathan S. Printers & Publishers, Pvt. Ltd. 2009.

Books for Reference:

1. Ashok, Padmaja. *The Social History of England*. Chicago: Orient Blackswan, 2011.
2. Crick, Julia & Elisabeth Van Houts. *A Social History of England 900 – 1200*. Cambridge: Cambridge University Press, 2011.
3. Macaulay, Thomas Babington. *The History of England.* USA: Penguin Classics, 1979.

SEMESTER – II			
Allied – II	**Literary Forms and Terms**		
Course Code : 21UENA21	**Hrs/ week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Objectives:

To introduce the various genres and forms of literature.

To enable the students make use of the various forms of literature and highlight the important concepts in a text and improve the quality of their writing.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO -1	comprehend the dimensions of literary forms.	1	Un
CO - 2	demonstrate their ability to explain the influence of genre on a given text.	1	Un
CO - 3	recognise how form and structure shape the meaning of a text.	1, 4	Ap
CO - 4	identify, analyse and interpret the different genres of literature.	4, 9	An
CO - 5	distinguish between different literary terms and usages.	1, 9	An
CO - 6	appraise the different genres of literature.	1	Ev
CO - 7	evaluate one's own perspective in relation to various forms of literature.	1	Ev
CO-8	formulate literary creations of their own.	2, 7	Cr

SEMESTER – II			
Allied – II	**Literary Forms and Terms**		
Course Code : 21UENA21	**Hrs/ week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit - I Introduction

Why We Study Literature? – R.J. Rees

Literary Terms

Simile, Metaphor, Personification, Irony, Allusion, Alliteration, Assonance, Consonance, Epithet, Paradox, Oxymoron, Apostrophe, Imagery, Hyperbole, Euphemism, Onomatopoeia, Understatement, Cacophony, Metonymy, Synecdoche.

Unit - II Poetry

Lyric, Ode, Sonnet, Idyll, Elegy, Epic, Ballad

Unit - III Prose

Essay, Short Story, Biography, Autobiography, Satire

Unit - IV Drama

Origin of Drama (Pg 140- 143), Comedy, Tragi- comedy, Farce, Melodrama, Masque, Dramatic devices (Irony, Soliloquy and Aside)

Unit – V Fiction

Novel (Pgs.193-199, 218- 224).

Text Books :

1. Abrams, M.H. *A Glossary of Literary Terms*. US: Wadsworth Publishers, 2012.
2. Prasad, Birjadish. *A Background to the Study of English Literature*. Delhi: Macmillan Publishers India Ltd., 2012.

Books for Reference:

1. Hudson, William Henry. *An Introduction to the Study of Literature*. Atlantic Publishers & Distributors (P) Ltd., 2006.
2. Iyengar, K.R. & P. N. Kumar. *An Introduction to the Study of English Literature* India: Sterling Publishers Pvt. Ltd., 2011.
3. Rees, R.J. *English Literature: An Introduction for Foreign Readers*. London: Macmillan Publishers, 1973.
4. Turco, Lewis. *The Book of Literary Terms: The Genres of Fiction, Drama, Nonfiction, Literary Criticism and Scholarship.* Lebanon: UPNE, 1999.

E-Resources:

1. https://englishlive.ef.com/blog/english-in-the-real-world/guide-english-literary-genres/
2. https://guides.lib.byu.edu/c.php?g=216352&p=1428448
3. https://www.britannica.com/art/literature

SEMESTER – III			
Allied III History of English Literature - I			
Course Code: 21UENA31	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Objectives:

To enable students to learn the history of English literature down the ages.

To make the students understand the literary movements and developments of the age.

Course Outcome:

CO. No.	Upon completion of this Course, students will be able to	PSO addressed	CL
CO 1	understand the phases of evolution of English literature	4	Un
CO 2	comprehend the characteristic features of the age	1	Un
CO 3	explore texts in their cultural and historical contexts.	1	Un
CO 4	have an insight into the major literary movements and genres.	1	Un
CO 5	analyze the distinct literary contribution of England.	4	An
CO 6	classify English literatures according to their periods.	7	Ap
CO 7	identify and interpret the didactic purpose in literature.	2	Ap
CO 8	review and estimate literary texts over the periods.	8	Ev

SEMESTER – III			
Allied III History of English Literature - I			
Course Code: 21UENA31	**Hrs/Week: 4**	**Hrs/Semester: 60**	**Credits: 4**

Unit-I Chapters II −V

English Literature before Chaucer - The Age of Chaucer – Chaucer's Work in General – The Canterbury Tales – General Characteristics of Chaucer's Poetry – The Development of the Drama

Unit-II Chapters VI – VIII

Elizabethan Poetry before Spenser - Spenser and his Poetry –Shakespeare's Works - Characteristics of Shakespeare's Works - Ben Jonson– Bacon and his Essays

Unit-III Chapters IX −X

The Age of Milton – Milton's Earlier Poetry - Milton's Later Poetry – Characteristics of Milton's Poetry -The Caroline Poets - Cowley and the 'Metaphysical' Poets

Unit-IV Chapters XI −XIII

Dryden's Poetry – Butler - The Rise of Modern Prose – Bunyan - Characteristics of the Classical School of Poetry - Pope's Work

Unit-V Chapters XIV–XVII

Swift – Addison and Steele - Johnson – Goldsmith – Richardson – Fielding - The Growth of the Love of Nature in 18th Century Poetry – Thomas Gray

Text Book:

Hudson, William Henry. *An Outline History of English Literature*. Atlantic Publishers, 2013.

Books for Reference:

Leguois, Emily &Cazamian. *A Short History of English Literature.* J.M. Dent & Sons, 1964.

Long, William J. *English Literature.* Ginn and Company, 1909.

E-Resources

https://literariness.org/2018/07/18/a-brief-history-of-english-literature/

http://www.historyworld.net/wrldhis/plaintexthistories.asp?historyid=aa08

https://www.britannica.com/art/English-literature

SEMESTER – IV			
Allied–IV History of English Literature –II			
Course Code: 21UENA41	**Hrs/Week: 4 Hrs**	**Hrs/Semester: 60 Hrs**	**Credits:4**

Objectives:

To comprehend the history of English Literature that combines the transformation of literary standards and tastes.

To suggest the vital relationship between English Literature and life.

Course Outcome:

CO. No.	**Upon completion of this Course, students will be able to**	**PSO addressed**	**CL**
CO-1	familiarize the important literary figures and literary works of the period	7	Un
CO-2	examine the issues discussed in the text in the socio-historic and cultural context	1	Un
CO-3	understand the chronologically arranged collection of biographical sketches	1	Un
CO-4	analyze the dominant literary and artistic movements of the early and the modern period	8	An
CO-5	exhibit the interplay of the personal and the impersonal in the making of history	4	Un
CO-6	discuss how literature influences the socio –political history of each period	7	An, Ev
CO-7	demonstrate an awareness of the social, historical and cultural elements of the centuries.	7	An, Ev
CO-8	prepare for UGC NET/SET competitive examinations	3,5	Un, An

SEMESTER – IV			
Allied–IV History of English Literature –II			
Course Code: 21UENA41	**Hrs/Week: 4 Hrs**	**Hrs/Semester: 60 Hrs**	**Credits:4**

Unit I - Chapter XVIII – XIX

The Age of Wordsworth - Lyrical Ballads and Wordsworth's Theory of Poetry - Characteristics of Wordsworth's Poetry - Coleridge - Byron- Shelley- Keats

Unit II - Chapter XX - XXII

The Age of Wordsworth (Prose) – General Characteristics - The Edinburgh Men – The London Men - Scott- Characteristics of Scott's Novels - The Age of Tennyson – Tennyson- Browning

Unit III- Chapter XXIII –XXV

Carlyle – Ruskin –Mathew Arnold - The Age of Tennyson (Novel) – General Characteristics – Dickens- Thomas Hardy - George Bernard Shaw

Unit IV - Chapter XXV – XXVI

Irish Drama and Poetry -Novelists of the Transition - Twentieth Century Novelists -
The Present Age - Gerard Manley Hopkins - T.S. Eliot

Unit V - Chapter XXV – XXVI

The Changing Novel – Virginia Woolf - James Joyce – D.H. Lawrence – Aldous Huxley - George Orwell - Graham Greene – J. K. Rowling – Salman Rushdie - Hilary Mantel – Harold Pinter

Text Book:

Hudson, William Henry. *An Outline History of English Literature*. Atlantic Publishers, 2013.

Books for Reference:

Leguois, Emily &Cazamian. *A Short History of English Literature.* Oxford University Press, 1998.
Long, William J. *English Literature.* Ginn and Company. 1909.

E –Resources

https://edisciplinas.usp.br/pluginfile.php/3875221/mod_resource/content/1/AN%20OUTLINE%20OF%20HISTORY%20OF%20ENGLISH%20LITERATURE.pdf

https://edisciplinas.usp.br/pluginfile.php/3874213/mod_resource/content/1/THE%20ROUTLEDGE%20HISTORY.pdf

SEMESTER – I			
Core – I	**Age of Renaissance (1500 to 1660)**		
Course Code: 21UENC11	**Hrs/Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Objectives:

To expose students to the significant literary features of English Renaissance.

To let them know of the significance and influence of Shakespeare and the representative writers of the age.

Course Outcome:

Co. No.	Upon completion of this course, students will be able to:	PSO addressed	Cognitive Level
CO-1	understand literary texts in their social, political, historical and cultural contexts.	3,8	Un
CO-2	practise writing as a process of motivated inquiry engaging other writers' ideas.	6,8	Ap
CO-3	appreciate and analyse the structure and content of any literary piece.	4	Ap
CO-4	analyse the structure and rhyme scheme of the sonnets.	1	An
CO-5	judge the aesthetic and ethical values of Renaissance.	1,8	Ev
CO-6	perceive the distinct qualities of the writers of the Age of Renaissance.	4	Ev
CO-7	identify and comprehend different genres pertaining to the Age of Renaissance.	3,4	Cr
CO- 8	create aesthetic taste for literary texts.	8	Cr

SEMESTER – I			
Core – I Age of Renaissance (1500- 1660)			
Course Code: 21UENC11	**Hrs/Week : 5**	**Hrs / Semester: 75**	**Credits: 4**

Unit – I Introduction of the Age

Historical background : Literary Features - Literary forms

Unit – II Poetry

Thomas Wyatt (1503 – 1542) : Forget Not Yet
Edmund Spenser (1552-1599) : Prothalamion
Philip Sidney (1554-1586) : Astrophel and Stella- Sonnet 1
Shakespeare : Shall I Compare Thee to a Summer's Day? (Sonnet 18)

Unit – III Prose

Francis Bacon (1561-1626) : Of Studies
Of Friendship
Of Parents and Children

Unit – IV Drama

Christopher Marlowe (1564-1593) : *Doctor Faustus*

Unit – V Fiction

Thomas More (1478-1535) : *Utopia* -Book 1

Text Books:

1.Blaisdell, Bob, ed. *Elizabethan Poetry: An Anthology*. New York: Dover Publications. 2005.
2.Marlowe, Christopher. *Doctor Faustus*. New York: Penguin, 1969.
3.More, Thomas. *Utopia*. David Wootton. ed. Cambridge: Hackett Publishing Company, 1999.

Books for Reference:

1. Albert, Edward. *History of English Literature*. New Delhi: OUP, 1979.
2. Chauduri, Sukanta. *An Anthology of Elizabethan Poetry*. India: OUP, 1993.
3. Harry, Berger. Spenser: *A Collection of Critical Essays*. Englewood Cliffs:Prentice-Hall,1968.
4. Leishman, J.B. *Themes and Variations in Shakespeare's Sonnets*. London: Hutchinson, 1961.
5. Morris, Helen. *Elizabethan Literature*. London: Oxford University Press, 1958.
6. Oliphant, Smeaton. *Francis Bacon's Essays*. London: J.M. Dent & Sons Ltd., 1955.
7. Saintsbury, George. *A History of Elizabethan Literature*. New York: The Macmillan Company, 1910.
8. Riggs, A. David. *The World of Christopher Marlowe*. London: Faber, 2004.

SEMESTER – II			
Core – III Age of Restoration and Transition (1660 – 1770)			
Course Code: 21UENC21	**Hrs/Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Objectives:

To explore the perspectives of the Restoration Age through different genres of literature.

To gain deeper literary insight through contextual analysis of literary pieces.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	remember the representative writers of the age.	4, 8	Re
CO-2	acquire knowledge of the social and political background.	3, 8	Re
CO- 3	understand the various movements of the age.	7	Un
CO- 4	understand the various aspects of literary genres.	1, 7	Un
CO- 5	analyse the distinctive features of the age.	1, 4	Un
CO-6	analyse the cultural legacy of the age.	8	An
CO-7	know the historical perspectives of the age.	1	An
CO-8	gain knowledge pertaining to the art of diary writing.	2	An

SEMESTER-II			
Core III Age of Restoration and Transition (1660 – 1770)			
Course Code : 21UENC21	**Hrs/Week: 5**	**Hrs/Semester:75**	**Credits: 4**

Unit I Introduction

The Age of French Influence, Political History and Revolution of 1688
Literary Characteristics – New Tendencies, Realism, Formalism, The Court Poets of the Restoration and Development of Restoration Drama - Novel.

Unit II Poetry

John Dryden (1631 – 1700) : Alexander's Feast
Aphra Behn (1640 - 1689) : Love Armed
Thomas Gray (1716 – 1771) : Elegy Written in a Country Churchyard

Unit III Prose

John Bunyan (1633- 1703) : Grace Abounding to the Chief of Sinners
Joseph Addison (1672- 1719) : Sir Roger at Church
Richard Steele (1672 – 1729) : Of the Club

Unit IV Drama

Oliver Goldsmith (1728 – 1774) : *She Stoops to Conquer*

Unit V Fiction

Samuel Richardson (1689-1761) **:** *Pamela*

Text Books:

1. Bunyan, John. *Grace Abounding to the Chief of Sinners*. US: Aneko Press, 2017.
2. Goldsmith, Oliver. *She Stoops to Conquer.* India: Peacock Books: 2019.
3. Richardson, Samuel. *Pamela*. New Delhi: Bloomsbury Publishing India Pvt. Ltd, 2014.

Books for Reference:

1. Alan, Robert J. *Addison and Steele: Selections from the Tatler and Spectator*. New York: Rinchart and Winston Publications, 1970.
2. Albert, Edward. *History of English Literature*. New Delhi: OUP, 1979.
3. Compton, Arthur and Rickett. *A History of English Literature*. Delhi: Universal Book Stall,. 1969.
4. Daiches, David. *A Critical History of English Literature*. vol. 4, New Delhi: The Ronald Press Company, 1960.
5. Hopkins, David. *John Dryden*. US: Liverpool University Press, 2003.
6. J. Long, William. *English Literature*. New Delhi: AITBS Publishers, 2018.
7. Lockitt, Charles Henry. *The Art of the Essayist*. London: Orient Blackswan, 1949.

E-Resources:

1. https://www.tetsuccesskey.com/2018/07/restoration-period-1660-1700-net-exam-notes.html
2. https://www.britannica.com/art/English-literature/The-Restoration
3. https://www.britannica.com/art/Restoration-literature

SEMESTER - II			
Core - IV	**Romantic Age (1770-1830)**		
Course Code : 21UENC22	**Hrs/Week : 5**	**Hrs / Semester : 75**	**Credits : 4**

Objectives:

To help students acquaint themselves with the artistic, literary, musical and intellectual movement of the age.

To explore the literary and artistic movement of the age with revolutionary zeal, love for tradition, nature, imagination, lyrical subjectivity and simplicity.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	recognise the development of literature and culture of the age.	1, 8	Re
CO-2	understand the school of Romanticism.	1	Un
CO-3	perceive the views of the writers of the age.	1, 2	Un
CO-4	gain knowledge about the social and political background of the age.	8	Un
CO- 5	practice the ethical values gained from the works of art.	3	Ap
CO-6	analyse the significant works of the age.	4, 8	An
CO- 7	develop introspection into the literary and artistic movement of the age.	1	An
CO-8	identify the writers' thoughts and points of view and reflect from one's own perspective.	2, 4	Ev

SEMESTER - II			
Core- IV	**Romantic Age (1770-1830)**		
Course Code : 21UENC22	**Hrs/Week : 5**	**Hrs / Semester: 75**	**Credits : 4**

Unit – I Introduction of the Age

Historical Background-Return to Nature : Development of Literary Forms

Unit – II Poetry

William Blake (1757-1827)	: Poison Tree
William Wordsworth (1770-1850)	: Ode on Intimations of Immortality
S.T. Coleridge (1772-1834)	: Kubla Khan
G.G. Byron (1788-1824)	: Ocean
John Keats (1795-1821)	: Ode to a Nightingale

Unit - III Prose

Charles Lamb (1775-1834)	: Dream Children – A Reverie
Thomas De Quincey (1785-1859)	: Confessions of an English Opium-Eater

Unit - IV Drama

P.B. Shelley (1792-1822) : *The Cenci*

Unit - V Fiction

Walter Scott (1771-1832) : *Kenilworth*

Text Books:

1. Appelbaum, Stanley, ed. *English Romantic Poetry: An Anthology*. New York: Dover Publication, 1996.
2. Shelley, Percy Bysshe. *The Cenci*; *a tragedy*, *in five acts* [*and in verse*]. London: C.& J. Ollier, 1821.
3. Scott, Sir Walter. *Kenilworth*. Edinburgh: OUP, 1829.

Books for Reference:

1. Albert, Edward. *Historyof English Literature.* New Delhi: OUP, 1979.
2. Abrams, M.H. Wordsworth: *A Collection of Critical Essays.* USA: Prentice-Hall Inc.,1972.
3. Allot, Miriam. *The Poems of John Keats*. London: Orient Longman, 1976.
4. Davison, Peter. *Sheridan: Comedies, A Collection of Critical Essays*. New York: Macmillan,1986.
5. Kelley, Gary. *English Fiction of the Romantic Period, 1789-1830*. London: Orient Longman,1989.
6. King-Hele, Desmond. *Shelley: The Man and the Poet.* New York: Thomas Yoseloff, 1960.
7. Klaus, Carl H. And Ned Stuckey-French. *Essayists on the Essay: Montaigne to Our Time*. Iowa: University of Iowa Press, 2012.

SEMESTER – III			
Core V – Victorian Age (1837-1901)			
Course Code:21UENC31	**Hrs/Week: 6 Hrs**	**Hrs/ Semester: 90**	**Credits: 6**

Objectives:

To expose students to the significant social and literary history of the Victorian age

To explore the characteristic features of the age in the literary texts

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the significance of the representative writers	1	Un
CO-2	comprehend the Victorian gender ideology.	1	An
CO-3	locate the scientific development and the emerging discipline of psychology.	4, 7	Un
CO-4	review the literary style of the various writers of the age.	1	Un
CO-5	analyse the texts in relation to its socio - cultural background.	1	An
CO-6	create an inclusive knowledge of the ideologies related to the age.	4	Ev
CO-7	evaluate the ethical values in the literary texts	7	Ev
CO-8	justify the art of Victorian style of writing	3	Cr

SEMESTER – III			
Core – V Victorian Age (1837-1901)			
Course Code:21UENC31	**Hrs/Week: 6 Hrs**	**Hrs /Semester: 90**	**Credits: 6**

Unit I - Poetry

Alfred Lord Tennyson (1809-1892) : The Lotos-Eaters
Robert Browning (1812-1889) : My Last Ride Together
Matthew Arnold (1822-1888) : Memorial Verses
Gerard Manley Hopkins (1844-1889) : The Windhover

Unit II - Prose

Thomas Carlyle (1795-1881) : The Hero as Poet.
John Ruskin (1819-1900) : *Sesame and Lilies* (Of Kings' Treasuries)

Unit III - Drama

Oscar Wilde (1854-1900) : *The Importance of Being Earnest*

Unit IV - Fiction

Emily Bronte (1816-1855) : *Wuthering Heights*

Unit V - Short Story

Charles Dickens (1812-1870) : A Christmas Carol
Oscar Wilde (1854-1900) : The Star Child
Rudyard Kipling (1865-1936) : Lispeth

Text Books:

Brontë, Emily. 1818-1848. *Wuthering Heights*. Penguin Books, 2003.
Wilde, Oscar, and Samuel Lyndon Gladden. *The Importance of Being Earnest: A Trivial Comedy for Serious People.* Broadview Press, 2010.
Ruskin John. *Sesame and Lilies*. Macmillan India Limited 1985.
Negri, Paul. *English Victorian Poetry: An Anthology.* Dover Publications Inc., 1995

Books for Reference:

1. Austin, Alfred. *Mr. Tennyson: The Poetry of the Period*. Richard Benteley Publishers, 1870.
2. Eliot, T.S. Essays. *Ancient and Modern*. Faber and Faber, 1936.
3. Tennyson, Emily. *The Poet's Wife*. Faber and Faber, 1996.

E-resources:

https://poemanalysis.com/alfred-tennyson/the-lotos-eaters/
https://www.cliffsnotes.com/literature/i/the-importance-of-being-earnest/critical-essays/themes-in-the-importance-of-being-earnest
http://academic.brooklyn.cuny.edu/english/melani/novel_19c/wuthering/themes.html
https://www.litcharts.com/lit/a-christmas-carol/characters

SEMESTER – IV			
Core – VI Twentieth Century British Literature			
Course Code:21UENC41	**Hrs/Week: 6**	**Hrs / Semester: 90**	**Credits: 6**

Objectives:

To introduce students to the significant literary features of Twentieth century British Literature.
To expose them to the trends and stylistic features of British Literature.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the thematic concerns of 20th C British Literature.	1	Un
CO-2	comprehend the influences of the age in its literary production.	1	Un
CO-3	analyze and appreciate the literary features of the genres.	1	An
CO-4	analyze the social milieu of twentieth century England through the literary texts.	4	Ev
CO-5	recognize the standpoints of different British writers of the age.	8	Un
CO-6	develop an aesthetic sense and appreciation of literary texts.	1	Cr
CO-7	evaluate the contributions and perceptions of the writers.	4	Ev
CO-8	apply the moral value voiced in the literary texts for life.	7	Ap

SEMESTER – IV			
Core – VI Twentieth Century British Literature			
Course Code: 21UENC41	**Hrs/Week: 6**	**Hrs / Semester: 90**	**Credits: 6**

Unit – I Poetry

W. B. Yeats (1865-1939)	:	Prayer for my Daughter
Rupert Brooke (1887-1915)	:	The Soldier
T.S. Eliot (1888-1965)	:	Journey of the Magi
Wilfred Owen (1893-1918)	:	Strange Meeting

Unit – II Prose

E.M. Forster (1879-1970)	:	Notes on the English Character
George Orwell (1903-1950)	:	Sporting Spirit

Unit - III Drama

George Bernard Shaw (1856-1950)	:	*Pygmalion*

Unit – IV Fiction

Virginia Woolf (1882-1941)	:	*To the Lighthouse*

Unit – V Short Story

Katherine Mansfield (1888-1923)	:	Bliss
Graham Greene (1925–1991)	:	The Destructors

Text Books:

Shaw, Bernard. *Arms and the Man*. Penguin Group, 2006.
Woolf, Virginia. *To the Lighthouse*. Marshall Cavendish, 1988.

Books for Reference:

The Bloomsbury Guide to English Literature, edited. Marion Wynne Davies. Prentice Hall, 1990.
The Cambridge Companion to Irish Literature. Edited by John Wilson Foster. Cambridge University Press, 2006.

E –Resources

https://www.sparknotes.com/poetry/hopkins/section2/
https://www.litcharts.com/poetry/rupert-brooke/the-soldier
https://www.litcharts.com/poetry/william-butler-yeats/a-prayer-for-my-daughter
https://poemanalysis.com/t-s-eliot/journey-of-the-magi/
https://englishsummary.com/whythe-novel-matters-summary/

SEMESTER - III			
Non - Major Elective Functional English – I			
Course Code: 21UENN31	**Hrs/Week: 2**	**Hrs/ Semester: 30**	**Credits: 2**

Objectives:

To provide fundamental knowledge of LSRW skills and develop communication skills
To enhance English language competence through intensive practice of LSRW skills

Course Outcome:

Co No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	understand the fundamentals of English Grammar.	4	Un
CO-2	enrich vocabulary and use them appropriately.	3	Un, Ap
CO-3	better the reading and writing ability of English language.	3	An
CO-4	understand the basics of phonetics.	3	Un
CO-5	do simple transcription of words and pronounce rightly.	2	Ap
CO-6	engage in simple conversation effectively.	2	Ap
CO-7	apply the LSRW skills effectively in regular usage.	3	Ap
CO-8	engage practicing communicating in English.	3	Ap

SEMESTER - III			
Non- Major Elective	**Functional English – I**		
Course Code: 21UENN31	**Hrs/Week: 2**	**Hrs/ Semester: 30**	**Credits: 2**

Unit – I Vocabulary Development

Antonyms
Synonyms
Blended Words

Unit – II Grammar

Sentence Pattern
Articles

Unit – III Introduction to Pronunciation

Sounds in English: Vowels and Consonants
Transcription (Word)

Unit - IV Conversational English

Introducing oneself
Telephonic conversation

Unit – V Writing Skills

Letter Writing (Formal/Informal)
Writing advertisements

Text Book

Pillai, G Radhakrishnan and K Rajeevan. *Spoken English for You: Level One*. Emerald Publishers, 2009.
Joseph, K. V. *A Textbook of English Grammar and Usage*. Vijay Nicole Imprints Pvt. Ltd., 2006.

Books for Reference:

Iyadurai, P. *English Phonetics for Beginners*. Jones Publications, 2013.
Malathi. *Functional English*. New Century Book House (P) Ltd., 2007.

E-Resources

https://www.grammarinenglish.com/compoundwords/?lesson=blending
https://www.grammarly.com/blog/articles/
https://www.speechactive.com/listen-english-vowels-and-consonant-sounds/
https://www.espressoenglish.net/telephone-english-phrases/
https://www.marketingdonut.co.uk/media-advertising/writing-an-advertisement

SEMESTER – I			
Skill Enhancement Course – I Professional English – I			
Course Code :21UENPE1	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Objectives:

To enhance the professional competence of the students through LSRW skills.

To focus on the academic and the professional pursuits of the students through communicative competence.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	refine written and verbal communication skills.	3, 9	Un
CO-2	speak confidently in any professional environment.	3, 5	Ap
CO-3	face interviews with confidence.	6	Ap
CO- 4	analyse and comprehend unfamiliar texts.	1, 6	An
CO-5	develop strategic competence through efficient listening.	2, 5	An
CO-6	construct error free sentences for content writing.	6	An
CO-7	narrate a process by comparing and contrasting.	9	Cr
CO-8	write recommendations and interpret visual inputs.	9	Cr

SEMESTER I			
Skill Enhancement Course - I Professional English – I			
Course Code : 21UENPE1	**Hrs/Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

UNIT I : COMMUNICATIVE SKILLS

Listening : Listening to Audio texts - Listening to Instructions
Speaking : Pair work and Group work.
Reading : Comprehension passages –Differentiate between facts and opinion
Writing : Developing a story with pictures.
Vocabulary : Register specific, Vocabulary incorporated into the LSRW tasks

UNIT II : NARRATIVE SKILLS

Listening : Listening to process description.-Drawing a flow chart.
Speaking : Role play (formal context)
Reading : Skimming/Scanning- Reading passages on products, equipment and gadgets.
Writing : Process Description –Compare and Contrast
Paragraph - Sentence Definition and Extended.
Vocabulary: Register specific, Vocabulary incorporated into the LSRW task.

UNIT III : NEGOTIATION STRATEGIES

Listening : Listening to interviews of specialists / Inventors in fields (Subject specific)
Speaking : Brainstorming (Mind mapping) – Small group discussions (Subject specific)
Reading : Longer Reading text
Writing : Essay Writing (250 words)
Vocabulary : Register specific, Vocabulary incorporated into the LSRW task.

UNIT IV : PRESENTATION SKILLS

Listening : Listening to lectures
Speaking : Making presentations (with PPT- practice).
Reading : Reading Comprehension passages.
Writing : Writing Recommendations – Interpreting visual inputs
Vocabulary : Register specific, Vocabulary incorporated into the LSRW tasks

UNIT V : PROBLEM SOLVING SKILLS

Listening : Listening Comprehension, Listening for information
Speaking : Short talks
Reading : Comprehension passages, Note making.
Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills.
Writing : Problem and Solution essay, Creative writing, Summary writing
Vocabulary: Register specific, Vocabulary incorporated into the LSRW tasks.

Text Book:

1. Professional English Course Text compiled by the PG and Research Department of English, St. Mary's College (Autonomous),Thoothukudi.

Books for Reference:

1. Hart, Steve. et al. *Embark: English for Undergraduates*. Delhi: Cambridge University Press, 2016.
2. Hasson, Gill. *Brilliant Communication Skills*. Great Britain: Pearson Education, 2012.

SEMESTER – II			
Skill Enhancement Course – II Professional English - II			
Course Code : 21UENPE2	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

Objectives:

To help the students meet their academic and non-academic needs, through LSRW skills.

To enhance domain-specific cognitive knowledge.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSOs addressed	Cognitive Level
CO-1	understand the theoretical and practical components of professional English and soft skills.	1, 3	Un
CO-2	use power point presentations.	1	Ap
CO-3	make oral presentations.	2, 5	Ap
CO-4	write minutes and reports.	2, 6	An
CO-5	write essays creatively and innovatively.	3, 6	Ev
CO-6	write advertisements, create web pages, business e-mail / video logs, etc.	9	Cr
CO-7	build a strong professional vocabulary which can be effectively used in different platforms.	10	Cr
CO-8	write script for short films, blogs, flyers, brochures and posters.	10	Cr

Semester II			
Skill Enhancement Course – II Professional English II			
Course Code : 21UENPE2	**Hrs / Week : 2**	**Hrs/Sem : 30**	**Credits : 2**

Unit – I **Communicative Competence**

Listening : Listening to conversation and comprehension
Speaking : Group discussions
Reading : Two subject – based reading texts followed by comprehension activities
Writing : Dialogue Writing

Unit - II **Persuasive Communication**

Listening : Listening to a product launch
Speaking : Debates – Just a Minute Activities
Reading : Reading texts on advertisements
Writing : Writing for advertisements

Unit - III **Digital Competence**

Listening : Listening to Motivational Talks/TED
Speaking : 5 minutes speech
Reading : Selected sample of Web Page (subject related topic)/ Read Blogs
Writing : Creating web pages, Business e-mail /Video logs

Unit - IV **Creativity and Innovation**

Listening : Listening to academic videos
Speaking : Making oral presentations
Reading : Essays on Creativity and Innovation
Writing : Basic Script writing for short films (subject based) blogs, flyers and brochures, poster making

Unit - V **Workplace Communication**

Speaking : Presentation using power point
Reading &Writing : Circulars, Minutes of Meeting and Report Writing

Text Book : Professional English Course Text compiled by the PG and Research Department of English, St. Mary's College (Autonomous), Thoothukudi.

Books for Reference:

4. Das, Bikram K. et. Al. *Teaching Professional English and Soft Skills*. Cambridge: Cambridge University Press, 2009.
5. Dixson, Robert J. *Complete Course in English*. New Delhi: Prentice Hall of India Private Limited, 1988.
6. Freeman, Sarah. *Written Communication in English*, Hyderabad: Orient Longman, 1977.
7. Sasikumar, V. P. V. Damaja. *Spoken English: A Self-Learning Guide to Conversational Practice*. 2nd edition. New Delhi: Tata McGraw Hill Education Private Limited, 2011.
8. Raj, Ajay. *Communication Skills: Speaking and Writing in Eng*lish. New Delhi: Sterling Publishers (P) Ltd. 1999.

SEMESTER – III	
Self Study/MOOC/Internship (Compulsory) Myth in Literature	
Course Code: 21UENSS1	**Credits: 2**

Objectives

To introduce the learners to the role of myth in history, literature, culture and consciousness
To let them explore the universality and social significance of myths and folklore in shaping society.

Course Outcome:

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO- 1	identify characteristics of myths, folklore	1	Un
CO- 2	describe the different types of myths.	2	Re
CO- 3	analyse the cultural and historical effects of mythological warriors	4	An
CO-4	define what sets apart a hero from the rest of society.	2	Re
CO- 5	appraise the characteristics of gods and goddesses of ancient mythology.	1	Ev
CO-6	relate the cultural effects of mythological systems.	4	An
CO-7	assess how comparative religion is used to compare the themes of sacred myths.	8	Ev
CO-8	understand the use of myths and legends to establish guidelines for living.	8	Un

SEMESTER – III	
Self Study/MOOC/Internship (Compulsory) Myth in Literature	
Course Code:21UENSS1	**Credits: 2**

Unit I

Stories of Adventure (Greek) : *The Iliad* - The Death of Hector

The Odyssey – Odysseus Reaches Ithaca

Unit II

The Roman Mythology : *The Aeneid* - Book III (20 lines)

Unit III

Stories from the British Isle : Holy Grail

Arthur and the Knights of the Round Table

Unit IV

Margaret Atwood : *The Penelopiad*

Unit V

Chitra Banerjee Divakaruni : *The Palace of Illusions: A Novel*

Text Books:

Kirkwood, G.M. *A Short Guide to Classical Mythology*. Botchery Carducci Publishers, Inc., 2003.

Lawall, Sarah. (ed). *The Norton Anthology of World Literature: Volume B, 100-1500*, 2nd ed. W.W.Norton & Company, 2003.

Atwood, Margaret. *Penelopiad*. Canongate Books, 2006.

Divakaruni, Chitra Banerjee. *The Palace of Illusions: A Novel*. Picador India, 2018.

Books for Reference:

Armstrong, Karen. *Short History of Myth*. Knopf, 2006.

Graves, Robert. *The Greek Myths*. (1955, Cmb/Rep edition 1993) Penguin, 1955.

Hamilton, Edith. *Mythology* (1942, New Edition). Little Brown & Company, 1998.

Hard, Robin. *The Routledge Handbook of Greek Mythology*. Routledge, 2004.

Segal, Robert. *Myth: A Very Short Introduction*. Oxford University Press, 2004.

SEMESTER IV	
Self-Study/Online Course/Internship (Optional) World Classic Fiction	
Course Code: 21UENSS2	**Credits: 2**

Objectives:

To widen the prospects of literary study across nations.

To expose students to varied textual analysis and critical perception.

Course Outcome:

CO No.	Upon completion of the course, the students will be able to:	PSO addressed	CL
CO -1	engage in close reading of literary texts	1	An
CO -2	understand the socio-cultural dimensions through the fiction.	1	Ap
CO -3	analyse the wide range of literary techniques.	1	An
CO -4	analyze characters in the light of their cultural and historical contexts.	1	Ev
CO -5	comprehend the creative process of significant world writers	7	Un
CO -6	evaluate the aesthetic and moral responses in texts	4	Ev
CO -7	widen their imagination and insight of the varied themes and concerns	1	Cr
CO -8	appreciate the richness and universality of literary art	1	Cr

SEMESTER IV	
Self-Study/Online Course/Internship (Optional) World Classic Fiction	
Course Code: 21UENSS2	**Credits: 2**

Unit I: French

Daphne Du Maurier (1907-1989) : *Rebecca*

Unit II: American

F. Scott Fitzgerald (1896-1940) : *The Great Gatsby*

Unit III: Russian

Fyodor Dostoevsky (1821 -1881) : *Crime and Punishment*

Unit IV: Latin American

Gabriel Garcia Marquez (1927- 2014) : *Love in the Time of Cholera*

Unit V: Indian

R.K. Narayan (1906- 2001) : *The Guide*

Text Books:

Du Maurier, Daphne. *Rebecca*. Virgo Press. 2018.
Fitzgerald F. Scott. *The Great Gatsby*. Scribner Paperback Fiction. 1995.
Dostoyevsky, Fyodor. *Crime and Punishment*: A Novel in Six Parts with Epilogue. Knopf, 1992.
Garcia Marquez, Gabriel. *Love in the Time of Cholera*. Penguin Classics, 2007.
Narayan, R. K. *The Guide*. Penguin Books, 2006.

Books for Reference:

Damrosch, David. *What is World Literature?* Oxford University Press, 2003.
Panorama of World Literature. Publisher: Author press, 2012.

E - Resources

https://www.sparknotes.com/lit/rebecca/summary/.
https://www.sparknotes.com/lit/gatsby/.
https://www.sparknotes.com/lit/crime/.
https://www.sparknotes.com/lit/cholera/summary/.
https://www.gradesaver.com/the-guide/study-guide/summary.

SEMESTER - II			
Core IV	**Monuments in India**		
18UHIC22	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Vision:

- To familiarize the Historical Monuments with proper understanding of history.

Mission:

- To know and respect our Historical Monuments and its heritage.
- To appreciate the pride of our Historical Monuments and to preserve it.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	respect and take pride of Historical Monuments.	2	Un, An, Ev
CO-2	know the historicity of Historical Monuments	1	Un, Re
CO-3	appreciate the workmanship of artisans.	2	Un, An, Ev
CO-4	know the means to preserve Historical Monuments.	1	Un, Re
CO-5	analyse the preservation of Monument Art.	2	Un, An, Ev
CO-6	analyse the influence of foreign invasions.	2	Un, An, Ev
CO-7	evaluate the significance of Historical Monuments.	2	Un, An, Ev
CO-8	understand the patronage of kings.	1	Un, Re

SEMESTER - II			
Core IV	**Monuments in India**		
18UHIC22	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Unit – I

Definition – Types – Significance – The Ancient Monument Preservation Act 1904 - National Historic Preservation Act of 1966

Unit – II

Religious Monuments: Sanchi Stupa – Madurai Meenakshi Amman Temple – Dilwara Jain Temple – Golden Temple Amirtsar – Nagoor Dargha – Velankanni Basilica.

Unit III

Secular Monument: Ajanta Caves – Hawa Mahal Palace – Qutb Minar – Charminar – Taj Mahal.

Unit IV

European Monuments: Basilica of Bon Jesus – Victoria Memorial Hall – Cellular Jail – St. George Fort – Gateway of India.

Unit V

Adichanallur – Arikkamedu – Brahadeeswara Temple – Keezhadi- Our Lady of Snows Basilica.

Books for Reference

1. Khurana K.L., *History of India from Earliest to 1526*, Lakshmi Narain Agarwal, Agra, 1995.
2. Rao, Hanumantha, B. and Rao, Basaveswara K., *Indian History and Culture*, Sri Vignana Manjusha, Guntur, 1973.
3. Anil Chandra Banerjee, *New History of Medieval India*, S.Chand & Company Pvt. Ltd., New Delhi, 1983.
4. Khurana K.L., *History of India from 1526 to 1967*, Lakshmi Narain Agarwal, Agra, 1995.
5. Majumdar R.C., *An Advanced History of India*, Macmillan Company Ltd, London, 1983.
6. Percival Spear, *Delhi- Its Monuments and History*, Oxford University Press, New Delhi, 1994.

Semester -V			
Core VIII	**History of India from AD 1857 to 1947**		
Code:18UHIC52	**Hrs/Week: 6**	**Hrs/sem:90**	**Credits:5**

Vision: To enhance the noble ideals of our freedom fighters.

Mission: To cherish the patriotic spirit of Indians against foreign yoke.

Course Outcome:

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	uphold the noble ideals of our leaders and render selfless service to our nation.	1	Un, Re
CO - 2	understand the work of Indian National Congress.	1	Un, Re
CO - 3	know the various stages of Indian Independence.	1	Un, Re
CO - 4	study the Constitutional development of India.	1	Un, Re
CO - 5	trace out the causes of nationalism.	1	Un, Re
CO - 6	highlight the nationalist spirit.	2	Re
CO - 7	assess the sacrifice of Freedom fighters.	4	An
CO - 8	understand the value of Independence.	1	Un. Re

Semester -V			
Core VIII	**History of India from AD 1857 to 1947**		
Code:15UHIC52	**Hrs/Week: 6**	**Hrs/sem:90**	**Credits:4**

Unit I – India under the Crown: Queen's Proclamation of 1858 Act – Indian Council Act of1861 – Lord Ripon – Local Self Government – Ilbert Bill Controversy – Indian Councils Act of 1892.

Unit II – Birth of the Indian National Congress – Moderates and Extremists– CurzonAligarhMovement – Muslim League.

Unit III – Minto-Morley Reforms 1909 – Home Rule League – First World War and its effects – Montague-Chelmsford Reforms 1919 – Gandhian Era – Rowlatt Act and Jalianwalla Bagh Tragedy – Non – Co-operation Movement - Chauri-Chaura incident. The Swarajya Party.

Unit IV – Simon Commission – Civil Disobedience Movement – Gandhi-Irwin Pact – RoundTable Conferences – Government of India Act 1935.

Unit V – Cripps' Mission – Quit India Movement – Nethaji and the Indian National Army –Wavell Plan – Cabinet Mission –Mountbatten Plan - Independence Act 1947.

Text Book:

1. K.L.Khurana. *History of India from 1526 to 1967 A.D.* Agra: Lakshmi Narain Agarwal, 2005

Books for Reference:

1. Grover B.L. and Alka Mehta. *A new look at Modern Indian History*. New Delhi: S.Chand and Company Ltd. 2010.
2. Nanda S.P. *History of Modern India.* New Delhi: Dominant Publishers and Distributors, 2003.
3. Sen S.P. *Studies in Modern Indian History*. Calcutta: Institute of Historical studies, 1969.
4. Sharma L.P. *Indian National Movement and Constitutional Development.* Agra: Lakshmi Narain Agarwal, 2007

Semester -V			
Core IX	**History of Europe from A.D. 1453-1783**		
Code:18UHIC53	**Hrs/Week: 6**	**Hrs/sem:90**	**Credits:4**

Vision: To appreciate the career of enlightened despots of Europe.

Mission: To analyse the diplomatic tactics of various European countries and its impact.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	important landmarks in Europe revolutionized the course of world history.	1, 2	Un,Re
CO-2	understand the diplomatic alliances of various European countries.	1, 2	Un, Re
CO-3	study the various places of French Revolution.	1, 2	Un, Re
CO-4	appreciate geographical discoveries.	1, 2	Un, Re
CO-5	know the administration of various dynasties.	1, 2	Un, Re
CO-6	anlayse the role of Europe in international affairs.	4	An
CO-7	evaluate the work of benevolent despots in Europe.	5	Un, Ev
CO-8	assess the foreign policy of Europe.	4	An

Semester –V			
Core IX	**History of Europe from A.D. 1453-1783**		
Code:18UHIC53	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits:5**

Unit I – Period of Transition – France under Louis XI – The Italian Wars- Geographical Discoveries – causes- discoveries- effects.

Unit II – Renaissance: Meaning- Causes – Renaissance: Philosophy – Literature – Architecture – Art and Science – results.

Unit III – Reformation: Meaning – Causes – Reformation in Germany - England – Switzerland – Results of Reformation – Counter Reformation Society.

Unit IV – Rise of Spain- Charles V- Philip II – France under Henry IV- Reforms of Cardinal Richelieu and Cardinal Mazarin.

Unit V – The Age of Enlightenment- Louis XIV- Internal and External Policy – Peter the Great of Russia - Reforms- Catherine – Foreign policy- Frederick the Great of Prussia.

Maps

1. Geographical Discoveries.
2. Important centres of Reformation.
3. Louis XIV.
4. Peter the Great.

Text Book:

Mahajan V.D. *History of Europe upto 1789.* New Delhi: S. Chand and Company Ltd., 1977.

Books for Reference:

1. Carsten F.L. *The New Cambridge Modern History.* London: Cambridge University Press, 1961.
2. Khurana K.L., *World History 1453- 1906 A.D.* Agra: Lakshmi Narain Agarwal, 1997.
3. Rao B.V. *History OF Europe 1450-1815.* New Delhi: Sterling Publishers, 1988.
4. Will Durant, *The Renaissance.* New York: Simon and Schuster, 1953.
5. Will Durant. *The Reformation.* New York: Simon and Schuster, 1957.

Semester – VI			
Core – X	**History of Tamil Nadu from A.D. 1336 to 2000 A. D**		
Code : 18UHIC61	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Vision: To appreciate the contribution of various dynasties and know about the contemporaryhistory of Tamil Nadu politics.

Mission: To enhance a critical study of Tamil Nadu history in the context of regionalism.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	obtain the historical background of the Tamil Nadu State.	1	Un, Re
CO-2	estimate the legacy of various dynasties.	5	Ev
CO-3	know about the history of Tamil Nadu in British India.	1	Un, Re
CO-4	appreciate the work of various ministries after Independence.	1	Un, Re
CO-5	visit historical sites in Tamil Nadu.	3	Ap
CO-6	analyse the cultural heritage of Tamils.	4	An
CO-7	assess the legacy of architecture.	5	Ev
CO-8	compare the past and present political condition of Tamil Nadu.	4	An

Semester – VI			
Core – X	**Political History of Tamil Nadu from A.D. 1336 to 2000 A. D**		
Code : 18UHIC61	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I – Vijayanagar Empire – Battle of Talaikotta – Battle of Thoppur – Administration -Contribution to Art and Literature.

Unit II – Nayaks of Madurai – Viswanatha Nayak – Tirumalai Nayak – Rani Mangammal – Nayaks of Tanjore – Raghunatha Nayak – Vijaya Raghava Nayak – Nayaks of Ginji – Krishnappa II – Contribution of the Nayaks to Administration, Art and Architecture.

Unit III – Sethupathis of Ramnad – Kizhavan Sethupathi – Maratha Rule in Tanjore –Venkoji – Shaji – Serfoji II – Contribution to Art and Architecture.

Unit IV – Poligars – Kattabomman – Maruthu Pandyan – South Indian Rebellion – Vellore Mutiny – Role of Tamil Nadu in the Freedom Struggle.

Unit V – Justice Party – E.V.R. and Self-Respect Movement – Tamil Nadu under Rajaji – Kamaraj – Annadurai.

Text Book

1. Rajayyan, K. *Tamil Nadu – Real History.* Madurai: Raj Publishers, 1982.

Books for Reference:

1. Aiyar Sathyanatha R. *History of the Nayaks of Madura*. Humphrey Milford, Madras: Oxford University Press, 1924.
2. Irschick Eugene. *Politics and Social Conflicts in South India.* Berkely and Los Angels: University of California Press, 1969.
3. Nambi, Arroran. *Tamil Renaissance and Dravidian Nationalism (1905 -1944).* Madurai: Koodal Publishers, 1980.
4. Rajayyan K. *History of Tamil Nadu – A Real History.* Trivandrum: Ratna Publications, 2005.
5. Yesudhasan V. and Issac Jaya Dhas R. *History of Tamil Society and Culture since 1336.* Villukuri: MCL Roy Publications, 2002.

Semester – VI			
Core – XII	**International Relations from A.D.1945 to 2000 A. D**		
Code : 18UHIC63	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Vision: To familiarize the developments of contemporary world.

Mission: To promote International understanding to every

individual.**Course Outcome:**

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the ideals of International Relations.	1	Un, Re
CO-2	understand the current international affairs.	1	Un, Re
CO-3	promote better international understanding.	1	Un, Re
CO-4	analyse the means to promote international peace.	4	An
CO-5	analyse the international issues and ways to solve it.	4	An
CO-6	analyse the disintegration of USSR.	4	An
CO-7	evaluate the Apartheid policy of South Africa.	5	Ev
CO-8	understand the oil diplomacy of Middle East.	1	Un, Re

Semester – VI			
Core – XII	**International Relations from A.D.1945 to 2000 A. D**		
Code : 18UHIC63	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I – United Nations Organisation – Its Structure and Functions – Achievements of the U.N.O – Disarmament – Nuclear Test Ban Treaty – Non-Proliferation Treaty –SALT – CTBT.

Unit II – Cold War – Truman Doctrine – Marshall Plan – NATO – CENTO – SEATO – Warsaw Pact – Anzus Pact – Cold War in Korea, Vietnam, Cuba - Berlin Crisis.

Unit III – European Economic Community – European Common Market – OAU – G8 – ASEAN – SAARC.

Unit IV – Soviet Union – Gorbachev – Glasnost and Perestroika- Soviet Disintegration – Apartheid in South Africa.

Unit V – Middle East Crisis – Arab-Israel War – Palestinian Liberation Organisation (P.L.O) – Oil Diplomacy – Gulf War.

Text Book :

1. Khurana. K.L. *The Twentieth Century World.* Agra: Lakshmi Narain Agarwal,2005.

Books for Reference

1. Burton J.W. *International Relations.* Bombay: George Allen and Unwin Pvt.Ltd.1971.
2. Frankel Joseph. *International Relations*. New Delhi: Oxford University Press,1967.
3. Holsti. *International Politics.* New Delhi: Prentice Hall of India Pvt. Ltd., 1978.
4. Palmer and Perkins. *International Relations.* New Delhi: AITBS Publishers &Distributors, 2000.
5. Sen A.K. *International Relations since 1919.* New Delhi: S. Chand & Co., Ltd,1993.

Semester – V			
Core Integral I	**History of Thoothukudi**		
Code : 18UHII51	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Vision: To appraise the role of Thoothukudi in the History of Freedom Struggle.
Mission: To enhance the missionaries impart and promotion of trade and commerce.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	appreciate the freedom fighters of Thoothukudi.	1	Un, Re
CO -2	understand Swadeshi Movement in Thoothukudi.	1	Un, Re
CO -3	analyse the mass conversion in Thoothukudi.	4	An
CO -4	know the significance of pearl fishing and trade and commerce.	1	Un, Re
CO -5	learn coastal policy of the Portuguese, Dutch and British in Thoothukudi.	6	Cr
CO -6	assess the role of missionaries in Thoothukudi.	4	An
CO -7	appreciate the historical monuments in Thoothukudi.	1	Un, Re
CO -8	understand the forgotten freedom fighters in Thoothukudi.	1	Un, Re

Semester – V			
Core Integral I	**History of Thoothukudi**		
Code : 18UHII51	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I – Thoothukudi through the ages– Antiquity of Thoothukudi – Sangam literature Reference – Travelogues – Location of Thoothukudi.

Unit II – Thoothukudi under the Portuguese – Mass Conversion – Trade – Pearl Fishing –Chank Fishing – Decline. Thoothukudi under the Dutch and the British –Trade – Causes for the decline.

Unit III – Freedom Movement in Thoothukudi – Freedom Fighters – V.O.C. – Ponnusamy Nadar – Masilamani – K.P. Kandasamy – Swadeshi Movement – Monuments – Holy Trinity Church – Lady of Snows Church – Ashe Memorial – Religious Centres: Nava Thirupathi – Nava Kailayam – Tiruchendur - Manappadu – Uvari.

Unit IV – Sailing Vessels of Thoothukudi – Cotton Industry in Thoothukudi – Labour strike – Need for New Port-Merger of the Two Ports – Service of the Port.

Unit V - People : Culture – Transport – Communication – Education – Administration.

Text Book

1. Decla, S. and Antony Raghu, J. (ed.). *History of Thoothukudi.* Chennai :Pavai Publications,. 2011.

Books for Reference

1. Caldwell R. *A History of Tinnevelly.* New Delhi: Asian Educational Services, 1982.
2. Heras Henry. *South India Under Vijayanagar Empire.* New Delhi: Cosmos Publications, 1980.
3. Pate H.R. *Tinnevelly District Gazetteer.* Tirunelveli: Manonmaniam Sundaranar University, 1993.
4. Sinnakani R. (ed.). *Gazetteers of Thoothukudi, Tamil Nadu State, Thoothukudi District, Vol. I and II.* Chennai: 2008.
5. Sobhanan B. *A History of Christian Missionaries in South India.* Thiruvananthapuram: Grace Printers, 1996.

Semester – V			
Core Integral – II	**Constitution of India**		
Code : 18UHII52	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Vision: Constitution the mother book of law provides for the smooth running of the government and ensures peace.

Mission: To elevate our students to be a responsible citizens and uphold the noble ideals ofour forefathers to achieve our national goals.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	provide awareness on the working of the constitution and prepare for the competitive Exams.	1	Un, Re
CO-2	understand the writing works of the Drafting Committee and Constituent Assembly.	1	Un, Re
CO-3	provide awareness on the working of the Constitution.	1	Un, Re
CO-4	awareness about the Fundamental Rights and Fundamental Duties.	1	Un, Re
CO-5	prepare for the Competitive Exams.	3	Ap
CO-6	appraise the powers and functions of the executive.	4	An
CO-7	appreciate the functioning of Union Cabinet.	1	Un, Re
CO-8	develop teamwork and leadership in terms of free legal aid.	6	Cr

Semester – V			
Core Integral – II	**Constitution of India**		
Code : 18UHII52	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I – Constituent Assembly – Drafting Committee – Preamble – Salient Features.

Unit II – Fundamental Rights and Duties – Directive Principles of State Policy – Amendments – Selected amendments (1, 12, 42, 44 and 71).

Unit III – The Executive: President – Election – Powers – Vice President – Prime Minister - Council of Ministers – Cabinet Ministers – Governor – Chief Minister.

Unit IV – The Legislature: Lok Sabha – Rajya Sabha - The Speaker – Composition and Powers - Law making procedure.

Unit V – The Judiciary: Supreme Court – Judicial Review – High Court – Party System.

Text Book:

1. Kapur A.C. *Constitutional History of India.* New Delhi: S.Chand and Co. (Pvt) Ltd., 1983..

Books for Reference:

1. Agarwal. *Constitutional History of India and National Movement*. New Delhi: S. Chand and Co. (Pvt) Ltd, 1981.
2. Gokhale B.K. *Political Science.* Bombay: A.R.Sheth & Co, 1972.
3. Mahajan V.D. *Constitutional History of India and the Nationalist Movement.* New Delhi: S.Chand and Company Ltd, 1982.
4. Sharma, M.P. *The Government of Indian Republic.* Allahabad: Kitab Mahal, 1968.

Semester – VI			
Core Integral III	**Historiography**		
Code : 18UHIIC61	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Vision: To develop historical writing skills and critically analyse the work of various historians.

Mission: To ensure historical writing skills and apply it for writing project.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the various disciplines of history.	1	Un, Re
CO-2	appreciate the significance of historical writings.	1	Un, Re
CO-3	enhance historical writing skills.	1	Un, Re
CO-4	analyse the various works of historians.	4	An
CO-5	know the recent trends in historical writing.	1	Un, Re
CO-6	evaluate the sources in historical writings.	5	Ev
CO-7	apply methodology in historical writings.	3	Ap
CO-8	promote thesis writing and articles.	1	Un, Re

Semester – VI			
Core Integral III	**Historiography**		
Code : 18UHIIC61	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I – History – Meaning and Scope – Nature – Purpose.
History – Science or Art? - ItsUses, Abuses and Lessons.

Unit II – History and its allied subjects - Theory of Causation – Role of Individuals, Ideas.

Unit III – Reputed Historians: Herodotus, Thucydides, Cornelius Tacitus, Livy, St. Augustin,Edward Gibbon, Kalhana, Karl Marx, Arnold J. Toynbee, K.A.N. Sastri, K. K. Pillai, N.Subramanian and K. Rajayyan.

Unit IV– Sources for the study of Indian History – Archaeological, Epigraphic, Numismaticsand Literary.

Unit V– Selection of Topic – Collection of sources, Objectivity and Subjectivity Criticism –Stages of Thesis Writing – Footnotes, Bibliography.

Text Book:

1. Rajayyan K. *History in Theory and Method.* Madurai: Ratna Publications, 2004.

Books for Reference:

1. Ali Sheik. *History – Its Theory and Method.* New Delhi: Macmillan India Ltd.,1993.
2. Khurana K.L. *Concepts and Methods of Historiography.* Agra: Lakshmi NarainAgarwal, 2006.
3. Sreedharan E. *A Text book of Historiography 500 B.C to A.D. 2000.* New Delhi:Orient Longman, 2000.
4. Subramanian N. *Historiography.* Madurai: Koodal Publishers, 1993.

SEMESTER III			
Core Skill Based	**Archives and Museums**		
Code: 18UHIS31	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To familiarize the students to Archives and Museums for proper understanding of History.

Mission: To know, analyse and appreciate our history and its heritage through archives and museums.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	visit of Archives and Museums.	2	Un, Re
CO-2	understand the organisations and functions of Archives and Museums.	1	Un, Re
CO-3	highlight the primary sources of Archives and Museums.	2,4	Un, An, Ev
CO-4	apply the uses of Archives and Museums in historical writings.	1	Un, Re
CO-5	respect and preserve Archives and Museums.	2	Un
CO-6	witness the evidences of History.	2,4	Un, Ev, Re
CO-7	develop more collaborative approaches.	2,4	Un, An, Ev
CO-8	identify good practice and skills of professionals.	1	Un, Re

SEMESTER III			
Core Skill Based	**Archives and Museums**		
Code: 18UHIS31	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I – Definitions: Archives - Museums – Definition.

Unit II – Kinds of Museums and Archives: Archaeology museum-Architecture museum-Biographical museum-Palace museum - Private Archives-Public Archives.

Unit III – History of the setting up of Museums: Indian Museums, Calcutta – Salar Jung Museum, Hyderabad - National Museum, Delhi, Chhatrapati Shivaji Maharaj Vastu Sangrahalaya – Mumbai, Gandhi Museum-Madurai, Saraswathy Mahal Museums – Tanjore.

Unit IV – History of the setting up of Archives: National Archives of India, Delhi – Tamil Nadu Archives, Chennai – Shenbaganoor Archives - Kodaikanal, Kerala State Archives – Trivandrum.

Unit V - A visit to a Museum and Archive is a part of this course.

Books for Reference:

1. *A Guide to the National Museum.* New Delhi: National Museum, 1997.
2. Agarwal, O.P. *Essentials of Conservation and Museology*, Delhi: Sundeep Prakasan, 2007.
3. Edson & David Routledge. *Handbook for Museum*. 1986.
4. Thiyagarajan J. *Archives Keeping.* Madurai: Prabha Publications, 2007.
5. Macdonald Sharon (ed). *A Companion to Museum Studies*. UK: Blackwell Publishing Ltd, 2006.

SEMESTER III			
Allied III	**Indus Valley Civilization**		
Course Code: 21UHIA31	**Hrs/Week :4**	**Hrs/Sem : 60**	**Credits : 4**

Objectives:

- To cherish the rich cultural heritage of our past.
- To appreciate and feel pride about our ancient civilization.
- To analyse the imprints of Indus Valley Civilization in the present scenario.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	widen the knowledge of Indus Valley Civilization in the context of other ancient civilizations in the world.	1	Un, Re
CO-2	know the latest and recent excavations of Indus Valley sites.	1	Un, Re
CO-3	understand the salient features of Indus Valley people.	1	Un, Re
CO-4	analyse the social, economic and religious condition of Indus Valley people.	4	An
CO-5	appreciate the administration of Indus Valley Civilization.	1	Un, Re
CO-6	highlight the engineering skills of Indus Valley Civilization.	2	Un, Re
CO-7	analyse the religious condition of Indus Valley Civilization.	4	An
CO-8	trace out the causes for its decline.	1	Un, Re

SEMESTER III			
Allied III	**Indus Valley Civilization**		
Course Code: 21UHIA31	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I **Indus Valley Civilization**

Civilisation – Bronze Age **-** Excavations – Major and Minor Sites – Date – Geographical Extent - Phases.

Unit II **Salient Features**

Great Bath – Granary – Drainage System – Town Planning –water supply.

Unit III **Socio-economic condition**

Religious Condition - Economy – Terracotta – Pottery Art & Crafts - Seals – Indus Script – Trade & Commerce

Unit IV **Decline & Legacy**

Causes for the Downfall – Debates - Legacy

Unit V **Comparison**

Indus Valley and Egyptian, Mesopotamian and Chinese Civilisations.

Text Book:

1. Irfan Habib. *The Indus Civilization*. Delhi : Tulika Books, 2013.

Books for Reference:

1. Basham, A.L. *The Wonder That Was India,* London: Sidgwick & Jackson, 1967.
2. Shereen Ratnagar. *Harappan Archaeology: Early State Perspectives*. Delhi : Primus Books, 2015.
3. Andrew Robinson. *The Indus : Lost Civilizations. London* : Reaktion Books, 2015.
4. Chopra P.N. Puri B.N., Dar, M.N. *A Social Cultural and Economic History of India(Vol. II).* New Delhi: Macmillan, 1974.
5. Lunia, B.N. *Evolution of Indian Culture.* Agra: Lakshmi Narain Agarwal Education Publishers,1955.
6. Mahajan, V.D. *Ancient History of India.* New Delhi: S. Chand and Company Ltd.,1980.
7. Majumdar, R.C. *An Advanced History of India.* New Delhi: Macmillan and Co ofIndia Ltd,1946.
8. Upinder Singh. *A History of Ancient and Early Medieval India.* New Delhi: Dorling Kindersley (India) Pvt. Ltd., 2009.

SEMESTER – I			
Core I	**History of India upto 647 C.E**		
Course Code:21UHIC11	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Objectives:

- To understand the evolution of Indian polity through the ages.
- To appraise our nation's pride and instil patriotism.
- To appreciate cultures of various dynasties and contribute to nation building.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	widen the knowledge of Ancient History of India.	1, 2	Un, Re
CO-2	understand the Geographical features of India and their impact.	1, 2	Un, Re
CO-3	appreciate the engineering skills of Indus Valley people.	1, 2	Un, Re
CO-4	comprehend the legacy of Vedic Civilisation.	1, 2	Un, Re
CO-5	analyse Dravidian Civilisation.	4	An
CO-6	analyse the Persian and Macedonian Invasion.	4	An
CO-7	examine the genealogy of various kings and their administration.	4	An
CO-8	evaluate the significance of Nalanda University.	5	Ev

Semester – I			
Core I	**History of India upto 647 C.E**		
Course Code:21UHIC11	**Hrs/Week : 5**	**Hrs / Sem :75**	**Credits : 4**

Unit – I **Survey of Sources**

Archaeology – Epigraphy – Numismatics – Literature – Foreign Accounts- Significance of Geography on History – Unity in Diversity

Unit – II **Pre and Proto History**

Traces of Stone Age cultures – Indus Valley Civilization – Origin – Extent - Features

Unit – III **Vedic Age & Rise of Religions**

Early and Later Vedic Period - Polity - Society – Economy & Culture -Jainism and Buddhism

Unit – IV **Transition from Territorial States to Emergence of Empires**

Rise of Mahajanapadas – Emergence of Magadha – Persian and Macedonian Invasions –Mauryan Empire – Administration – Society - Economy – Religion- Art & Architecture – Downfall – Kushans – Polity – Society – Economy – Religion

Unit – V **Gupta & Vardhana Dynasties**

Rise and Growth of Guptas – Administration – Society – Economy – Religion – Art and Architecture – Literature – Science – Technology – Decline - Harsha – Administration – Religion – Hiuen-Tsang – Polity – Society – Economy - Culture

Text Book:

1. Mahajan, V.D. *History of Ancient India.* New Delhi : S. Chand & Company Ltd., 1986.

Books for Reference:

1. Majumdar, R.C. *Advanced History of India*. London : Macmillan Company Ltd. , 1958.
2. Rao, Hanumantha, B. and Rao, Basaveswara K. *Indian History and Culture*. Guntur : Sri Vignana Manjusha, 1973.
3. Sathianathaier, R. *History of India. Vol. I*, Madras : S. Viswanathan (Printers and Pulishers), 1998.
4. Rajkumar. *Social and Cultural History of Ancient India*. New Delhi : Sumit Enterprises, 2007.

SEMESTER – I			
Core II	**Religions in India**		
Course Code:21UHIC12	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Objectives:

- To promote religious tolerance and secularism among the students through proper understanding of religions in India.
- To reveal the noble ideals and ethical values adopted in India through its religions.
- To improve and raise the quality of lives in religious and ethical contexts.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand and develop religious tolerance	1, 2, 5	Un, Re, Ev
CO-2	respect the feelings of other religions.	2, 3	Re, Ap
CO-3	analyse the basic principles and teachings of various religions.	4	An
CO-4	study the schism in religion.	1, 2	Un, Re
CO-5	analyse the forms of worship.	4	An
CO-6	evaluate the essence of all religions.	5	Ev
CO-7	appreciate and follow the ethical and moral standards of religions.	1, 3	Un, Ap
CO-8	evaluate the contribution of various religions.	5	Ev

SEMESTER – I			
Core II	**Religions in India**		
Course Code:21UHIC12	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Unit – I **Religion**

Definition – Etymology – Significance- Religious Tolerance –Secularism

Unit –II **Genesis of Hinduism**

Bhi mbetka Rock art – Indus Valley Civilisation – Vedic Religion – Sangam Religion - Baghavatism – Saivism and Vaishnavism – Bhagavad Gita

Unit – III **Jainism and Buddhism**

Tirthankaras – Teachings – Angas – Guatama Buddha – Teachings – Eight Fold Path–Tripitakas

Unit – IV **Christianity and Islam**

Jesus Christ – Advent of Christianity in India - Teachings –The Bible – Contribution - Schism - Muhammed the Prophet – Advent of Islam in India - Teachings – The Quran – Schism - Contribution

Unit – V **Sikhism and Zoroastrianism**

Guru Nanak – Teachings – Adi Granth – Contribution – Schism– Zoroastrianism - Teachings

Text Book:

1. Fred, W. Clothey. *Religion in India*. USA : Routledge, 2006.

Books for Reference:

1. Jagdish Saran Sharma. *Encyclopaedia Indica.* New Delhi : S. Chand & Company Ltd., 1975.
2. Duggal, K, S. *The Sikh Gurus*. New Delhi : Vikas Publishing House Pvt Ltd., 1980.
3. Joseph Davey Cunningham. *A History of the Sikhs*. New Delhi : S. Chand & Co (Pvt.) Ltd., 1972.
4. Colebrooke, H, T. *Essays on History Literature and Religions of Ancient India.* New Delhi : CosmoPublications, 1977.
5. Prabhakar Machwe. *Hinduism – Its Contribution to Science and Civilisation.* New Delhi : VikasPublishing House Pvt. Ltd., 1979.
6. Moojan Momen. *An Introduction to Shi 'I Islam*. New Delhi : Oxford University, 1985.

7. Banerjee, P. *Early Indian Religions*. Delhi : Vikas Publishing House Pvt. Ltd., 1973.
8. Baig, M.R.A. *The Muslim Dilemma in India*. Delhi : Vikas Publishing House Pvt. Ltd., 1974.

Semester – II			
Core III	**History of India from 647– 1526 C.E**		
Course Code: 21UHIC21	**Hrs/Week : 5**	**Hrs / Sem :75**	**Credits : 4**

Objectives:

- To understand the advent of Muslim rule in India.
- To have a better understanding and critically analyse about Medieval India.
- To create an awakening on the impact of Muslim rule in India.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know about the Origin of Rajputs and their legacy.	1, 2	Un, Re
CO-2	understand the Muslim culture and their legacy.	1, 2	Un, Re
CO-3	anlayse the Arab Conquest of Sindh.	4	An
CO-4	evaluate the impact of foreign invasions.	5	Ev
CO-5	estimate the reforms of Delhi Sultanate.	5	Ev
CO-6	examine the advent of Muslim polity and culture.	4	An
CO-7	evaluate the struggle between Vijayanagar and Bahmani Kingdoms.	5	Ev
CO-8	analyse the study of fine arts through the ages.	4	An

Semester – II			
Core III	**History of India from 647– 1526 C.E**		
Course Code: 21UHIC21	**Hrs/Week :5**	**Hrs / Sem :75**	**Credits :4**

Unit – I **Rajputs**

Origin – Clans of Rajputs - Tripartite Struggle – Battle of Tarain – Administration - Society – Economy – Religion – Art & Architecture

Unit – II **Foreign Invasions**

Traces of Arab Invasion – Gahzni and Ghori Invasions – Impact

Unit – III **Delhi Sultanate (1206 – 1290 CE)**

Slave Dynasty – Qutb-ud-dinAibak – Iltutmish – Sultana Raziya – Khilji Dynasty – Jalal-ud-din Khilji - Ala-ud-din Khilji

Unit – IV **Delhi Sultanate (1290 – 1526 CE)**

Tughlaq Dynasty - Ghiyas-ud-dinTughlaq - Muhammad-bin-Tughlaq – Firoz Shah Tughlaq – Sayyid Dynasty – Khizr Khan Sayyid – Mubarak Shah – Muhammad Shah – Alauddin Alam Shah – Lodi Dynasty – Bahlul Khan Lodi – Sikandar Lodi – Ibrahim Lodi

Unit – V **Impact of Islam**

Administration – Society - Economy–Art & Architecture– Reforms – Bhakti & Sufi Movement – Emergence of Composite Culture

Text Book:

1. Mahajan, V.D. *History of Medieval India.* New Delhi : S. Chand & Company Ltd, 1986.

Books for Reference:

1. Majumdar R.C. *An Advanced History of India*. London : Macmillan Company Ltd., 1958.
2. Majumdar R.C. *History and Culture of the Indian People. Vol. VI.*, London : Macmillan Company Ltd., 1957.
3. Rao, Hanumantha, B. and Rao, Basaveswara K. *Indian History and Culture*. Guntur : Sri Vignana Manjusha, 1973.
4. Sathianathaier, R. *History of India. Vol. II*, Madras : S. Viswanathan (Printers & Publishers), 1998.

Semester – III			
Core V	**History of India from AD 1526 to 1707 C.E**		
Course Code: 21UHIC31	**Hrs/Week : 6**	**Hrs / Sem : 90**	**Credits : 6**

Objectives:

- To imbibe the History of India to promote our nation.
- To understand the administration of important dynasties.
- To impart the significance of historical monuments.

Course outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the History of the Mughals and the Advent of the Europeans.	1	Un, Re
CO-2	cherish the glory of Marathas.	1	Un, Re
CO-3	appreciate the religious policy of Akbar.	5	Ap
CO-4	understand the settlements of European.	1	Un, Re
CO-5	estimate the Anglo-French rivalry in India.	4	An
CO-6	analyse the golden age of Mughals	4	An
CO-7	become aware of the advent of Europeans.	1	Un, Re
CO-8	understand the British supremacy in India.	1	Un, Re

Semester – III			
Core V	**History of India from AD 1526 to 1707 C.E**		
Course Code: 21UHIC31	**Hrs/Week : 6**	**Hrs / Sem : 90**	**Credits : 6**

Unit I **India on the eve of Babur's Invasion**

Mughal India: Sources – India on the eve of Babur's invasion – Political - Socio - Economic conditions – Babur – Humayun – Shershah - Administration.

Unit II **G r e a t M u g h a l s**

Akbar – Administration – Religious policy – Jahangir – Rule of Nurjahan – Shahjahan – Golden Age - Art and Architecture – Aurangazeb – Religious policy.

Unit III **Mughal's Rule**

Mughal Art, literature and Architecture – Mughal administration – Deccan Policy – Religious policy – Society and Economy - Decline and fall of the Mughals.

Unit IV **Marathas**

Sivaji – Military achievements – Administration

Unit V **Advent of the Europeans**

The Portuguese – The Dutch – The English – The French.

Maps

Babur
Humayun
Akbar
Aurangazeb
Shivaji
Major settlements of Europeans

Text Book:

1. Mahajan, V.D., *India Since 1526*. New Delhi: S. Chand & Co Pvt. Ltd, 2001.

Books for Reference:

1. Irfan Habib. *Medieval India : The Story of a Civilization*. New Delhi : National Book Trust, 2008.
2. Satish Chandra. *A History of Medieval India*. Hyderabad : Orient Blackswan, 2007.
3. Banerjee Chandra Anil. *New History of Medieval India.* New Delhi :S.Chand & Company Pvt. Ltd,1983.
4. Khurana K.L. *History of India from 1526 to 1967.* Agra: Lakshmi NarainAgarwal, 1995.
5. Majumdar R.C. *An Advanced History of India.* London: Macmillan CompanyLtd, 1983.

Semester IV			
Core VI	**History of India from AD 1707 to 1858 C.E**		
Course Code:21UHIC41	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Objectives:

- To offer the heroic resistance of native Indians to the company's rule.
- To understand the administration of company and national spirit of Indians.
- To analyse the diplomacy of the British.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appreciate the uprisings of native Indians in the context of British rule.	1,2	Un, Re
CO-2	understand Lord Warren Hastings reign.	1,2	Un, Re
CO-3	analyse Permanent Revenue settlement of Bengal.	4	An
CO-4	critically analyse Subsidiary Alliance of Lord Wellesley.	4	An
CO-5	appreciate the tactics of Tippu Sultan of Mysore.	1,2	Un, Re
CO-6	enhance the social reforms of Lord William Bentinck.	1,2	Un, Re
CO-7	elevate Great Revolt of 1857 as the First War of Indian Independence.	1,2	Un, Re
CO-8	enhance the leaders of Great Revolt of 1857.	1,2	Un, Re

Semester IV			
Core VI	**History of India from AD 1707 to 1858 C.E**		
Course Code:21UHIC41	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Unit I **Anglo-French Rivalry**

Carnatic Wars – Battle of Plassey – Battle of Buxar – Robert Clive – Dual Government in Bengal - Lord Warren Hastings – Regulating Act 1773 – Pitts India Act 1784 - First Maratha War – First and Second Mysore War – The Rohilla War – Impeachment.

Unit II **Revenue System**

Lord Cornwallis – Reforms - Permanent Revenue Settlement of Bengal –Third Mysore War – Charter Act of 1813.

Unit III **Expansion Policy**

Lord Wellesley – Subsidiary Alliance – Fourth Mysore War – Second MarathaWar – Lord Hastings – Third Maratha War.

Unit IV **Reforms & Aggression**

Lord William Bentinck – Reforms – Charter Act of 1833 – Lord Dalhousie–Doctrine of Lapse – Administrative Reforms.

Unit V **Civil and Tribal uprisings**

Sepoy Mutiny of 1857 – Causes -Course– Consequences - End of Company's rule.

Text Book:

1. Khurana K.L. *History of India from 1526 to 1967.* Agra: Lakshmi Narain Agarwal, 1995.

Books for Reference:

1. Ayer Sathianatha S. *A Political and Cultural History of India. Vol.III. Modern India*.Madras: Viswanathan Private Limited, 1982.
2. Grover B.L. *A new look on Modern Indian History.* New Delhi: S. Chand & Co.,Limited, 2016.
3. Chandra, Bipan. *History of Modern India*. Delhi : Orient Blackswan PVT LTD, 2020.
4. Bipan Chandra, et al. *India's Struggle for Independence*. Delhi : Penguin Random House India Private Limited, 2016.

Semester – III			
Non Major Elective I Freedom Movement in India			
Course Code : 21UHIN31	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Objectives :

- To appreciate and inculcate the values of patriotism.
- To respect and follow the noble virtues of freedom fighters.
- To impart the legacy of freedom fighters.

Course Outcome:

CO.No.	Upon completion of this course, students will be ableto	PSO addressed	CL
CO-1	understand the history of hard earned freedom	1 ,2	Un, Re
CO-2	appreciate the sacrifice of freedom fighters	1,2	Un, Re
CO-3	know the imperialist policy of British	1,2	Un, Re
CO-4	asses the various factors of nationalism	4	An
CO-5	analyse the impact of western education	4	An
CO - 6	aware of the role of freedom fighters	1,2	Un, Re
CO-7	respect the values of nationalism and independence	3	Ap
CO-8	strive hard to preserve independence	3	Ap

Semester – III			
Non Major Elective I	**Freedom Movement in India**		
Course Code : 21UHIN31	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Unit – I **Indian National Congress**

Origin & Growth – Moderates & Extremists –Partition of Bengal and Surat Split – Home RuleLeague.

Unit – II **Gandhian Era**

Rowlatt Act of 1919 – Jallian-Wala Bagh Tragedy – Khilafat Movement – Non Co-operation Movement – Simon Commission Report – Poorna Swaraj Resolution.

Unit – III **Civil Disobedience Movement**

Dandi March – Round Table Conferences – Gandhi-Irwin Pact – Communal Award – Poona Pact.

Unit – IV **Phases of Freedom Struggle**

August Offer – Cripps Mission -Quit India Movement – Cabinet Mission Plan – Wavell Plan – The Simla Conference

Unit – V **Towards Independence**

Two Nation Theory - Mountbatten Plan – Independence Act 1947

Text Book:

1. Mahajan, V.D., *Modern Indian History.* New Delhi : S.Chand &Co., 2016.

Books for Reference:

1. Bipan Chandra. *India's Struggle for Independence*. New Delhi : Penguin India 2016.
2. Agarwal, R.C. Bhatnagar Mahesh. *Constitutional Development and National Movement in India*. New Delhi : S. Chand and Co., 2006.
3. Chand, Tara. *History of the Freedom Movement in India. Vol.II*, New Delhi : Ministry of Education,Government of India, 1974.
4. Jayapalan, N. *History of the Freedom Movement (1857 to 1947).* New Delhi : Ashish Publishing House, 1988.
5. Menon, Sreedhara, A. *Modern India Since 1707 and History of the Freedom Movement.* Madras : S.Viswanathan Pvt Ltd, 1989.

Semester – IV			
Non-Major Elective II	**Constitution of India**		
Course Code : 21UHIN41	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Objectives :

- To abide the rules and regulations of the Constitution.
- To respect and appreciate the constitution.
- To know about the recent constitutional amendments.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	respect the fathers of Constituent Assembly	3	Ap
CO-2	analyse the salient features of the Constitution	4	An
CO-3	follow and respect the Constitutional rules andregulations	3	Ap
CO-4	analyse the constitutional framework in the present scenario	4	An
CO-5	aware of the Constitutional amendments	1 ,2	Un,Re
CO-6	highlight the decentralization of power in administration	1 ,2	Un,Re
CO-7	appreciate fundamental rights and duties of citizens	1 ,2	Un,Re
CO-8	enumerate the ideals of democracy	1 ,2	Un,Re

Semester – IV			
Non-Major Elective II	**Constitution of India**		
Course Code : 21UHIN41	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Unit – I **Indian Constitution**

Framing of the Indian Constitution – Preamble - Salient Features of the Indian Constitution.

Unit – II **Rights & Duties**

Fundamental Rights and Duties – Directive Principles of State Policy.

Unit – III **Executive**

Powers & Functions: The President – The Prime Minister The Governor – The Chief Minister – The Council of Ministers - The Cabinet Ministers.

Unit – IV **Legislature**

Lok Sabha – The Speaker – Rajya Sabha – State Legislature

Unit – V **Judiciary**

The Supreme Court & Lower Courts – Judicial Review.

Text Book:

1. Kapur A.C. *Constitutional History of India.* New Delhi: S.Chand and Co. (Pvt) Ltd., 1983.

Books for Reference:

1. Agarwal, R.C. Bhatnagar Mahesh. *Constitutional Development and National Movement in India*. New Delhi : S. Chand and Co., 2006.
2. Gokhale, B.K. *Political Science*. Bombay : A.R.Sheth & Co., 1972.
3. Mahajan V.D. *Constitutional History of India and the Nationalist Movement*, New Delhi : S.Chand and Company Ltd. 1982.
4. Sharma, M.P. *The Government of Indian Republic*. Allahabad: Kitab Mahal, 1968.

SEMESTER - II			
ALLIED	OFFICE MANAGEMENT		
Code: 15UCCA22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Objectives:

- **To impart the knowledge of various concepts on Office Management**
- **To Know the lay out and workings of Office**

Unit I Modern office

Office –Definition-Functions-Office work-Factors contributing to the growth of office work-Activities of modern office-Importance-Challenges before the office

Unit II Office Accommodation and layout

Introduction-Location of office building-Owned Vs Rented premises-Factors in choice of location-Layout-Merits-Open office Vs Private office –New trends in office layout

Unit III Office Environment

Introduction –Office lighting-Ventilation-Interior decoration and furnishing-Office Furniture-freedom from noise and dust-Safety-Sanitary arrangement –Security –Secrecy

Unit IV Record administration and office forms

Introduction –Purpose-Principles-Essentials-Office forms-Significance-Advantages-Types-Formsdesigning-Principles-Guidelines

Unit V Office report and Precise writing

Introduction-Meaning-Functions-Types-Qualities-Sources of data-Drafting-a questionnaire-Guiding principles for a good report-Presentation –Form of report-Préciswriting.-Essentials -Illustrations

Text book

R.S.N. Pillai & Bagavathi, Office Management, S.Chand Publications & Co

Books for Reference:

1. Stanton W.J., Fundamentals of Office Management, McGraw Hill, New York, 1991.
2. Partrick ,Office Methods and Management , Kalyani Publications

SEMESTER- III			
CORE- V	ADVANCED FINANCIAL ACCOUNTING		
Code: 15UCCC31	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives:

- **To make the students to be familiar with the aspects of branch and department.**
- **To enable the students to be familiar with accounting for firms.**

Theory 40: Problems 60

UNIT I

Branch Accounts – Dependent branches – Cost Price and Invoice Price method – Distinction between Wholesale Profit and Retail Profit – Independent Branch (Foreign branches excluded)

UNIT II

Departmental Accounts – Basis for allocation of expenses – Interdepartmental transfer at cost or selling price – Treatment of expenses which cannot be allocated.

UNIT III

Partnership Accounts – Admission of Partner – New Ratio –Goodwill – Accounting Treatment

UNIT IV

Retirement of a Partner – Sacrificing Ratio – Settlement of retiring partners account - Death of a Partner – Joint Life Policy – Settlement of executors account.

UNIT V

Dissolution of partnership – Realisation a/c - Insolvency of a partner - Garner Vs Murray – Piece meal distribution of cash – Surplus of Capital basis method – Maximum Loss method.

Text Book:

T.S. Reddy &A. Murthy, Financial Accounting - Margham Publications, Chennai

Books for Reference:

1. R.L.Gupta&V.K.Gupta, Advanced Accounting, Sultan Chand & Sons, New Delhi.
2. S.P Jain & K.L. Narang, Financial Accounting, KalyaniPublishers,New Delhi.
3. M.C.Shukla&T.S.Grewal, Advanced Accounting,S Chand , New Delhi.
4. Dr.M.A.Arulanandam and K.S.Raman, Advance Accountancy,Himalaya Publishing House.
5. S.Parthasarathy and A.Jaffarulla, Financial Accounting, Kalyani Publishers, New Delhi.

SEMESTER- III			
CORE- IV	HUMAN RESOURCE MANAGEMENT		
Code: 15UCCC33	Hrs/Week: 5	Hrs/Sem: 90	Credits: 4

Objectives:

- **To make students understand the concept of HRM.**
- **To enable students to keep themselves abreast of knowledge on various strategy of HRM.**

UNIT-I : INTRODUCTION

Human Resource Management: Meaning - Objectives - Nature and Scope - Importance – Functions - and Problems of HRM - Personnel Management Vs. HRM - Qualities and Qualifications of Human Resource Managers.

UNIT-II : HUMAN RESOURCE PLANNING, RECRUITMENT AND SELECTION

Human Resource Planning: Meaning - Need and Importance - Objective - Problems - Process – Recruitment: Meaning - Factors Influencing Recruitment - Sources of Recruitment - Problems in Recruitment – Selection: Meaning - Factors Affecting Selection Decisions - Selection Policy - Steps in Selection.

UNIT-III : TRAINING AND DEVELOPMENT

Training: Need and Importance - Objective - Types - Steps in Training Programme – Methods of Training - Evaluation of Training Programmes – Development: Meaning - Concept and Essentials of Management Development Programmes.

UNIT-IV : TRANSFER, PROMOTION & COMPENSATION

Transfer: Objective - Transfer Policy - Promotion: Purpose - Promotion Policy – Demotion - Compensation: Objective – Principles.

UNIT-V : PERFORMANCE APPRAISAL

Performance Appraisal: Meaning - Need and Importance - Objective - Problems in Performance Appraisal - Factors Influencing Performance Appraisal – Methods of Performance Appraisal.

Text Book:

Chitra Atmaram Naik,Human Resource Management, Ane Books Pvt.

Books for Reference:

1. Dr.C.B.Gupta, Human Resource Management, Sultan Chand & Sons, New Delhi.
2. C.P.Memoria, Personnel Management,Himalaya Publishing House.
3. L.M.Prasad, Human Resources Management Sultan Chand & Sons, New Delhi

SEMESTER – IV			
CORE- VIII	LOGISTICS MANAGEMENT		
Code: 15UCCC41	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives:

- **To impart knowledge about the concepts of logistics.**
- **To enable the student to have knowledge in Sea, Road, Rail, Air transportation.**

UNIT I

Concepts of Logistics – Evolution –Nature and Importance – Components of Logistics Management – Competitive Advantages of Logistics – Functions of Logistics

UNIT II

Elements of Logistics – Inventory carrying – Warehousing – types- Material handling – Order processing. Demand forecasting-Impact of forecast on Logistics management

UNIT III

General structure of shipping Industry- Types of ships – shipping routes – Containerisation – Benefits and constraints- Inland Container Depot – Export Clearance at ICD's – Container Freight Stations

UNIT IV

Transportation Infrastructure –Port Infrastructure- Airport Infrastructure – Canal Infrastructure – Rail Infrastructure – Road Infrastructure

UNIT V

Port procedures –Bill of lading and other documents involved in logistics.– Insurance aspects of Logistic

Text Book

Krishnaveni Muthiah, Logistics Management, Himalaya Publishing house, New Delhi

Books for Reference

1. D.K. Agarwal, 'Textbook of Logistics and Supply Chain Management', Mac Millan India Ltd.
2. Martin Christoper, 'Logistics and Supply Chain Management' Pearson Education, 2003.
3. Ronald H. Ballou, 'Business Logistics and Supply Chain Management' Pearson Education, 2004.
4. Doughan Lambert, 'Fundamentals of Logistics Management' Mc Graw Hill, 1998.

SEMESTER – IV			
CORE- IX	CORPORATE FINANCIAL SERVICES		
Code: 15UCCC42	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives

- **To provide Knowledge and understanding of investment avenues and regulatory frame work concerning capital markets in India.**

Unit I

Securities and Exchange Board of India – CCI – SCRA- malpractices in the securities market – deficiencies in the market – SEBI – objectives – functions – powers – organisation – SEBI and the central government – SEBI guidelines – Primary market – Secondary market – FII- Bonus issues – Rights issues – Debentures – Protection of interest of debenture holders – underwriters – Investor protection – book building.

Unit II

Financial Services – Meaning – Features of financial services – classification – scope –fund based activities – Non-fund based activities – modern activities – sources of revenue – causes for financial innovation – financial services and promotion of industries – new financial products and services – innovative financial instruments – challenges facing the financial service sector – present scenario.

Unit III

Mutual funds – meaning – scope of mutual fund – definition – fund unit Vs share – origin of the fund – types of funds – importance of funds – risks – organisation of the fund – operation of the fund – facilities available to investors – net asset value – performance evaluation of mutual funds – investor's rights – general guidelines – selection of fund – commercial banks and mutual fund.

Unit IV

Venture capital – meaning – features – activities of VC funds – scope of venture capital – importance – origin – initiative of India – Venture capital guidelines – Methods of venture financing.

Credit rating – definition and meaning – functions of credit rating – origin – benefits – Credit rating agencies of India**.**

Unit V

Credit card – what is credit card – who can be a member – types of credit card – new types of credit cards – parties of credit card – procedure at the time of purchase – procedure for reimbursement – facilities of card holders – benefits – demerits – credit card business in India – RBI guidelines on credit cards

Text Book

E.Gordon, E.Natarajan, Financial Markets and Services,Himalaya publishing House

Books for Reference:

1. Cherunilam Francis, Internatioanl Trade and Export Management - Himalaya Publishing House – Mumbai.
2. T.T. Sethi, Money Banking & International Trade - S.Chand & Co., - Delhi.
3. Robert J.Carbaugh, International Economics - Thomson Information Publishing Group - Wadwon Publishing Company - California.

SEMESTER - V			
CORE –X		INCOME TAX	
Code: 15UCCC51	**Hrs/Week: 7**	**Hrs/Sem: 105**	**Credits: 5**

Objectives:

- **To help students understand and apply basic concepts of Income Tax Act 1961**
- **To enable the students to compute income under different heads**

Theory :40 Problem :60

UNIT I

Income Tax – Introduction – Important definition – Assessment Year, Previous Year, Assessee, Income, Gross Total Income,Total Income – Residence and Incidence of Tax – Agricultural income – simple problems

UNIT II

Income from Salaries – Salary – Allowances – Perquisities –Profit in lieu of salary – Provident Fund – Gratuity – Pension and Commuted Pension –Earned Leave Salary - Retrenchment Compensation – Compensation on voluntary retirement - computation – simple problems

UNIT III

Income from House Property- Basis of charge- Exemption – Annual income – Deductions- Self occupied house – unrealized rent – Arrears of rent – computation – simple problems

UNIT IV

Income from Profits and Gains of Business or Profession –Important rules – deductions allowed – deductions disallowed computation - simple problems

UNIT V

Income from Capital Gains – Basis of charge – Kind of Capital Assets – Transfer of Capital Assets Value of consideration – Cost of acquisition – Cost of improvement - computation – simple problems.

Income from other sources- Income chargeable – Dividend – Securities – Deductions - computation – simple problems

Text Book:

Dr. H. C. Mehrotra and Dr. P. Mehrotra, Income Tax Law and Accounts, Sahitya Bhawan publications

Books for Reference:

1. Vinod K Singhania, "Direct Taxes Law and Practise", New Delhi,Taxmann- Latest Edn.
2. Bhagawati Prasad, "Income Tax Law and Practice", New Delhi, ViswaPrakashan, Latest Edn.
3. P.Gaur&D.B.Narang**, "**Income Tax Law and Practice", Oscar Publications

SEMESTER- V			
CORE-XII	CORPORATE ACCOUNTING		
Code: 15UCCC53	**Hrs/Week: 7**	**Hrs/Sem: 105**	**Credits: 6**

Objectives:

- **To make the students to be familiar with important aspects of corporate accounting.**
- **To enable the students to be familiar with accounting for companies.**

Theory 40: Problems 60

UNIT I

Issue, forfeiture and re issue of shares -redemption of preference shares – issue – Simple problems only.

UNIT II

Issue of Debentures - Redemption of debentures – underwriting

UNIT III

Valuation of goodwill and shares - Final Accounts – Excluding computation of Managerial remuneration & disposal of profit – Profit Prior to incorporation

UNIT IV

Accounting for amalgamation of companies -Accounting for absorption of companies– Accounting for External reconstruction

UNIT V

Accounting for Internal reconstruction - Liquidation of a company

Text Book:

T.S. Reddy &A.Murthy, Corporate Accounting, Margham Publications ,Chennai.

Books for Reference:

1. S.N. Maheswari, Corporate Accounting, Vikas publishing House, New Delhi.
2. Shukla&Grewal, Advanced Accounting,Sultan& Chand , New Delhi
3. R.C.Gupta .Advanced Accountancy, Sultan chand& Co, New Delhi
4. R. L. Gupta &Radhasamy ,Compamy Accounts, Sultan Chand & Sons, New Delhi
5. Arulantham& Ram Advanced Accountancy, Himalaya Publication

SEMESTER - VI			
CORE -XIII		INDIRECT TAXATION	
Code: 15UCCC61	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 5**

Objectives:

- **To enable the students to learn the basic concepts of indirect taxes.**
- **To impart a thorough knowledge of applying indirect taxation in business.**

UNIT I

Indirect Taxes – meaning – special features – merits – demerits – difference between indirect tax and direct tax.

UNIT II

Central Excise Act 1944 – sources of central excise law- important definitions- objectives of excise duty- importance of excise duties- difference between sales tax and excise duty- types of excise duty- levy of tax- valuation of excisable goods

UNIT III

Customs Act 1962 – features- objectives – types of customs tariff- types of import duties – important definitions – levy of customs duty- types of assessment – valuation of goods- exemption from customs duty- customs duty drawback- clearance of goods – difference between sales tax and customs duty/ excise duty and customs duty

UNIT IV

Value Added Tax (VAT) – meaning – special features – need – importance – meaning of important term under VAT – rates of tax under VAT- levy of tax- input tax credit – registration of dealers

UNIT V

Service tax – introduction – rules- services subject to service – statutory provisions as to service tax filling of returns and E- filing - exemptions – convertible foreign exchange Goods and Service Tax- Meaning – features – need – importance- levy of tax

Text Book

P. Radhakrishnan, Indirect Taxation, Kalyani Publishers, New Delhi

Books for Reference

1. Dr. V. Balachandran,"Indirect taxation" Sultan Chand & Sons, New Delhi.
2. Dr.H.C.Mehrotra and Prof. V.P.Agarwal, Indirect tax, Sahitya Bhawan Publications, Agra.

SEMESTER VI			
CORE -XIV	CORPORATE GOVERNANCE		
Code: 15UCCC62	Hrs/Week: 6	Hrs/Sem: 90	Credits:5

Objectives

- **To have basic knowledge on laws governing Corporate**
- **To enable students to have an adequate knowledge on laws of Corporate Governance**

UNIT I

Introduction- - Meaning – Definition-Nature – Features- Objectives - Benefits- Importance- Significance- Transparency and Accountability – Legal Frame work.

UNIT II

Corporate Board Management – Structure –Composition of the Board –Size of the Board –Powers – Responsilbilities – Funtions- Code of Conduct – Training - Effectiveness

UNIT III

Contribution of NGO's to corporate social responsibility – Characterestics – types – social welfare schemes of the government –UNDP -UNICEF

UNIT IV

Legislations and Corporate social responsibility – corporate legislations – labour – stake holders – environmental

UNIT V

Social Accounting, Auditing and Reporting – Social accounting – Social Auditing – Corporate social reporting – Auditing the social reporting process

Text Book:

V.Balachandran ,V.Chandrasekaran , Corporate Governance Ethics and Social responsibility, PHI Learning pvt Ltd.

Books for Reference:

1. R.C. Sharma &Krishna Mohan,Corporate Governance,Tata McGraw Hill.
2. Mary Ellen Guffey, Corporate Governance – Process and Product International Thomson Publishing - Ohio.

SEMESTER - V			
CORE ELECTIVE		GLOBAL BUSINESS	
Code: 15UCCE51	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 5**

Objectives:

- **To give global perspective to learners as to establishment of business and running of business in the era of Globalization.**
- **To enable students to have an adequate knowledge on global business.**

Unit – I

Evolution – nature of international business – reasons and stages of internationalisation – approaches and theories of international business – comparative advantages and problems of international business.

Unit – II

International business analysis – modes of entry – exporting – licensing – franchising – contract manufacturing – turn key projects – foreign direct investment modes of entry.

Unit – III

Meaning of MNC, international companies, global company, and transnational corporation – Factors for the growth of MNCs – organizational design and structure of MNCs – merits and demerits of the MNCs – role of MNCs in India.

Unit – IV

International marketing intelligence - Meaning – information required – sources of information – characteristics of sounds IMIs – meaning of marketing research – scope and process of marketing research.

Unit – V

Functions of ECGC, EXIM bank , STC, TTCIL, ITPO, AEPC.

Text Book

Introduction to International Business – P.Subha Rao [Himalaya publishing House]

Reference Books

1. Cherunilam Francis, Internatioanl Trade and Export Management - Himalaya Publishing House - Mumbai.
2. T.T. Sethi, Money Banking & International Trade - S.Chand & Co., - Delhi.
3. Robert J.Carbaugh, International Economics - Thomson Information Publishing Group - Wadwon Publishing Company - California.

SEMESTER- V	
SELF STUDY COURSE	**PRINCIPLES OF INSURANCE**
Code:15UCCSS3	**Credit: 1**

Objectives

- **To understand the concept and rules and regulations of Insurance Industry in India**
- **To be familiar with the terms of Insurance**

UNIT I : INTRODUCTION

Insurance - Definition - Functions of Insurance - Nature of Insurance - Benefits of Insurance to Individuals, Business Units and the Society

UNIT II: PRINCIPLES OF INSURANCE

Basic Principles of Insurance - Utmost good faith - Insurable Interest - Material Facts - Indemnity - Proximate Cause. Economic Principles of Insurance -

UNIT III: CLASSIFICATION AND TYPES

Classification of Insurance - Life Insurance - Types of Life Insurance: Pure and Terms - General Insurance - Types of General Insurance: Fire, Marine, Motor, and Miscellaneous.

UNIT IV: INDIAN INSURANCE INDUSTRY

Structure of Indian Insurance Industry - Insurance Regulatory and Development Authority (IRDA): Constitution, Duties, Powers and Functions - Public Sector Insurance Companies - Private Sector Insurance Companies - Reforms in the Indian Insurance Industry.

UNIT V: AGENTS AND UNDERWRITING

Law relating to Agents - Procedure for becoming an Agent - License, Cancellation of License. Underwriting Procedures - Assignment and Nomination

Books for Reference:

1. Nalini Prava Tripathy and Prabir Pal : Insurance Theory and Practice, Prentice- Hall of India Private Limited, 2005.
2. Mishra, M.N.: Insurance Principles and Practice, New Delhi, S.Chand & Company Limited., 2005
3. Mishra, M.N.: Modern Concept of Insurance, New Delhi, S.Chand & Company Limited

SEMESTER- V			
CORE- XI		BUSINESS LAW	
Code: 15USCC52	**Hrs/Week: 7**	**Hrs/Sem: 105**	**Credits: 5**

Objectives:

- **To have basic knowledge on laws governing business.**
- **To enable students to have an adequate knowledge on laws of agreement.**

UNIT I

Indian Contract Act – definition - essentials elements of contract – classification of contracts- offer – acceptance – communication of offer, acceptance and revocation- consideration – contract without consideration - capacity to make contract.

UNIT II

Performance of contract- contract not to be performed - discharge of contract – remedies for breach of contract- specific performance- Quasi contracts.

UNIT III

Contract of indemnity – contract of guarantee – extent of surety's liability – kinds of guarantee – rights of surety – discharge of surety

UNIT IV

Bailment – classification of bailments – duties and rights of bailor and bailee - Pledge – rights and duties of pawnor and pawnee – Pledge by non owners – contract of agency

UNIT V

Sale of Goods Act – Difference between sale and agreement to sell – Rights of Buyers and Sellers – duties – conditions and warranties – delivery of goods – unpaid seller.

Text Book:

N.D.Kapoor "Business Law" Sultan Chand & Sons, New Delhi.

Books for Reference:

1. P.C.Tulsian "Business Law" Tata McGraw Hill Edition.
2. P.C.Tulsian "Business and Corporate Law" Tata McGraw Hill Edition.

SEMESTER –II			
Allied Information Technology And Business			
Code:15UCOA21	**Hrs/Week: 6**	**Hrs/Sem : 90**	**Credits : 5**

Objective:

To provide knowledge on the use and application of computers in accounting and to enable the students to know about the emerging trends in computer technology.

Unit I – Introduction to Computer System:

Introduction to computers – Characteristics- Advantages. Classification of digital computer system – Number system – Anatomy of digital computer – Application of Information Technology in business and industry.

Unit II –Computer Architecture:

Word processor – Spreadsheets –Compilers-Interpreters. Memory units –RAM-ROM-PROM-EPROM-EEPROM. Storage devices – Mass and auxiliary . Input devices - Keyboards-Mouse etc.Output devices- Monitor-Printer etc.

Unit III – Computer Software:

Introduction to Computer software– System software-Application software.Operating system – Functions-Classification. Programming languages – Low level-High level languages.

Unit IV –Database Management Systems:

Data processing – Data versus Information-Quality of good information. File processing – Sequential and Direct access processing. Introduction to data base management system – Characteristics of data in a data base –Types of DBMS. Data base design-Data normalization.

Unit V –Internet and Intranet:

Internet and world wide web – Internet access-Dial up and direct connection. Internet protocols-Advantages and disadvantages.Electronic mail – Need- Importance- Advantages and disadvantages.Intranets-

Text Book:

Fundamentals of Information Technology – Alexis Leon and Mathew's Leon – Vikas Publishing House.Chennai.

References:

1. Efraim Turban, Introduction to Information Technology - Wiley India Pvt. Ltd.
2. Alexis Leon, Introduction to computers - Vikas Publishing House.Chennai.

SEMESTER –III			
Part III Core V Advanced Accounting			
Code:15UCOC31	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Objective:

To expose the students to advanced accounting issues.

Unit I – Branch and Departmental Accounts:

Branch accounting – Debtors system – Invoice price method (excluding independent branches and foreign branches) – Departmental accounts – Allocation of common expenses – Departmental transfer at invoice price.

Unit II – Hire Purchase and Installment System:

Hire purchase and Instalment system – Calculation of interest – Calculation of cash price – Default and repossession – Difference between hire purchase and instalment.

Unit III – Introduction to Partnership Accounts and Admission:

Partnership accounts – Definition – Legal requirements – Partner's capital account.Admission of a partner – New Ratio –Sacrifice ratio- Revaluation – Treatment of Good will

Unit IV - Partnership Accounts- Retirement and Death:

Retirement – Gaining ratio- Settlement of Retiring partner'sloana/c– Death– Settlement of Executors

Unit VPartnership – Dissolution:

Dissolution of a firm – Realisation account –Insolvency of one partner –Insolvency of all partners – Rule in Garner vs Murray- Piece meal distribution of cash.

Theory :30% Problem:70%

Text Book:

1.Reddy .T.S. and Murthy.A.Advanced Accountancy- Vol-I—Margham Publications, Chennai-17

References:

1.Gupta and Radhasamy (2010) , Advanced Accounts-Volume II - Sultan Chand &Sons, New Delhi.

2.S.P.Jain & Narang (2010),Practical problems in Advanced Accountancy – Kalyani Publishers, New Delhi.

3.S.N. Maheswari, Advanced Accounting – Vikas Publishing House, New Delhi.

4. ArulrajPonnudurai-Accountancy-Vol-III- Sathya Publications Tirunelveli-5.

SEMESTER –IV			
Part III Core VIII - Corporate Accounting			
Code:15UCOC41	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Objective:

To expose the students to the practice of maintenance of company accounts as per the revised Indian accounting Standards.

Unit I - Issue of Shares:

Issue of shares – at par, premium and discount – Forfeiture of shares – Redemption of preference shares.

Unit II - Issue of Debentures:

Issue of Debentures – Redemption- Sinking fund – Own debentures – Ex-interest and cum-interest

Unit III - Profit Prior to Incorporation and Final Accounts:

Profit prior to incorporation – Final accounts simple problems (Excluding calculation of managerial remuneration)

Unit IV - Amalgamation Absorption and External reconstruction:

Amalgamation – Absorption – External reconstruction – Purchase consideration – Calculation of purchase consideration-Accounting entries.

Unit V –Internal Reconstruction and Liquidator's Final Statement of Accounts

Alteration of share capital and internal reconstruction – Liquidator's final statement of account.

Theory:30% Problem:70%

Text Book:

1.Reddy .T.S. and Murthy.A.Corporate Accounting—Margham Publications, Chennai-17

References:

1.S.P. Jain & K.L. Narang, Advanced Accountancy – Kalyani Publishers, New Delhi.

2. R.L. Gupta and M. Radhaswamy 2003, Advanced Accountancy – Volume-II,Sultan Chand & Sons, New Delhi.

3. Dr.M.A.Arulanandam& K.S. Raman, Corporate Accounting- Himalaya Publishing house,Mumbai.

SEMESTER –V			
Part III Core X - Income Tax Law & Practice I			
Code:15UCOC51	**Hrs/Week: 7**	**Hrs/Sem:105**	**Credits : 5**

Objective:

To help students understand and apply basic concepts and provisions of Income tax act 1961 and to help students compute different heads of income

Unit I: Introduction:

Basic concepts and definition – Agricultural income — Residential status – Tax Incidence – Problems.

Unit II: Salaries:

Income under the head salary - Different forms – Allowance – Perquisites - Computation Problems

Unit III: House Property:

Income under the head House Property – Deductions – Computation - Problems

Unit IV: Profits and gains:

Income under the head profits and gains from business or profession – Deduction Expressly allowed – General deductions – computation – Problems

Unit V: Capital gains and Income fromother sources:

Income under the head capital gains – Types – Exemption – Computation – Problems – Other Sources – Simple problems only.

Note: Theory - 40% Problem - 60%

Text Book :

1.Mehrotra H.C. and.S.P. Goyal , Income tax law & accounts – Sahitya Bhawan Publication, Agra.

References:

1.Bagavathi Prasad – Income Tax Law and Practice – Wishwa Prakashan, New Delhi. 2.Lal B.B., Direct taxes – Konark Publishers Pvt Ltd, Delhi.

SEMESTER –VI			
Part III Core XIII - Income Tax Assessment			
Code:15UCOC61	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits : 5**

Objective:

To help students understand and apply tax rate and deductions. and to help students compute income of individuals, firms etc.,

Unit I: Clubbing of Income and Set off :

Income from other sources – Computation – Clubbing of income – Set off and carry forwards – Problems. Exempted Income.

Unit II: Deductions

Deductions from gross total income – Tax rate – Simple Problems only.

Unit III: Procedure for filing of return

Returns – Types – Belated return – Defective return – Assessment – Tax deducted at Source – E-Filing – PAN.

Unit IV: Assessments

Assessment of individuals and H.U.F - Computation - Simple Problems only.

Unit V: Partnership firms

Assessment of firms – Book profit – Computation – Simple Problems only.

Note : Theory :40% Problem 60%

Text Book:

1.Mehrotra H.Cand Goyal S.P. , Income tax law & accounts– Sahitya Bhawan Publication, Agra.

References:

1.Bagavathi Prasad , Income Tax Law and Practice – Wishwa Prakashan New Delhi. 2.Lal B.B., Direct taxes – Konark Publishers Pvt Ltd, Delhi.

SEMESTER –VI			
Part III Core XV - Management Accounting			
Code:15UCOC63	**Hrs/Week: 6**	**Hrs/Sem : 90**	**Credits : 5**

Objective:

To acquaint the students with accounting concepts, tools and techniques for Managerial decisions.

Unit I Introduction to Management Accounting& Ratio Analysis:

Meaning - Objectives and Scope of Management Accounting - Functions - Management Accounting Vs Financial Accounting - Management Accounting Vs Cost Accounting - Advantages - Limitations. Tools of Financial Statement Analysis (Theory only).

Ratio analysis: Meaning **-** Importance - Limitations - Ratio Analysis for Liquidity, Activity, Solvency and Profitability.

Unit IIFunds Flow and Cash Flow Analysis:

Funds Flow Analysis**:** Concept of Fund- Schedule of changes in working capital - Preparation of Funds flow statement.

Cash Flow Analysis: Cash from operations - Preparation of Cash Flow Statement.

Unit III Marginal Costing:

Meaning of Marginal cost and Marginal costing - Advantages and Limitations of Marginal costing - Contribution - P/V ratio - BEP - Margin of safety - Applications of marginal costing in managerial decision making: Fixation of selling price - Key factor - Make or Buy - Selection of suitable product mix.

Unit IV Budgetary Control:

Meaning of budget - Budgetary Control - Objectives - Features - Advantages - Limitations - Preparation of Budgets: Production budget - Purchases Budget - Sales Budget - Cash budget - Flexible budget.

Unit V Standard Costing: Meaning of Standard cost and Standard costing - Advantages and Limitations of Standard costing - Comparison between standard costing and Budgetory control - Analysis of Variances: Material Variances - Labour variances - Overhead Variances using Two variance methodonly.

Note: Theory – 30% Problems – 70%

SEMESTER –V			
Self Study-Salesmanship			
Code:15UCOSS1			**Credit : 1**

Objective

To introduce the art of salesmanship and train the students about the basic skills for successful salesman.

Unit I – Salesmanship

Salesmanship – Meaning – Definition – Characteristics of salesmanship – Importance of salesmanship.

Unit II – Personal selling

Personal selling – Steps involved in personal selling – Qualities of successful salesman.

Unit III – Knowledge of Customers

Meaning – Definition – Classification of customers.

Unit IV –Handling Objections

Meaning – Reasons for raising objections - procedure for handling objections –.

Unit V – Sales talk

Meaning of sales talk- Essentials of effective sales talk- Methods of closing the sales.

Text Book: -

1. Sahu P.K., and Raut K.C.. Salesmanship and Sales management-Vikas publishing House Pvt. Ltd., New Delhi..

References: -

1..Rustom Davar S. Sohrab Davar R. and Nulsi R.-Salesmanship and Publicity-Vikas publishing house pvt. Ltd., N New Delhi.

2. Pillai, R.S.N. & Bhagavathi, - Salesmanship, S.Chand & Co, New Delhi – 2005

SEMESTER –V			
Part III Core Integral I Corporate Governance			
Code:18UCCI51	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision : To have basic knowledge on the laws governing the companies

Mission : To enable students to have an adequate knowledge on laws of a company

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand the corporate social responsibility.	1,2	Un
CO – 2	understand the legal framework.	1,2	Un
CO – 3	know about the auditing and social accounting.	1,2,3	Un
CO - 4	understand the corporate legislation.	2,5	Un
CO – 5	understand the contribution of NGO.	2,5	Un
CO – 6	understand the powers and responsibilities of corporate board.	2,5	Un
CO – 7	understand the schemes of government.	4,5	Un
CO - 8	know about stakeholders responsibilities.	1,4,5	An

SEMESTER V			
Part III Core Integral I	**Corporate Governance**		
Code: 18UCCI51	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Unit I Introduction

Introduction - Meaning – Definition-Nature – Features- Objectives - Benefits- Importance-Significance- Transparency and Accountability – Legal Frame work.

Unit II Corporate Board Management

Corporate Board Management – Structure –Composition of the Board –Size of the Board – Powers – Responsilbilities – Funtions - Code of Conduct – Training - Effectiveness

Unit III Corporate Social responsibilities

Contribution of NGO's to corporate social responsibility – Characterestics – types – social welfare schemes of the government –UNDP -UNICEF

Unit IV Corporate Legistlations

Legislations and Corporate social responsibility – corporate legislations – labour – stake holders – environmental legislations

Unit V Social Accounting

Social Accounting, Auditing and Reporting – Social accounting – Social Auditing – Corporate social reporting – Auditing the social reporting process

Text Book:

1. Balachandran,V.Chandrasekaran. *Corporate Governance Ethics and Social Responsibility*. New Delhi: PHI Learning Pvt Ltd,.

SEMESTER –VI			
Part III Core Integral III Securities Law and Financial Markets			
Code:18UCCI61	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision: Seeks to adhere to sound, conservative business principles to provide an attractive investment environment.

Mission: To enable the students to learn about an organized, fair, transparent, and efficient market for trading securities and to deepen the knowledge about the securities law and financial instruments.

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know the various theories of security law and types of financial market.	1,2	Un
CO-2	enhance their analytical skills through extensive and in-depth discussion of the financial markets.	2,5,8	An
CO-3	demonstrate in-depth knowledge of the legal rules on mutual fund and shares.	2,5,8	Ap
CO-4	display a thorough understanding of the various Financial Markets Act.	4,5,8	Un
CO-5	analyse to what extent a financial market satisfies the conditions of an efficient market.	5,8	An
CO-6	possess the ability to discuss and write about the theory of financial markets.	5,8	Un
CO-7	know the various risks involved in trading derivative instruments.	2,5	Un
CO-8	understand the roles and power of SEBI.	2,5	Un

SEMESTER – VI			
Part III	**Core Integral III**	**Securities Law And Financial Markets**	
Code: 18UCCI61	**Hrs/Weeks: 5**	**Hrs/Sem:90**	**Credits:4**

Unit – I Financial Market

Financial Market- Capital Market – Money market –Participants and Instruments in Capital market & money market

Unit – II Securities Exchange Board of India

Securities Contract (Regulation) Act, 1956-Object of the Act- Regulatory framework governingIndian Capital market- Role and Powers of SEBI- Recognition of stock exchange- Bye laws-Membership in Stock exchange- Eligibility- Powers of Central Government

Unit – III New issue market and Investors Protections

New issue market –Parties involved in the new issue market –Govt and Statutory agencies-Collection centers- Placement of issue –Allotment of shares –Investors Protection in the Primary market – secondary market – role of intermediaries

Unit – IV Mutual Fund

Mutual Fund – Meaning –Definitions –Types –Performance, Evaluation –SEBI Regulations on mutual fund-Mutual Fund current scenario

Unit – V Depositories Act and Credit Rating

Depositories Act, 1996- Importance-definition –Depository Participants-Dematerialization – Opening of Demat - SEBI Regulations - Credit Rating – Concepts – Importance- Benefits in India – Rating process –Rating symbols

Text Book:

1.Gordon. E. & Natarajan .*Financial Market & Services.* New Delhi: Himalaya Publishing House.

Books for Reference:

1. Gurusamy. S. *Indian Financial System.* Chennai: Vijay Nicole Imprints Private Limited.
2. Natarajan L. *Financial Market & Services.* Chennai: Margham Publications.
3. Anil Agashe, *Financial Services, Markets& Regulations*, New Delhi: Himalaya Publishing house.
4. Gupta N.K., Monika Chopra, *Financial Markets Institutions & Service*, Chennai: ANE Books.
5. Shashi K.Gupta, Nisha Agarwal, Neeti Gupta, *Financial Market & Services*, Ludhiana: Kalyani Publishers.

SEMESTER –I			
Part III Allied II	**Business Information System**		
Code:18UCOA12	**Hrs/Week: 3**	**Hrs/Sem: 45**	**Credits : 3**

Vision:

To equip students with skills of managing a business enterprise.

Mission:

To enable students to have thorough knowledge in principles of management.

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	gain thorough knowledge about the principles of management.	1,2,3	Un
CO – 2	understand nature of management and apply the various functions in business.	1,2,3	Ap
CO – 3	know about principles of organization and its forms.	1,4	Ev
CO – 4	understand the motivational theories.	1,2,6	Ap
CO – 5	familiarise with the controlling and co-ordination techniques.	1,4	Ap
CO – 6	exhibit knowledge on importance of controlling and techniques of controlling.	2,7	Ap
CO - 7	analyse the importance of decision making in business.	1,2,6	An
CO - 8	outline the methods of motivation.	7,8	Cr

SEMESTER –I			
Part III Allied II	**Business Information System**		
Code:18UCOA12	**Hrs/Week: 3**	**Hrs/Sem: 45**	**Credits : 3**

Unit I – Introduction to Computers

Computer: History- Evolution - Characteristics- Benefits and Problems of Computerization tobusiness firms- Input & Output Devices.

Unit II – Internet

Internet service providers: Creating an E-mail account- Sending and Receiving messages withattachments- Multimedia and its Applications.

Unit III – MS-Word

MS-Word: Formatting pages, working with columns- Constructing high quality tables.

Unit IV – MS – Excel

MS – Excel: Entering andEditing cell entries- Working with numbers – Changing worksheetlayout.

Unit V – MS- PowerPoint:

MS- PowerPoint: Creating a basic presentation – Formatting and checking text- Applyingtransition and animation effects.

(Practical: 20 hours per Semester)

Text Book:

Vikas Gupta-*Comdex Computer Course Kit,Windows XP with Office 2007*. NewDelhi:Dreamtech Press,

Books for Reference:

1. Introduction to Computers and their Applications to Banking .NewDelhi:T. N.Srivastava, Macmillan India, Ltd.
2. Sanjay Saxena, *MS Office XP to Everyone*. Chennai: Vikas Publishing House Pvt. Ltd.

SEMESTER –II			
Part III	**Core-IV**	**Principles of Marketing**	
Code:18UCOC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision:

Create proficient marketing executives.

Mission:

To provide knowledge on concepts of marketing and awareness on the various issues in marketing

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	understand the nature, importance and classification of markets.	1,2	Un
CO – 2	understand the functions of marketing and marketing mix.	1,2	Un
CO – 3	evaluate the life cycle of products.	1,2,3,5	Ev
CO - 4	know the importance of sales promotion, advertising and qualities of successful salesmen.	2,3,4	Ap
CO - 5	understand about the product line and product life cycle through modification.	1,4	Ap
C0 - 6	demonstrate the importance of branding and packaging.	2,4,5	Ev
CO - 7	know the objectives and methods of pricing.	1.2.3	Un
CO - 8	analyse the pros and cons of the various channels of distribution.	4,5	Cr

SEMESTER –II			
Part III Core IV	**Principles of Marketing**		
Code:18UCOC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I - Market and Marketing:

Introduction – Evolution – Meaning of market – Definition of market – Classification of markets– Marketing – Features of marketing – Importance of marketing – Is marketing Science or Art? –Approaches to the study of marketing – Modern marketing.

Unit II - Marketing System, Marketing Mix, Marketing Functions:

Marketing mix – Meaning - Definition – Elements – Problems - Marketing system – Meaning – Marketing process – Concentration – Dispersion – Equalization – Marketing functions – Classification-Online marketing- Characteristics and Benefits

Unit III - Product Planning and Development:

Product planning and development meaning and importance – Steps involved in the development of a new product - Product Line – Modification - Trading Up and Trading Down – Product Life Cycle.

Unit IV - Branding, Packaging and Pricing:

Branding, Meaning – Uses – Registration – Essentials of a Good Brand – Kinds – Packaging andlabelling – Need - Requisites of a good package – Kinds – Merits – Pricing – Objectives – Kinds– Methods of Pricing.

Unit V – Promotion and Distribution

Sales promotion –Importance - Kinds of sales Promotion- Personal Selling – Salesmanship- Importance - Qualities of salesmen -Kinds of Customers -Advertising –Functions- Advantages – Criticism of advertising –Advertising Media .

Text Book

Pillai R.S.N. &Bagavathi, *Marketing*.New Delhi: Sultan Chand & sons.

Books for Reference:

1. Rajan Nair, *Marketing*. New Delhi:S. Chand & Sons.
2. Philip Kottler, *Marketing*. New Delhi: Prentice Hall of India Pvt Ltd.
3 .Memoria& Joshi, *Principles of Marketing*. New Delhi: MC GrawHill International.

SEMESTER –I			
Part III Core II	**Corporate Culture and Practices**		
Course Code:21UCCC12	**Hrs/Week: 5**	**Hrs/ Sem: 75**	**Credits : 4**

Objectives:

- To create an understanding to the students of the importance of Corporate Culture and
  Practices
- To provide the macro-socio-cultural factors that influence corporate culture

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	study the value in shaping Corporate Culture	1,2	Un
CO-2	impart with the knowledge of cultural variables, mission & vision	2,3	Un
CO-3	develop the operational values and vision to the students	2,4	Un
CO-4	learn the socio cultural factors that influence corporate culture	5,8	Ev
CO-5	familiarize the students on different models of corporate culture	1,5,7	Un
CO-6	provide knowledge on the growth of corporate culture	1,5	Ap

SEMESTER –I			
Part III Core II	**Corporate Culture and Practices**		
Code:21UCCC12	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I: Introduction **15 Hrs**

Meaning - Definition - Importance and scope - Role of values in shaping Corporate Culture. Cultural variables: Individual –Social -National and Professional variables.

Unit II: Creating Corporate Culture **15 Hrs**

Establishing values - Creating Vision –Operationalising Values and Vision – Socialization of employees to the Corporate Culture.

Unit III: The Cultural Web **15 Hrs**

Organizational structure – rituals& routines - stories& symbols – Heros & power structures – control systems. Edgar Schien' approach to organizational culture - Hofstead's findings on cross-cultural dimensions.

Unit IV: Managing Cultural Change **15 Hrs**

Managing Cultural Change: Introduction to Cultural change – Meaning - key elements of change - the change process – creating and sustaining corporate culture.

Unit V : Typologies of Corporate Culture **15 Hrs**

Deal &Kennedy's Corporate Tribes model - Handy's Typology: Power culture – role – Task culture - Entrepreneurial – strategic -. Amarchand & Jayaraj's model - Growth – Person-oriented - Mixed and Weak culture.

Text books:

1. Ulrich. *Managing Corporate Culture*.Bengaluru:Macmillan publications.2016
2. Terrence E.Deal& Allen A. Kennedy. *Corporate cultures the rites and rituals of corporate life*.New Delhi.Sultan Chand: 2016
3. Addison-Wesley.*Corporate Culture*.International Book house:2018

Books for References:

1.Amarchand&B.D ,J. Jayaraj. *Corporate Culture & Organisational Effectiveness*. New Delhi:Global Business Press.2011

2. Biswas R.K. *Organisational Climate and Culture*.New Delhi: Altar Publishing House.2017

SEMESTER – II			
Part III Core-IV Corporate Finance			
Course Code:21UCCC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Objectives:

- To enable the students on the recent trends in Capital Market.
- To understand the Application of Finance to Business

Course Outcome :

CO. No.	**Upon completion of this Course Students will be able to**	**PSO's addressed**	**Cognitive Level**
CO 1	understand the functions & Objectives of Corporate Finance	1,2	Un
CO 2	understand the need for Capitalization	2,3,4	Ap
CO 3	gain knowledge on the Capital Structure	2,3	Un
CO 4	study the different types of Cost of Capital	3,4,5	Un
CO 5	evaluate the determinants of Working Capital	3,4,5	Ev
CO 6	know about the different sources of Financial Markets	1,2	Ap

SEMESTER –II			
Part III Core IV	**Corporate Finance**		
Code:21UCCC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

UNIT-I- Corporate Finance **(15 hrs)**

Corporate Finance-Meaning- Nature and Scope of Corporate Finance-Functions-Objectives - Profit maximization- Wealth Maximization-Finance manager and his role.

UNIT-II- Financial Planning **(15 hrs)**

Financial planning-Characteristics of a sound financial plan-Factors affecting financial plan - Need for financial plan-Capitalization-Over Capitalization-Under Capitalization.

UNIT-III-Capital structure **(15 hrs)**

Capital Structure-Business and Financial risks-Financial and Operating leverage- Sources of funds- Share capital-Debt Capital.

UNIT-IV- Cost of Capital **(15 hrs)**

Cost of Capital-Importance of the cost of Capital -Different types of capital-Average cost of capital-Working capital-Determinants of Working capital-Sources of Working Capital.

UNIT-V-Financial Markets **(15 hrs)**

Financial markets-Money markets-Primary Market-Secondary market -Recent trends in capital market.

Text Books:

Aswath Damodaran.*Corporate Finance Theory and Practice*.William Publishing house:2015

Reference Books:

1.Shashi K.Gupta, Anju Gupta.*Business Finance*.New Delhi: Kalyani Publishers.2013
2. Vishwanath S.R, Co*rporate Finance Theory and Practice Sage Response.* Second edition, Murthy.A,Madurai. F*inancial Management*.Margham Publications.2011
3. Prasanna Chandra.*Fundamental of Financial Management.* TMH.
4. Indian Institute of Banking & Finance.*International Corporate Finance*.India.Macmillan Publishers :2013

SEMESTER III			
Part III Core Skill Based Banking and Financial Services			
Course Code: 21UCCS31	**Hrs/Week :4**	**Hrs/Sem : 60**	**Credits : 4**

Objectives

- To equip the students to study and compare the performance of public and private sector banks.
- To enable the students to gain knowledge on venture capital funding and start up challenges.
- To help students to discover the status of securitization in India

Course Outcome

S. No.	Upon the completion of this course , students will be able to	PSO Addressed	CL
CO 1	acquaint the recent trends in banking system	1,2,5	Ap
CO 2	discover the banking technologies	1,2,5	Ap
CO 3	discern on the categories in merchant banking	1,2,5	Un
CO 4	familiarize the credit rating activities	1,5,8	An
CO 5	gain knowledge on venture capitalizing	1,5,6	Ev
CO 6	perceive the role and structure of Financial system	1,2	An

SEMESTER III

Part III	Core Skill Based	Banking and Financial Services	
Course Code: 21UCCS31	Hrs/Week :4	Hrs/Sem : 60	Credits : 4

Unit-1Introduction to Indian Financial System **12 hours**

Introduction to Financial system – Major Components of financial system. Financial Instruments – Money market – Capital market. Financial Institution –Banking and Non banking Financial Institution and Overview of Financial services in India

Unit-2 Commercial bank **12 hours**

Commercial Bank - Structure, Functions - Primary & secondary function, Role of commercial banks in socio economic development, Banking Technology- ATMs-Internet banking– Mobile banking-Debit, Credit and Smart cards– Electronic Payment systems MICR-Cheque Transaction-ECS- EFT– NEFT-RTGS.

Unit-3 Merchant Bank **12 hours**

Merchant Bank- Categories, Services offered by merchant bank – Issue Management – Project Management – Loan Syndication – Portfolio Management – Corporate Counselling – Managing Joint Ventures , Code of Conduct for Merchant bankers, Merchant banking in India

Unit-4 Credit rating **12 hours**

Credit rating **-** Meaning – Nature and Scope of Credit Rating – Features of Credit Rating – Process of Credit Rating – SEBI Regulations – Rating Agencies of India and their symbols .

Unit-5 Venture **12 hours**

Venture capital - Nature and Scope of venture Capital Financing – Features of venture capital Process – Venture Capital financing stages – Advantages and Disadvantages of Venture Capital. Venture Financing Schemes in India.

TEXT BOOK

1. Mukund Sharma . *Banking and Financial Services. Himalaya publishing*. New Delhi: 2015

Books for Reference

1. Gordon & Natarajan .*Financial Markets and Services. Himalaya publishing*. New Delhi:2011.
2. Padmalatha& Justin Paul, Pearson. *Management of Banking and Financial services. Pearson India Education Services Pvt. Ltd :*2017
3. Vij&Dhavan .*Merchant Banking & Financial services. McGraw Hill.* New delhi: 2011.
4. Pratap G Subramanyam .*Investment Banking. Tata McGraw Hill:* 2012.
5. Khan M Y .*Financial services. McGraw Hill:*2018.

SEMESTER –IV			
Part III Core Skill Based	**Corporate Law and Secretarial Practice**		
Course Code: 21UCCS41	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 4**

Objectives:

The students will be able to :

- identify the various documents required to bring the company into administration
- know the basic practices and concepts of company management

Course Outcome:

S. No.	Upon the completion of this course, the students will be able to	PSO addressed	CL
CO1	understand the concepts and principles of company law	1,2	Ap
CO2	understand the secretarial duties regarding the formation of company	1,2,5	Ap
CO3	gain knowledge through different documents in the company	1,2,5	Ap
CO4	familiarize the doctrine of memorandum	1,2,5	Ap
CO5	state the relevant law and discuss the secretarial duties	1,5,8	Ap
CO6	analyze different types of companies	1,8	Ap

SEMESTER IV			
Part III Core Skill Based Corporate Law and Secretarial Practice			
Course Code : 21UCCS41	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit-I Companies Act **(12 hrs)**

Companies Act 2013 - History of Company Law – Definition of Company Characteristics - Formation of company – Incorporation – Effects of Registration – Promoter –Preliminary contracts- Secretarial Duties

Unit-II Kinds of Companies **(12 hrs)**

Types of companies - Private company – Public Company – Distinction – Special privileges of private company – Holding company - subsidiary company – Government company– Foreign company – one person company – Secretarial Duties

Unit-III Legal Documents of the Company **(12 hrs)**

Memorandum of Association – it's clauses – Alterations - Articles of Association –contents– alterations - Distinction between the two - Doctrine of ultravires – Secretarial duties. – Functions and Legal status - Secretarial Duties

Unit-II Kinds of Meetings **(12 hrs)**

Annual General Meeting – Annual report –Secretarial duties connected with meetings –proxies – Extraordinary General Meeting - Meetings of Board of Directors – Resolutions –Motions– Minutes – Agenda – Secretary's duties with regard to preparation of minutes and reports.

Unit-III Company Secretary and Responsibilities **(12hrs)**

Company Secretary – Types of Secretaries – Importance – Functions – Appointment, qualification, Rights - Duties and Liabilities - Scope of secretarial work.

Text Book:

1. Kapoor. N.D. *Elements of company Law*. New Delhi: Sultan Chand & Sons.

Books for Reference:

1. Kuchal M.C. *Company Law*. Noida: VikasPublications.2006.
2. Avtarsigh. *Company Law*. Lucknow: Eastern BookCompany.2018.
3. Dr. G.K. Kapoor, Dr. Sanjay Dhamija, Dr. Vipan Kumar. *Company Law*. New Delhi: Taxmann(P) PublicationsLtd.2021.

SEMESTER –I			
Part III **Allied I** **Business Information System**			
Course Code: 21UCOA11	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 4**

Objectives

- To equip the students on the use of computers in business.
- To acquire hands-on experience in the use of Micro soft office programs.

Course Outcomes :

CO. No.	Upon completion of this course, students will beable to	PSO addressed	CL
CO – 1	gain thorough knowledge about the fundamentals of MS Word	2,4,5	Un
CO – 2	practice the applications of computer inadministration level	1,2,3	Ap
CO – 3	familiarize the calculations made in excel sheets	1,2,4	Ap
CO – 4	present skills with power point	1,3,5	Ap
CO – 5	design the documents with various formats and designs	1,3,4,5	Ap
CO – 6	exhibit knowledge on important application in Internet and email	2,3,5	Ap
CO – 7	analyse the importance of MS Office in business enterprises.	1,2,6	An
CO – 8	create the methods of forming MS Access	1,3,5	Cr

SEMESTER –I			
Part III Allied I Business Information System			
Course Code: 21UCOA11	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 4**

Unit I – MS-Word (12 hours)

Basic Computing Skills: Word Insert Menu - Comment, Header, Footer, Page Number, Text Box, Quick parts, Word Art, Date and Time -Design and Page Layout Themes, Colors, Fonts, Paragraph Spacing, Effects, Water Mark, Page Color, Page Border - Introduction to mail merge-Mail Merge with labeling.

Unit II – MS – Excel (12 hours)

MS – Excel: Entering and Editing Cell Entries- Applications of Formula, Calculations of Commission and Inserting chart – Chart types - Working with Numbers– Changing - Worksheet Layout.

Unit III – MS- PowerPoint (12 hours)

MS- Power Point: Creating a basic presentation – Formatting and checking text- Applying Transition and Animation effects.

Unit IV – MS- Access (12 hours)

Introducing Access: Database – Tables, Queries, Forms, and Other Objects - Creating a Database Table – Opening and Viewing Tables – Entering and Altering Table Fields – Field Properties for Making Sure that Data Entries are Accurate – Finding and Replacing Data.

Unit V – Internet and Email (12 hours)

Creating an E-mail account- Sending and Receiving messages with attachments - Mail merge - Multimedia and its Applications in various sectors advantages – Emerging technologies in Multimedia.

Practical: 30 hours

Text Book:

Vikas Gupta.*Comdex Computer Course Kit,Windows XP with Office* ,New Delhi: Dreamtech Press 1st Edition 2017.

Books for Reference:

1. Srivastava T. N. *Introduction to Computers and their Applications to Banking,* New Delhi:Macmillan India, Ltd. , 1st Edition 2000.
2. Sanjay Saxena. *MS Office XP to Everyone* ; *1st Edition*, Chennai: Vikas Publishing HousePvt. Ltd., 2009.

SEMESTER – II			
Part III Core-IV	**Principles of Marketing**		
Course Code:21UCOC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Objectives

- Create proficient marketing experts
- To provide knowledge on concepts of marketing and awareness on the various issues in marketing

Course Outcomes :

CO No.	Upon completion of this course, students will beable to	PSO addressed	CL
CO – 1	understand the nature, importance and classification of markets.	1,2	Un
CO – 2	understand the functions of marketing and marketing mix.	1,2	Un
CO – 3	evaluate the role of wholesalers and retailers.	1,2,3,5	Ev
CO - 4	demonstrate the importance of sales promotion, and qualities of successful salesmen.	2,3,4	Ev
CO - 5	understand about the product planning ,development and product life cyclethrough modification.	1,4	Un
C0 - 6	demonstrate the importance of advertising.	2,4,5	Ev
CO - 7	assess the objectives and methods of pricing.	1.2.3	Un
CO - 8	analyse the pros and cons of the various channels ofdistribution.	4,5	An

SEMESTER –II			
Part III Core IV	**Principles of Marketing**		
Course Code: 21UCOC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I - Market and Marketing (15 hours)

Meaning of market – Definition of market – Evolution -Classification of markets - Marketing – Features of marketing – Importance of marketing –Modern marketing - Online marketing- Social Media marketing Instagram, Facebook, Whats app.

Unit II -Marketing Mix, Marketing Functions (15 hours)

Marketing mix 4P's –Definition – Modern Marketing Mix 7P's–Marketing system – Marketing process – Concentration – Dispersion – Equalization – Marketing functions – Classification.

Unit III - Product Planning, Development and Pricing (15 hours)

Product planning and development– Steps involved in the development of new product - Product Line– Product Mix -Product Life Cycle Market segmentation – Definition — Criteria – Bases for segmentation - Pricing – Factors affecting Pricing – Methods of Pricing.

Unit IV – Sales Promotion and Advertising (15 hours)

Sales promotion –Importance - Kinds of sales Promotion- Personal Selling – Salesmanship- Importance - Qualities of salesmen - Kinds of Customers –Advertising: Functions- Advantages and disadvantages – Criticism of advertising – Recent trends in Advertising Media.

Unit V – Channels of distribution (15 hours)

Channels of distribution –Objectives – Characteristics – Kinds of Channel members – Directand Indirect Marketing channel - Requisites for good members - Functions – Factors to be considered in channel selection – Motivations to Channel Members- Retailing and Wholesaling– Types of Retailers and wholesalers .

Text Book

Pillai R.S.N. & Bagavathi. *Marketing*. New Delhi: Sultan Chand & sons Reprint First Edition- 2014

Books for Reference:

1. Philip Kottler. *Marketing*. New Delhi: Prentice Hall of India Pvt Ltd:10th Edition 2010
2. Rajan Nair. *Marketing*. New Delhi:S. Chand & Sons: 7th Edition 2014

SEMESTER –IV			
Part III Non Major Elective E-Banking			
Course Code: 21UCON41	**Hrs/Week: 2**	**Hrs/Sem.: 30**	**Credits : 2**

Objective:

- To impart basic knowledge of the fundamental concepts in preparing final accounts.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to:	PSO Addressed	Cognitive Level
CO – 1	have a fundamental knowledge about banking system	1,2,5	Un
CO – 2	fill the forms used in banks	1,2,3,8	Ap
CO – 3	gain fundamental idea about e-banking	1,2	Un
CO – 4	use ATM, PoS and CDM	2,8	Ap
CO – 5	understand about Internet Banking	2,8	Un
CO – 6	use Internet Banking	2,5	Ap
CO – 7	describe about Mobile Banking	2,5	Un
CO – 8	use Mobile Banking	2,5	Ap

SEMESTER –IV			
Part III Non Major Elective E-Banking			
Course Code: 21UCON41	**Hrs/Week: 2**	**Hrs/ Sem.: 30**	**Credits : 2**

Unit I Banking (5 Hours)

Meaning – Definition – Bank – Banking – Origin of Bank – Steps to open bank account – Filling out the Forms - Deposit Challan – Withdrawal Challan - Requisition Forms- Cheque- Cancellation of cheques.

Unit II E- Banking (5 Hours)

Meaning – Definition – Steps to open bank account through online - Types – Advantages – Disadvantages – E-Banking in India

Unit III Automated Teller Machine, Point on Sale and Cash DM (7 Hours)

Origin of ATM – Debit & Credit Card - Procedure to use ATM – Advantages – Disadvantages – PoS – Steps to use PoS - CDM- Origin – Procedure to use CDM– Advantages – Disadvantages – Usage of ATM, PoS and CDM in India

Unit IV Internet Banking (7 Hours)

Definition – Procedure to activate internet banking – Steps to access banking transactions - Fund Transfer through NEFT and RTGS through online - Advantages – Disadvantages – Security Issues in Internet Banking

Unit V Mobile Banking (6 Hours)

Meaning – Definition – Procedure to login mobile banking – Steps to access banking transactions - Fund Transfer - Advantages – Disadvantages – Security Issues in Mobile Banking – Latest Payment Apps

Text book:

Gurusamy S. *Banking Theory Law & Practice*. Chennai: Vijay Nicole Imprints Private Ltd. 4th edition 2017.

Books for Reference:

1. Gordon and Natarajan. *Banking Theory Law and Practice*. Delhi: Himalaya Publishing House, 29th edition 2021
2. Sundaram S.M. *Banking Theory Law and Practice*. Karaikudi : Sree Meenakshi Publications, 1st Edition 2014
3. Maheshwari S.N. and Maheshwari S.K. *Banking Theory Law and Practice*. Kalyani Publishers, 11 Edition January 2014

SEMESTER – IV	
Part IV Self Study Course Goods and Services Tax	
Course Code : 21UCOSS1	**Credit : 2**

Objectives:

- To expose the students to the basic principles, concepts and provisions in GST.
- To provide a conceptual understanding and impart skills in GST.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand basic concepts and provisions of the GST Act 2017.	1,2,3	Un
CO – 2	discuss the various concepts of levy of tax on the supply of goods and services.	2,5	Un
CO – 3	demonstrate on collection of levy, GST.	4,5	Ap
CO – 4	understand the rules for place of supply.	2,5	Un
CO – 5	understand the rules for time and value of supply.	5,8	Un
CO – 6	do the process for registration.	5,8	Ap
CO -7	prepare tax invoice debit and credit notes	5,8	Ap
CO -8	evaluate the payment of tax, returns, offences and penalties.	2,5	Ev

SEMESTER – IV	
Part IV Self Study Course Goods and Services Tax	
Course Code: : 21UCOSS1	**Credit : 2**

Unit–I Introduction to GST

Introduction- Historical background- Concept- Salient features- Advantages and disadvantages- Dual GST.

Unit–II Taxation Mechanism

Charging Section-Collection and Rates -Types of SCST, CGST, IGST-Exemptions and Exempt Supplies- Threshold Limit- Output tax.

Unit–III GST Council, Network and Impact

GST Council-Role and Functions, GST Network- Functions- Services-Anti-Profiteering- Important definitions, Impact of GST.

Unit–IV Supply, Place of supply

Supply-Meaning-Essential ingredients- Deemed supply- Composite supply-Mixed supply- Continuous supply-Inward and outward supply, Time of supply-Value of supply, Place of supply-Determination of place of supply

Unit–V Levy and collection of GST

Levy and collection of GST and IGST- Taxation of import of Goods and services, Registration- Category- Time limit- Types- Special cases- Procedure- Documents ,Input tax credit- Crucial facts.

Text Book:

Mehrotra H.C. and Agarwal V.P., *Goods and Services Tax (GST).* Agra: Sahitya Bhawan Publications Hospital Road ,8th Revised edition August 2021.

Books for Reference:

Career Counseling Group, *The Institute of Chartered Accountants of India, Goods and Services Tax*. 1st edition 2018.

SEMESTER – IV	
Part IV Self Study Course Goods and Services Tax	
Course Code : 21UCOSS2	**Credit : 2**

Objectives:

- To expose the students to the basic principles, concepts and provisions in GST.
- To provide a conceptual understanding and impart skills in GST.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand basic concepts and provisions of the GST Act 2017.	1,2,3	Un
CO – 2	discuss the various concepts of levy of tax on the supply of goods and services.	2,5	Un
CO – 3	demonstrate on collection of levy, GST.	4,5	Ap
CO – 4	understand the rules for place of supply.	2,5	Un
CO – 5	understand the rules for time and value of supply.	5,8	Un
CO – 6	do the process for registration.	5,8	Ap
CO -7	prepare tax invoice debit and credit notes	5,8	Ap
CO -8	evaluate the payment of tax, returns, offences and penalties.	2,5	Ev

SEMESTER – IV	
Part IV Self Study Course	**Goods and Services Tax**
Course Code: : 21UCOSS2	**Credit : 2**

Unit–I Introduction to GST

Introduction- Historical background- Concept- Salient features- Advantages and disadvantages- Dual GST.

Unit–II Taxation Mechanism

Charging Section-Collection and Rates -Types of SCST, CGST, IGST-Exemptions and Exempt Supplies- Threshold Limit- Output tax.

Unit–III GST Council, Network and Impact

GST Council-Role and Functions, GST Network- Functions- Services-Anti-Profiteering- Important definitions, Impact of GST.

Unit–IV Supply, Place of supply

Supply-Meaning-Essential ingredients- Deemed supply- Composite supply-Mixed supply- Continuous supply-Inward and outward supply, Time of supply-Value of supply, Place of supply- Determination of place of supply

Unit–V Levy and collection of GST

Levy and collection of GST and IGST- Taxation of import of Goods and services, Registration- Category- Time limit- Types- Special cases- Procedure- Documents ,Input tax credit- Crucial facts.

Text Book:

Mehrotra H.C. and Agarwal V.P., *Goods and Services Tax (GST).* Agra: Sahitya Bhawan Publications Hospital Road ,8th Revised edition August 2021.

Books for Reference:

Career Counseling Group, *The Institute of Chartered Accountants of India, Goods and Services Tax*. 1st edition 2018

SEMESTER – I			
Core I	**Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)**		
Course Code: 21UBOC11	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

Objectives:

- To have comprehensive idea on primitive plants
- To understand the major groups of lower plants and their characteristics.
- To study the effective utilization of algae, fungi, lichen and bryophytes for the environment and human well being

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know the general characteristics of algae, fungi, lichen and bryophytes	1	An
CO-2	ennumerate the importance of algae and bryophytes and their role in everyday life and environment.	7	Ev
CO-3	observe adaptive feature of the specified plant groups	3	An
CO-4	compare and contrast algae, fungi and bryophytes	2	Un
CO-5	identify algal, fungal and bryophytes samples	8	Re
CO-6	distinguish life cycle pattern in algae, fungi and bryophytes	7	Ap
CO-7	understand the criteria behind the classification of algae, fungi and bryophytes	1	Un
CO-8	apply the knowledge acquired for self employability	6	Ap

SEMESTER – I			
Core I	**Plant Diversity I (Algae, Bryophytes, Fungi and Lichens)**		
Course Code: 21UBOC11	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

UNIT I: **Algae**: Introduction - Brief history of Algae, Classification of algae based on Fritsch (1945), Habitat. General characteristics of algae - Range of thallus organization, Methods of reproduction-vegetative, asexual and sexual, Life cycle patterns, Alternation of generation in algae. Algal cytology – cell wall, cytoplasm (algal pigments, reserve food materials), flagella and nucleus. Economic importance of algae: algae as food, SCP, fodder, green manure, role in N_2 fixation, medicine and biofuels. Ecological benefits of algae.

UNIT II: Habitat, thallus structure, reproduction and life cycle of *Oscillatoria, Volvox, Caulerpa, Vaucheria, Sargassum* and *Gracilaria*.

UNIT III: **Bryophytes:** General characteristics of Bryophytes. Classification of Bryophytes by Rothmaler (1951). Habitat, thallus structure, reproduction and life cycle of *Marchantia* and *Polytrichum.* Economic importance of Bryophytes - biological, ecological, medicinal and as potting material. Affinities between algae and bryophytes.

UNIT IV: **Fungi :** Classification of fungi based on Alexopoulus and Mims (1979), General characters. Habitat, somatic structure, asexual reproduction, sexual reproduction and life cycle of *Albugo, Aspergillus, Peziza,* and *Polyporous*. Role of fungi in medicine, industry, food and food products.

UNIT V: **Lichens:** Classification of lichen based on habit, habitat, anatomy, nature of partners, different views on lichen association, organization, process of lichenization. Vegetative propagules - isidia, soredia, cyphellae, cephalodia.Thallus structure and reproduction of *Collema, Parmelia* and *Usnea*. Economic and ecological significance of lichens.

Text Books:

1. Pandey S.N. and Trivedi. P.S. *A Text Book of Botany* Vol. I and II. New Delhi: VikasPublishing House Pvt. Ltd., 2006.
2. Sharma O.P. *Text Book of Algae.* New Delhi: Tata Mc. Graw-Hall Publications, 2006.
3. Johri, R.M., Smeh Lata and Kavitha Tyagi. 2011. *A Text Book of Fungi*, DominantPublishers and Distributors Pvt. Ltd., New Delhi
4. Singh V. Pandey P.C. and Jain D.K.. A *Text Book of Botany*. Meerut: RastogiPublication, 2002

Books for Reference:

1. Fritsch F.E. *The Structure and Reproduction of Algae*. London: Vol.I all II. CambridgeUniveristy Press, 1972.
2. Kamat N.D. *Topics in Algae*. Aurangabad: Sai Kraipa Prakasham, 1982.
3. Parihar N.S. *Bryophyta*. Allahabad: Central Book Depot Publications in Botany, 1967.
4. Robert Edward Lee. *Phycology*: Cambridge University Press, 2009.
5. Vashishta B.R, Sinha A.K. and Singh V.P. *Algae*. New Delhi: S. Chand and Co. Ltd.2007.
6. Vashishta B.R Sinha A.K. and Singh V.P. *Bryophyta*: New Delhi: S. Chand and Co.Ltd., 2006.
7. Ahmadjian V and Hale M.E. *The lichens.* London: Academic Press, 1973.
8. Alexpoulous C.J. Mims C.W. and Blackwell M. *Introductory Mycology.* New Delhi:Wiley Eastern Limited, 1988.
9. Dubey H.C. *An introduction of fungi.* New Delhi: Vikas Publishing House, 2005.
10. Pandey B.P. *Plant Pathology.* New Delhi: S.Chand and Co.Ltd, 2007.
11. Rangasamy G. *Diseases of Crop Plants in India Prenties*. New Delhi. Hall of India,1992.
12. Singh R.S. *Plant Diseases.* New Delhi: Oxford IBH, 1991.

Practicals: Hrs/Week: 2 hrs

- Micropreparation and evaluation of *Oscillatoria, Volvox*, Diatoms, *Vaucheria, Caulerpa,Sargassum, Dictyota, Acanthophora, Gracilaria*
- Micropreparation evaluation of *Riccia, Marchantia* and *Polytrichum*
- Micropreparation evaluation of *Albugo, Aspergillus, Peziza* and *Polyporous.*
- Micropreparation evaluation of *Usnea*and*Parmelia*
- Identification of microscopic and macroscopic algae
- Identification of Bryophytes
- Identification of microscopic and macroscopic fungi
- Field visit: No of days: 2 (Collection of seaweeds and bryophytes)
- Submission of specimen (algae/

bryophytes/ fungi/ lichen)Submission:

Record note book

SEMESTER – II			
Core II	**Anatomy, Embryology and Microtechniques**		
Course Code: 21UBOC21	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

Objectives:

- To understand the fundamental organization of tissues, developmental events of plants and related techniques
- To understand the developmental process from flower to fruit
- To gain knowledge on the histological architecture of plants
- Application of techniques in anatomical and embryological studies

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	classify meristems and explain the organization of root apex	2	Ev ,An
CO-2	distinguish meristematic and permanent tissues	8	An
CO-3	compare the secondary growth in dicot stem and root	3 , 7	An
CO-4	describe the cytological events associated with the flower development	1 ,3	Un , E
CO-5	explain the physiological changes during pollen pistil interaction.	1	Un
CO-6	understand fertilization and double fertilization.	2	Ev
CO-7	explain the development of seed and dispersal mechanism	2, 3	Un
CO-8	apply microtechniques to prepare anatomical sections and make permanent mounts	3	Un

SEMESTER – II			
Core II	**Anatomy, Embryology and Microtechniques**		
Course Code: 21UBOC21	**Hrs / Week: 6**	**Hrs / Sem: 90**	**Credits: 6**

UNIT I: Meristematic tissues: Classification based on position. Shoot apex (Tunica corpus theory) and root apex (Histogen theory). Permanent Tissues: Simple tissue -parenchyma (chlorenchyma, aerenchyma), collenchymas and sclerenchyma.Complex tissues – xylem and phloem.Organs: Primary structure of dicot and monocot root, stem and leaf.Nodal anatomy – Unilacunar (*Nerium*), Trilacunar (*Azadirachta*), Multilacunar (*Aralium*).

UNIT II: Secondary growth: Secondary growth in root and stem. Vascular cambium – structure (fusiform initial, ray initial) and function, seasonal activity – annual ring.Structure of wood, secondary medullary rays, heart wood and sap wood.Cork cambium – structure and function. Bark. Lenticels. Adaptive and Protective system: Epidermis, cuticle, stomata. General account of adaptations in xerophytes and hydrophytes.

UNIT III: Structural organization of flower: Structure of anther and pollen, structure andtype of ovules, types of embryo sacs, organization and ultra structure of mature embryo sac. Pollination and fertilization: Pollination mechanisms and adaptations.Pollen pistil interaction.Phenomenon of double fertilization.

UNIT IV: Embryo and endosperm: Dicot and monocot embryo. Endosperm - type, structure and functions. Embryo endosperm relationship.Seed-structure appendages anddispersal mechanisms.Apomixis and polyembryony: Definition, types and applications

UNIT V: Microtechnique: Preparation of permanent free hand sections.Microtomy: Fixation, dehydration, embedding, sectioning, staining (general staining and double staining) and mounting. Micrometry – definition, types and uses.

Books for Reference:

1. Bhojwani S.S. and Bhatnagar S.P. *The embryology of Angiosperms*. Uttar Pradesh: VikasPublishing house PVT. Ltd., 2007.
2. Dwivedi J.N and Singh R.B. *Essential of plant techniques*. Jodhpur: Chant printers, 1985.
3. Eames, A.J and L.H Mac Danniels. *An Introduction to Plant Anatomy.* New Delhi: TataMcGraw- Hill Publishing Company Ltd, 1972.
4. Fahn A. *Plant Anatomy*. United Kingdom, Pergamon Press.1990
5. Maheswari, P. *Introduction to embryology of angiosperm*. India: Tata Mc Graw Hillpublications and Co. 1971.
6. Pandey B.P. *Plant Anatomy*. India: S. Chand Co. 1978.
7. Ruth L.W. *Microtechniques*, New York: Mc millaian Company, 1971.
8. Singh V Pandey P.C and Jain D.K. 1987. Meerut: *Anatomy of Seed Plants*. Rastogi,Publication,

Practicals Hrs/ hr: 2

- Observation of tissues - parenchyma, collenchyma and sclerenchyma.
- To measure the dimensions of the given tissue types using stage micrometer and ocularmicrometer
- Sectioning of stem - monocot (*Dracaena*), dicot (*Polyalthea* and *Boerhaavia*)
- Sectioning of root – Dicot (*Azadirachta*), Monocot (*Crinum*)
- Nodal anatomy: Taking series of transverse sections in the nodal region and identify thetypes of nodal anatomy
- Study of the types of stomata from the epidermal peeling of *Hybiscus/ Cucurbita/* grass
- Adaptive antomy: Xerophytic – (*Nerium* leaf), hydrophytes (*Hydrilla* stem)
- Structure of young and mature anther (permanent slide)
- Types of ovule: Anatropus (permament slide), orthotropus, circinotropus, amphitropus,campylotropus (models)
- Dissection of embryo from developing seeds

SEMESTER – II			
Skill Enhancement Course - II Professional English for Botany – II			
Course Code: 21UBOPE2	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

Objectives:

- To enhance the lexical, grammatical, sociolinguistic and communicative competence in an increasingly complex, interdependent world.
- To develop intellectual flexibility, creativity and critical thinking skills of students by offering adequate practice in professional context.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recognise the words used in life science and improve their competence in using the language	1	An
CO-2	Comprehend unfamiliar texts and describe biological processes	7	Ev
CO-3	Apply critical and theoretical approaches to the reading and analysis of various texts in life science	3	An
CO-4	Analyse critically, negotiate and present without committing errors and develop entrepreneurship skills	2	Un
CO-5	Recognize the technical words used life science laboratory settings	8	Re
CO-6	learn language use in formal/professional world	7	Ap
CO-7	Write simple sentences without spelling or grammatical error	7	Ap
CO-8	Improve English proficiency with good vocabulary	7	Ap

SEMESTER – II			
Skill Enhancement Course - II Professional English for Botany – II			
Course Code:21UBOPE2	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

UNIT I: Communication

Listening: Listening to audio text and answering questions: Primary Tissues in plants
Pair Work: Pairwise reading of a conversation script (e.g. difference between plant cell and animal cell) prepared by each pair of their choice. (The script can be based on any topic in plant science)
Reading: Comprehension passage- JanakiAmmal, the Indian Botanist
Writing: Developing a story with pictures: Story of seed
Vocabulary: Unit oriented

UNIT II: Description

Listening: Listening to Process Description - Mitosis
Role play: Deforestation
Reading Passages on Environment conservation
Process Description - Compare & Contrast Algae and Fungi
Vocabulary: Unit oriented

UNIT III: Negotiation Strategies

Listening to the interviews of James Watson, Stephen Hawking, SasiTharoor Small group discussion - Green Revolution, impacts, limits, and the path ahead
Reading: Passage reading - Pseudoscience, the paranormal, and science education
Writing: Developing essay from the passage -Healthy diet.
Vocabulary: Unit oriented

UNIT IV: Presentation Skills

Listening : Listening to lectures and notes taking-
(https://www.youtube.com/watch?v=Dh9ptiJj7TE)
Speaking: Organized speech – Frustrations of people in Pandemic situation. (informative)
Reading: Comprehensive passage - Embryogenesis and answering questions.
Writing: Descriptive writing- Interpretation-Animals for ever (Gerald Durrell's)
Vocabulary: Unit oriented

UNIT V: Critical Thinking Skills

Listening: Listening for information - Introduction to enzymes
Speaking: Preparation of Power Point presentation –Small group discussion on errors in Power Point presentation: History of Botany
Reading: Note making –Professional Competence and Professional Ethics
Writing: Summary writing – Drug designing.

Text Book:

1. Tamil Nadu State Council for Higher Education (TANSCHE).*Professional English forLife Sciences - I.*

Books for Reference:

1. Verma P.S. and Agarwal. V.K. *Cell biology, Genetics, Molecular Biology, Evolution andEcology*. New Delhi, S. Chand and Co., 2007.
2. Bhojwani S.S and Bhatnagar S.P. *The embryology of Angiosperms*. New Delhi: VikasPublishing house PVT. Ltd., 2007.
3. Dubey, R.C. 2006. *Text Book of Biotechnlogy*, fourth edition. New Delhi. S. Chand and CoLtd., 2006.

SEMESTER – III			
Core III Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)			
Course Code: 21UBOC31	**Hrs / Week:4**	**Hrs / Semester: 60**	**Credits:4**

Objectives:

- To investigate and illustrate the key characteristics of fossil and living pteridophytes and gymnosperms through micropreparation and microscopic observation
- To provide firsthand experience in plant collection, identification preservation and data collection for future studies.
- To impart knowledge on the ecology, economic importance, phylogenic importance of pteridophytes and to infer the evolution of seed habit from pteridophytes.

Course Outcomes:

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	summarize the general characters of pteridophytes and gymnosperms and outline the classification of these groups of plants	1,2	Cr
CO-2	specify the criteria of classification and assign the taxonomic hierarchical rank to the taxa	2,3	Re
CO-3	explore the ecological and economic significance of pteridophytes and gymnosperms	1,4	Ev
CO-4	highlight the phenomenon of heterospory in pteridophytes and infer its significance in origin of seed habit	2,4	Un
CO-5	examine microscopically the key characteristics of (morphological, anatomical and ecological) pteridophytes and gymnosperms and make sketches of the same.	4,7	An
CO-6	record the geological time scale and relate the geological era with evolution of plants	7,8	Un
CO-7	identify the types of fossils and discuss the fossilization process and substantiate the importance of fossils evidences in organic evolution.	2,4	Un
CO-8	analyze and justify the idea of evolution of seed plants from pteridophytes	7	Ev

SEMESTER – III			
Core III Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)			
Course Code: 21UBOC31	**Hrs / Week:4**	**Hrs / Semester: 60**	**Credits:4**

UNIT I: General Characters of pteridophytes (upto genus level). Classification of pteridophytes: Pteridophyte Phylogeny Group (PPG) by Erics (2016) (upto order level). Stelar Evolution. Heterospory and seed habit. Economic importance: food, fodder, medicine, ecological indicators, ornamental and biofertilizer

UNIT II: Distribution, external structure, internal structure, reproduction, types of gametophyte and life cycle of *Lycopodium* and *Selaginella* (Developmental details not required).

UNIT III: Distribution, external structure, internal structure, reproduction, types of gametophyte and life cycle of *Adiantum* and *Marsilea* (Developmental details not required)

UNIT IV: General characters of gymnosperms, outline the classification of gymnospermsby Chamberlain (1934). Distribution, external structure, internal structure, reproduction and life cycle of *Pinus* and *Gnetum.* (Developmental details not required)

UNIT V: Economic importance of gymnosperms: food, fodder, ornamentals and industrial uses. Fossils: introduction, process of fossilization, theories of fossilization, types of fossils, techniques to study fossils. Geological time scale. Fossil pteridophyte: *Rhynia,* Fossil gymnosperm: *Lyginopteris* constructed plant parts.

Text Book:

1. Pandey S.N., Trivedi P.S. and Misra S.P. *A text Book of Botany Vol. II.*New Delhi:Vikas Publishing House Pvt. Ltd., 2006.

Books for Reference:

1. Rashid A. *An introduction to Pteridophyta*. New Delhi: Vani Educational Books. Vikas Publishing House Pvt. Ltd., 1985.
2. Vashishta P.C., Sinha A.K. and Anil Kumar, *Botany for degree students – pteridophyte.*New Delhi.S. Chand & Co., 2007.
3. Vashishta P.C., Sinha A.K. and Anil Kumar, *Botany for degree students - Gymnosperms.*New Delhi.S. Chand & Co., 2007.
4. Chamberlain C.J., *Gymnosperms* – Structure and evolution. New Delhi: CBS Publishers & Distributors, 1986.

5. Shukla A.C. and Misra S.P. *Essentials of Paleobotany*. New Delhi: Vikas PublishingHouse Pvt. Ltd., 1982.

Practicals:
Hrs/Weel: 2

Pteridophytes

- *Lycopodium* - Habit, section – T.S. of stemPermanent slide: L.S. of cone
- *Selaginella* - Habit, section – T.S of rhizophore, stem and L.S. of cone
- *Adiantum* - Habit, section – T.S. of rachisPermanent slide: L.S. of sporophyll
- *Marsilea*- Habit, section – T.S. of rhizome, petiole and sporocarpPermanent slides: sporocarp at different plane

Gymnosperms:

- *Pinus* - Twig, dwarf shoot, section- T.S. of young stem and needle
  Permanent slides: T.S. of old stem, L.S. of young and mature male, female cone, seedentire
- *Gnetum* - Twig, section – T.S. of stem and leaf, wood showing anomalous secondarythickening
  Permanent slides: L.S. of male and female inflorescence, seed entire

Fossils :

- *Rhynia* (Stem)
- *Lyginopteris*- Constructed plant parts

Field Study

Submission: Record note book

Laboratory manual for reference:

Srivastava H. N. *Practical Botany Volume I.* Jalandhar: Pradeep Publications, 1987

SEMESTER - III			
Allied III	**Plant Diversity**		
Course Code: 21UBOA31	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits:3**

Objectives:

- To observe and record the key morphological and anatomical structures using compound microscope and make sketches of the same.
- To provide field experience in plant collection, identification, preservation and generation of herbarium database.
- To explain lifecycle pattern, economic importance and the role of diversified group of plants in ecosystem function.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
1.	consider the criteria of classification and outline the system of classification (algae, fungi, bryophytes, pteridophytes and gymnosperms) as proposed by different taxonomist	1, 2	An
2.	work out micropreparation techniques to study the specimen and to reveal the histological architecture using compound light microscope	1, 2	Cr
3.	illustrate the key features of these plants and explain their characters to distinguish different plant groups	1, 6	Ap
4.	explore and express the ecosystem services and economic benefits of these groups of plants	6	Ap
5.	assign the taxonomic ranks to indicate its systematic position and evaluate the evolution of plant species	1, 2	Un
6.	trace the origin and evolution of steles, foliage and seed from seedless plants	1, 2	Re
7.	infer phylogenetic relation between plant groups and comment pteridophytes are pioneer in the evolution of seed habit	1, 2	An
8.	discuss the life cycle pattern of different group of plants	1, 2	Un

SEMESTER - III			
Allied III	**Plant Diversity**		
Course Code: 21UBOA31	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits:3**

UNIT I: **Algae**: General characteristics. Classification of algae by F. E. Fritsch (1954).Economic importance of algae. Occurrence, morphology and anatomical structures, mode of reproduction and life cycle of *Caulerpa* and *Gracilaria.*

UNIT II: **Fungi:**General characteristics. Classification of fungi by Alexopoulos and Mims (1979). Economic importance of fungi. Occurrence, morphology and anatomical structures, mode of reproduction and life cycle of *Agaricus*

UNIT III: Bryophytes: General characteristics. Classification of bryophytes by Rothmaler(1951). Economic importance of bryophytes. Occurrence, morphology and anatomical structures, mode of reproduction and life cycle of *Polytrichum*.

UNIT IV: Pteriodophytes: General characteristics. Classification of pteridophytes by Smith (1955). Economic importance of pteridophytes. Morphological, anatomical structure and mode of reproduction of *Marsilea.*

UNIT V: Gymnosperms: General characteristics, classification of Gymnosperms by K.R. Sporne (1965). Economic importance of gymnosperms. Morphological, anatomical structure, reproduction and life cycle of *Pinus.*

Text book

1. Pandi S.N., Trivedi P.S. and Misra S.P. *A text Book of Botany*. Vol. I and II. New Delhi: Vikas Publishing House Pvt. Ltd., 2006.

Books for Reference:

1. Fritsch F.E. *The structure and reproduction of algae*. Vol. I & II. London: Cambridge University Press, 1972.
2. Alexopoulos and Mims. *Introductory mycology*. Hyderabad: Wiley Eastern Ltd., 1983.
3. Rashid, A. *An introduction to Bryophyta*. Chennai: Vikas Publishing House Pvt. Ltd., 1999.
4. Vashishta, P.C., Sinha A.K. and Anil Kumar. *Botany for degree students*. New Delhi: S. Chand & Co., 2008.

Practicals: 2Hrs/Week

- **Algae:**

  Caulerpa – T.S. of rhizome

  Gracilaria – T.S. of thallus with cystocarp

- **Fungi :**

  Agaricus –

  T.S. of Pileus

  Permanent

  slide –

  Aspergillus

- **Bryophytes:**

  Polytrichum - T.S. of stem, T.S. of capsule

  Funaria - T.S. of stem and leaf

- **Pteridophytes:**

  Marsilea – Habit, section - T.S. of petiole, T.S. of rhizome and T.S. of sporocarp

  Dicranopteris – Habit, section - T.S. of rhizome,

  petiole and pinnulePermanent slide: *Marsilea*

  sporocarp at different planes

- **Gymnosperms:**

  Pinus - Twig, dwarf shoot, section- T.S. of young stem

  and needle Permanent slides: T.S. of old stem,

  L.S. of young and mature male,female cone,

  seed entire

  Gnetum - Twig, section of T.S. of stem and leaf, wood

  showing anomaloussecondary thickening

  Permanent slides: L.S. of male and female inflorescence, seed entire

Laboratory manual for Reference:

Srivastava, H. N. *Practical Botany.* Volume I. Jalandhar: Pradeep Publications, 1987.

SEMESTER - IV			
Allied IV	**Angiosperm Taxonomy and Plant Physiology**		
Course Code: 21UBOA41	**Hrs / Week : 4**	**Hrs / Semester: 60**	**Credits:3**

Objectives:

- To understand the natural system of classification of plants and acknowledge the scientific contribution of plant taxonomist.
- To furnish first hand learning experience in plant collection and describe the diagnostic features of plant in technical terms with the aim of identifying the taxa.
- To elucidate the physiological metabolism associated with the life of the plants.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	study the morphological variation of vegetative part of angiosperms in relation to environmental condition	1	Un
CO-2	characterize the morphological features and architecture of floral components and categorize the types of inflorescences	2	Ev
CO-3	layout and recall the natural systems of classification of angiosperms as proposed by Bentham and Hooker	2	Re
CO-4	describe the dissected components of flowers and make sketches of that.	2	An
CO-5	understand the physical process associated with water absorption, transport and transpiration	2 ,3	Un
CO-6	analyze light enhance photochemical reaction, synthesis of ATP and NADPH and fixation of carbon dioxide into organic compound	2.,3	Un
CO-7	pronounce the role of growth hormones in plant function	2	An
CO-8	design and conduct scientific experiments to record the data	4, 8	Cr

SEMESTER - IV			
Allied IV	**Angiosperm Taxonomy and Plant Physiology**		
Course Code: 21UBOA41	**Hrs / Week : 4**	**Hrs / Semester: 60**	**Credits:3**

UNIT I: Modification of plant parts: root, stem, leaf. Types of inflorescence, parts of a flower and types of fruits.

UNIT II: Concept of classification, natural system - Bentham and Hooker. Vegetative, floral characters and economic importance of Annonaceae, Rutaceae and Caesalpiniaceae.

UNIT III: Vegetative, floral characters and economic importance of Rubiaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.

UNIT IV: **Plant - Water Relations:** Importance of water to plant life. Physical properties of water**,** diffusion, osmosis, imbibition, plasmolysis and water potential. **Absorption and transport of water:** Soil water, mechanism of water absorption, ascent of sap – path and mechanism. **Theories of ascent of sap:** Vital force theory, root pressure theory and Dixon cohesion theory. **Theory of translocation**: Munch hypothesis. **Transpiration**: types, mechanism of stomatal movement, significance

UNIT V: Photosynthesis: Electromagnetic spectrum, photosynthetic apparatus, pigment systems, red drop and Emerson enhancement effect. **Photochemical reaction:** cyclic and non-cyclic photophosphorylation. **CO_2 fixation:** C_3 cycle. Factors affecting photosynthesis. **Growth:** definition, growth phases. **Plant growth promoting hormones:** occurrence, physiological effects and practical applications of auxin, gibberellin and cytokinin.

Text books:

1. Pandey B.P. *Taxonomy of Angiosperms*. New Delhi: S. Chand & Company Ltd., 2005.
2. Jain V.K. *Fundamentals of Plant Physiology.* New Delhi: S. Chand & Company Ltd., 2004.

Books for Reference:

1. Shukla P. and Misra S.P. *An introduction to Taxonomy of angiosperms*. New Delhi: Vikas Pub. House Ltd., 1997.
2. Vashista P.C. *Taxonomy of Angiosperms*. New Delhi: S. Chand & Co., 1985.

3. Pandey B.P. *Economic Botany*. S. New Delhi: Chand & Co., 2000.
4. Salisbury F.B. and Ross C.W. 2007. *Plant physiology.* Singapore: Thompson. Asia. Pvt.Ltd., 2007.

Practicals: 2 Hrs/week

- Dissections and drawing of the floral parts of typical genus belonging to the familiesprescribed in the syllabus (Floral diagram and floral formula are expected).

  Anonaceae - *Anonasquamosa*
  Rutaceae - *Murraya koenigii*
  Caesalpiniaceae - *Caesalpinia pulcherima*
  Rubiaceae - *Ixora coccinea*
  Asclepiadaceae - *Calotropis gigantea*
  Euphorbiaceae - *Euphorbia cyathophora*
  Poaceae - *Chloris barbata*
- Identification of families.
- Identification of the economically important plant products prescribed in the syllabus.
- Determination of water potential by gravimetric method
- Effect of temperature on membrane permeability
- Estimation of starch by colorimetric method.
- Estimation of chlorophyll by spectroscopic method.
- Submission of record notebook

Laboratory Manual for Reference:

1. Ashok Bendre and Ashok Kumar. *Text Book of Practical Botany II*. Meerut: RastogiPublications, 1976.
2. Gamble J.S. *Flora of Presidency of Madras, Volume I to III,* London: Adlard and Son.,Ltd., 1997.
3. Henry A.N., Chitra, V. and Balakrishnan, N.P. *Flora of Tamil Nadu, India, Volume III.*
   Coimbatore: Botanical Survey of India, Southern circle, 1989.

4. Henry N., Kumari, G.R. and Chitra, V. *Flora of Tamil Nadu, India, Volume II*. BotanicalSurvey of India, 1987.
5. Mathew K.M. *The flora of Tamil Nadu, Carnatic. Volume I to III.* Rapinet herbarium,
   Tiruchirapalli: St. Joseph's College, 1981 to 1984.
6. Francis H Witham, David F Blaydes and Robert N Devlin.
   Experiments in PlantPhysiology. New Delhi: Vanmostr and Rainhold Company, 1970.

SEMESTER IV			
Skill Based Elective	**Weed Science**		
Course Code: 21UBOS42	**Hrs/week: 2**	**Hrs/semester: 30**	**Credits: 2**

Objectives

- To provide knowledge on ecology of weeds and its dynamic interaction with human activities
- To evaluate herbicides and its long time impact to environment and non-targeted organism
- To identify and survey weeds distribution and apply various weed management techniques

Course Outcomes:

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	characterize and classify weeds	1	An
CO-2	recall the harmful and beneficial effects of weeds	7	Ev
CO-3	comment on method of propagation, dispersal mechanism and its perpetuation in its ecological niches	7	Un
CO-4	recognize competition between crop and weed in terms of light, space, moisture and nutrition	4,7	An
CO-5	investigate allelopathic effects between crops in their rhizosphere	1	Un
CO-6	strategies weed control methods	7	Un
CO-7	reveal the mechanism action of herbicides	5	Re
CO-8	understand the importance of herbicides and correlate its long time impact to the environment and non targeted organisms	8	Ap

SEMESTER IV			
Skill Based Elective	**Weed Science**		
Course Code: 21UBOS42	**Hrs/week: 2**	**Hrs/semester: 30**	**Credits: 2**

UNIT I: Weeds**:** Definition, characteristics and classification of weeds. Harmful and beneficial effects of weeds. Biology and ecology of weeds.

UNIT II: Propagation and persistence**:** Propagation, dispersal and persistence of weeds.

UNIT III: Crop - weed competition**:** Crop - weed competition for light, space, moisture and nutrients. Critical period of crop - weed competition. Allopathic effects of weeds on crops.

UNIT IV: Weed management**:** Principles, prevention, eradication and control of weed. Mechanical, cultural, chemical and biological methods of weed control.

UNIT V: Herbicide**:** Definition. Objectives and scope of herbicide application. Formulation. Mechanism of action of herbicides. Toxic symptoms of herbicide in weeds and crops. Effects of herbicide on the environment.

Text Books

1. Grafts A. S. and Robbins W. W. *Weed Control*. New Delhi: Tata-McGraw-Hill, Publishing Co. Ltd., 1973.
2. Zimdahl R. L. *Fundamentals of Weed Science*. U.S.A: Academic Press, 1983.

Books for Reference:

1. Aldrich R.J. *Weed - crop ecology- principles in Weed Management*. Massachusetts, U. S. A.: Breton Publishers, 1984.
2. Fryer J.D. and Makepeace. *Weed Control Handbook Vol. II*. London: Blackwell Scientific Publication, 1978.
3. Hance R.J. and Holy K. *Weed Control Handbook*. Oxford: Blackwell Scientific Publication, 1990.
4. Narwal S. S. *Allelopathy in Crop Production*. Jodhpur: Scientific Publishers, 1994.
5. Gupta O. P. *Scientific Weed Management*. New Delhi: Today & Tomorrow's Printers & Publishers, second revised & enlarged edition, 1984.
6. Gupta O. P. and Lamba P. S. *Modern Weed Science*. New Delhi: Today and Tomorrow's Printers and Publishers, 1978.
7. Rao V. S. *Principles of Weed Science*. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd., third edition, 1988.
8. Subramanian S., Mohamed Ali A. and Joya Kumar R. *All about Weed Control*. New Delhi: Kalyani Publishers, 1997.

SEMESTER VI			
Core X - Marine Botany			
Code: 15UBOC62	**Hrs/week: 6**	**Hrs/semester: 90**	**Credits: 5**

Objectives:

- To know about the marine biodiversity and its importance
- To generate self-employment by training the students in commercial cultivation of sea-weeds and mass cultivation of micro-algae.

Unit I : Marine environment- classification, physical and chemical properties of sea water, characteristics and adaptations of pelagic (planktonic), benthic (littoral and deep sea) organisms.

Unit II : Marine phytoplankton- collection, preservation and importance of phytoplankton, productivity- measurement, factors affecting primary production. Role of marine bacteria in the economy of sea.

Unit III : Laboratory culture of marine micro algae. Commercial cultivation of seaweeds - general methods- *Gracilaria* and *Porphyra.* Economic importance of marine algae- in food and agriculture. Phycocolloids - agar – agar, algin, alginate, carrageenan -commercial production, properties and uses, diatomite, antibiotics and vitamins.

Unit IV : Estuarine ecology – characteristics, types. Adaptations and importance of mangroves, mangroves of Tamil Nadu. Salt marshes. Coastal sand dune vegetation and their importance.

Unit V : Marine pollution– pollution due to heavy metals, radioactive wastes, oil, thermal, algal blooms - sources and control measures – oil degrading bacteria – GMO and Pollution abatement. .Conservation of coastal ecosystem with special reference to coral reef and mangroves.

Text Books:

1. Bilgrami, K.S. and L.C. Saha, 2004. Textbook of Algae. CBS publishers & Distributors, New Delhi.

2. Tait, 1978. Elements of marine ecology. Butterworth & Co. (Publishers) Ltd. London

Books for Reference:

1. Boaden P.J.S. and R. Seed 1985. An Introduction to coastal ecology. Thomas Press Limited, New Delhi.
2. Chapman, V.J. and Chapman, 1980. Seaweeds and their uses – Chapman and Hall, London.
3. Dawes, C.J. 1981. Marine Botany. John Wiley & Sons, New york.
4. Lobban, C.S. and M. J. Wynne. 1981. The biology of Seaweeds. Blackwell Scientific publications. Oxford, London.
5. Newell and Newell.1977. Marine Plankton a practical guide. Hutchinson and Co. Ltd.
6. Sinha, P. C. 1998. Marine pollution, Anmol publications Pvt. Ltd. New Delhi.
7. Sverdrup H.U. 1972. The Oceans – Modern Asia Edition.
8. Venkataraman, G.S. 1969. The cultivation of algae, IARI.

Practical

Hrs/week: 2

1. Determination of acidity in water samples.
2. Determination of alkalinity in water samples.
3. Estimation of dissolved oxygen content in sea water samples.
4. Estimation of phosphate in seawater samples.
5. Phytoplanktons-Collection and identification
6. Seaweeds- *Ulva, Sargassum, Hypnea* and *Gracilaria*
7. Study of sand dune, salt marsh and mangrove vegetation in their natural habitat, submission of photographs and field report for internal evaluation.

SEMESTER IV			
NME II	**Food Technology**		
Course Code: 21UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

Objectives:

- To provide cognizant on the chemistry of food components, microbial interaction with food product and apply scientific methods of food preservation to restrict microbial growth.
- To develop skill in food processing techniques and apply it to their professional accomplishment.
- To encourage collaborative learning and develop skill to introduce novelty in quality improvement and enhancing marketing values.

Course Outcomes:

CO. No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	discuss basic principles of food preservation methods.	6,8	Un
CO-2	identify and explain nutrients in foods and the specific functions in maintaining health.	6,8	Re
CO-3	commends on causes and deterioration mechanisms of foods and methods to control food spoilage.	6,8	An
CO-4	manufacture a range of simple nutritious and novel food products	6,8	Ap
CO-5	modify recipe for specific purposes such as nutrient enhancement, quality improvement and ingredient substitution.	4	Ap
CO-6	understand the compositional and technological improvement in dairy and bakery industries	6,8	Un
CO-7	learn nutritious values of food and employ technologies in production and preservation	6,8	Ap
CO-8	apply preservation principles in product design	6	Ap

SEMESTER IV			
NME II	**Food Technology**		
Course Code: 21UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

UNIT I: Technology of Vegetables**:** Nutritive value of vegetable, storage of vegetable, factors affecting storage life, spoilage of vegetables. Methods of preservation: refrigeration, freezing, canning, drying and dehydration, and chemical preservatives. Preparation - pickles (lemon, mango), soups (mixed vegetables, tomato).

UNIT II: Bakery Technology**:** Ingredients & processes for breads, cakes. Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

UNIT III: Dairy Technology**:** Milk and dairy products, Pasteurization, sterilization, HTST and UHT processes. Preparation of butter, ghee, ice-cream, paneer.

UNIT IV: Technology of Fruits**: C**omposition and nutritive values of fruits. Spoilage of fruits. Preparation of jam - mixed fruits jam. Fruit juices pineapple and grapes.Squash – lemon. Sauce- tomato.

UNIT V: Technology of millets: Types of millets, nutrient content of millets, health benefits of millets, ways to incorporate millet into diet. Processing **-** hand pound method and machine method. Preparation of millet bread, millet roti, porridge and laddu.

Text Book:

1. Raina U. Kashyap S. Narula V. Thomas S. Suvira S. and Chopra S. *Basic Food Preparation- A complete Manual*. Hyderabad: Orient Longman Pvt. Ltd., third edition, 2007.

Books for Reference:

1. Dubey S.C. *Basic Baking*. New Delhi: Chanakya Mudrak Pvt. Ltd., fifth edition, 2007.

2. Frazier W.C. and West Holf D.C. *Food Microbiology*. New Delhi: Tata McGraw Hillpublishing Co Ltd., 1995.
3. Kulshrestha S.K. *Food preservation.* New Delhi: Vikas publishing House. 1994.
4. Srivastava R. P. *Preservation of fruits and vegetable products***.** Dehra Dun: Bishen SinghMahendra Pal Singh, 1982.
5. Srivastava R. P. and Kumar S. *Fruit and Vegetable Preservation: Principles andPractices.* Lucknow: International Book Distributing Co., 2002.
6. Swaminathan M. *Handbook of Food Science and Experimental foods*. Banglore: TheBanglore printing and publishing Co. Ltd., 1992.

SEMESTER V			
Core VII	**Biotechnology (Common Core)**		
Code: 18UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credits: 3**

Vision:

- To gain knowledge and develop skill in the field of about the importance of biotechnology in different fields
- To create graduates who endeavor for the welfare of mankind.
- Create opportunities for multi-disciplinary education, training and research in biotechnology

Mission:

- Impart quality education for lifelong professional growth and opportunity in a wide range of Careers.
- To create awareness towards socio-ethical implications of potentials of biotechnology
- To provide a platform for biotechnology education, training and research at the interface of multiple disciplines

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe different cloning vehicles and learn the different type of vectors	1	Kn, Un
CO-2	gain knowledge about techniques of biotechnology.	2	Un
CO-3	summarise the different techniques in animal biotechnology	2	Un, An
CO-4	compare the various techniques in plant and animal biotechnology	4	Cr
CO-5	enumerate cell culture, organ culture and stem cell culture and point out implications in health care	6	Kn, An
CO-6	distinguishes methods of alleviating environmental pollution and understand the synthesis of industrial products	5	An
CO-7	relate biotechnology and its benefits to mankind	6	Ap, Ev
CO-8	design, conduct experiments, analyze and interpret data for investigating problems in biotechnology and allied fields	7,8	Ap

SEMESTER V			
Core VII	**Biotechnology (Common Core)**		
Code: 18UBCC51	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credits: 3**

Unit I Cloning Vectors

Introduction – Scope and importance of biotechnology – Gene cloning techniques - cloning vehicles – bacterial plasmid vectors – pBR322 and Ti plasmid – bacteriophage vectors – lambda – M13 – Plant viral vector – CaMV- Gemini virus and tobamovirus – animal viral vector – SV40- Role of restriction and modification enzymes

Unit II Gene Cloning and Screening

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – PCR – hybridization technique – blotting techniques – Southern, Northern and Western.

Unit –III Cell, Tissue and Organ culture

Culture media – cell culture techniques – monolayer culture and immobilized culture of cell lines –callus culture – suspension culture and anther culture – techniques and applications of human embryonic stem cell culture – plant embryo culture- invitro pollination – organ culture – techniques – tissue engineering of artificial skin and cartilage.

Unit – IV Environmental and Bioprocess technology

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol – Biodiesel – Biofertilizer – mass cultivation and application of Azola

Unit –V Health care biotechnology

DNA probes and diagnosis of genetic disorders – DNA fingerprinting technique – gene therapy and treatment of genetic diseases – vaccines – recombinant DNA vaccines and viral vaccines – edible vaccines- Bt cotton – Golden rice- Human Genome Project – types – methods of sequencing – potential benefits of mankind

Text Books

Dubey R.C, S *A text book of Biotechnology* .Chand and Comp.Ltd, New Delhi, 2004.
Kumaresan, V., Biotechnology . - Saras Publication , Nagercoil - 2010

Books for Reference

1. Clark and J. Pazdernik. 2009. *Biotechnology*, Elsevier Academic Press, California, USA.
2. Dubey, R.C. 2006. *Text Book of Biotechnlogy*, 4th edition, S. Chand and Co Ltd, New Delhi.
3. Ramadass, P. 2009. *Animal Biotechnology – Recent Concepts and Development*. MJP Publishers, Chennai
4. Rema, L.P. 2009. *Applied Biotechnology*, MJP Publishers, Chennai.

5. Shailendra Singh, 2007. *Applied Biotechnology*, 1st edition, Campus Books InternationalNew Delhi.
6. Singh, B.D. 2005. *Biotechnology, Revised edition*, Kalyani Publishers, Chennai.

Practicals 18UBCCR5
Hours/Week :2 Credits : 1

1. Isolation of Blue Green Algae
2. Preparation of synthetic seed
3. Estimation of dissolved oxygen and BOD
4. DNA Estimation by Spectrophotometric method
5. Preparation of plant and animal tissue culture media
6. Preparation of SDS – PAGE (Gel mould only)
7. Isolation of protoplast
8. Estimation of protein by column chromatography
9. Demonstration : Electrophoresis – full techniqueBlotting technique
   PCR – DNA
   Amplification
   Mushroom
   cultivation /
   Vermiculture
10. Models and Charts pertaining to theory

Book for Reference:

1. Aneja,K.R., *Experiments in Microbiology, Plant Pathology and Tissue Culture*, WishwaPrakashan, (A Division of Wiley Eastern Ltd), New Delhi.

SEMESTER V			
Core VIII	**Microbiology**		
Code: 18UBOC52	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Vision:

- To provide information on various techniques to culture different microbial strains and recent advances in the field of microbiology

Mission:

- To know the characteristic features of microbes including their mode of nutrition
- To make the students aware of symptoms and preventive measures of common human diseases.
- To exploit the potentialities of microorganisms in food and industries.

Course Outcome

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	realise the history and scope of microbiology	3	Un
CO-2	understand the structure and growth characteristics of microorganism that enabling the learner to identify and classify microorganisms by themselves	4	Cr
CO-3	use various microbiological techniques to isolate, characterize and identify bacterial and viral pathogens of plants.	6	An
CO-4	provide a thorough knowledge about the microbes causing human diseases , their symptoms and preventive measures	4	Ap
CO-5	understand the role of microorganisms in biotechnology, fermentation, medicine and other industries for human well being	4	Ap
CO-6	discuss the role of microorganism in food, milk and water	4	An
CO-7	identify and control food borne disease and food spoilage	4	An
CO-8	test the quality of milk and enumerate microorganisms found in milk and soil	6	Ev

SEMESTER V			
Core VIII	**Microbiology**		
Code: 18UBOC52	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Unit I:

Brief history and scope of microbiology. Morphology and ultra structure of Bacteria. Reproduction – binary fission, conjugation, transduction and transformation. Nutrition types - chemosynthetic, photosynthetic, saprophytic, parasitic and symbiotic.

Unit II

Culture of microorganisms – sterilization (dry, heat, moist heat and filtration), media for micro organisms (NA, Czapek-Dox and PDA), Methods of culturing bacteria – broth culture, agar plate and agar slant culture, pure culture, batch culture and continuous culture. Growth – phases of growth.

Unit III

Virus – general characteristics, structure and multiplication of TMV and T_4 phage. Microbes and human diseases –typhoid, cholera, tuberculosis and influenza

Unit IV

Fermentation technology- fermentors- stirred tank, tower and air lift. Commercial production of vinegar, citric acid, penicillin and vitamin B_{12}.

Unit V

Food microbiology – types of food spoilage and methods of food preservation. Microorganisms as food -single cell protein –bacteria, fungi and yeast.
Milk microbiology - bacterial flora in milk, types of contamination and pasteurization of milk.
Water microbiology – testing potability of water and methods of purification of potable water.

Text Book

1. Dubey, R.C. and D.K. Maheswari, 2003. A textbook of Microbiology. S. Chand company Ltd. New Delhi.

Books for Reference:

1. Adams, M.R. and M.O. Moss, 2005. Food Microbiology. New Age International publishers.
2. Kalaichelvan, P.T. 2005. Microbiology. Biotechnology - Lab Manual – MJP Publishers, Chennai.
3. Patel, A.H. 2004. Industrial Microbiology. Mac Milan India Ltd., New Delhi.
4. Pelzar, M.H., E.C.S Chan and N.R. Krieg. 2005. Microbiology. Tata MC. Graw Hill Pub. Co. Ltd., New Delhi.
5. Purohit, S.S. 1988. Microbiology. Agro Botanical publishers India.

Practical

Hrs/ week: 2

- Sterilization (dry, heat, moist heat and filtration)
- Preparation of media- NA, PDA
- Demonstration of plating and serial dilution technique
- Pure culture technique – streak plate method
- Staining of Bacteria (Gram's staining)
- Analysis of milk – dye reduction test

Spotters

- Ultra structure of bacterial cell, T_4 phage, TMV and HIV-EM
- Colony counter
- Fermentors- stirred tank, tower and air lift,
- Agar slant/ stab/plate
- Milk samples
- Spoiled food

Submission: Record note book

Book for Reference: Lakshmanan M, Kunthala Jeyaraman, Jeyaraman and Gnanam, 1971.Laboratory experiments in microbiology and molecular biology, Higginbothams Pvt. Ltd.

SEMESTER - II			
Core III	**Fungi, Lichens and Plant pathology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem : 60**	**Credits: 4**

Vision:

Imbibe knowledge on uniqueness of Fungi and Lichens

Mission:

To study the life cycle patterns of fungi and lichen.

To learn about the plant diseases and their impact on crops

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	characterize and identify the diversity of fungal and lichen world and their adaptations	1	Un
CO-2	Identify fungal specimens microscopically	2	Ap
CO-3	Identify major groups of fungi and lichens based on morphology and anatomy	2	Ap
CO-4	understand and explain the ecological roles and trophic modes of major Fungal and Lichen groups	5	Ap
CO-5	evaluate the importance of Fungi and Lichens , their role in everyday life and environment	7	Ev
CO-6	understand the various plant diseases and their impact on agriculture	7	Un
CO-7	identify symptoms and diagnose different plant diseases and methods to control.	6	Ap
CO-8	identify pathogenecity with their specific symptoms	4	Ev

SEMESTER - II			
Core III	**Fungi, Lichens and Plant pathology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I : Classification of fungi based on Alexopoulus and Mims (1979), General characters.
Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle of *Albugo* and *Aspergillus*.

Unit II : *Peziza* - Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle.
Puccinia - Occurrence, primary host, alternative host and life cycle.
Role of fungi in medicine, industry, agriculture, food and food products.

Unit III : Lichens- Classification, association, morphology of thallus- crustose, foliose, fruiticose, reproduction and economic importance.
Usnea- Structure and reproduction.

Unit IV : Study of the following diseases with reference to causal organism, symptoms, dissemination and control measures: tikka disease of groundnut, red rot of sugarcane and blast disease of paddy.

Unit V : Study of the following diseases with reference to causal organism, symptoms, dissemination and control measures: canker disease of citrus, angular leaf spot of cotton and bunchy top of banana.

Text Books:

1. Johri, R.M., Smeh Lata, Kavitha Tyagi. 2011. A Text Book of Fungi, Dominant Publishers and Distributors Pvt. Ltd., New Delhi
2. Pandey, S.N. and P.S Trivedi 2006. A Text Book of Botany Vol. I Vikas Publishing House Pvt. Ltd., New Delhi & I.
3. Singh, V., P.C. Pandey and D.K.Jain. 2002. A Text Book of Botany, Rastogi Publication, Meerut.

Books for Reference:

1. Ahmadjian, V and M.E. Hale.1973. The lichens, Academic Press, London.
2. Alexpoulous, C.J., C.W. Mims, and M. Blackwell. 1988. Introductory Mycology, Wiley Eastern Limited, New Delhi
3. Dubey, H.C.2005. An introduction of fungi. Vikas Publishing House, New Delhi.
4. Pandey, B.P. 2007. Plant Pathology S.Chand and Co.Ltd New Delhi.
5. Rangasamy, G. 1992. Diseases of Crop Plants in India Prenties Hall of India, New Delhi.
6. Singh, R.S. 1991. Plant Diseases. Oxford IBH, New Delhi

SEMESTER - II			
Core IV	**Anatomy and Embryology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Vision:

To understand the fundamental organization of tissues and developmental events of plants

Mission:

To understand the developmental process from flower to fruit

To gain knowledge on the histological architecture of plants

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	classify meristems and explain the organization of root apex	2	Ev ,An
CO-2	distinguish meristematic and permanent tissues	8	An
CO-3	compare the secondary growth in dicot stem and root(normal and anomalous)	3 , 7	An
CO-4	describe the structure of a microsporangium and pollengrains and	1 ,3	Un , E
CO-5	Explain the structure and development of male gametophyte.	1	Un
CO-6	explain the structure and development of megasporangium	2 , 3	Ev
CO-7	understand fertilization and double fertilization.	2	Un
CO-8	differentiate dicot embryo from monocot embryo.	2 ,3	An

SEMESTER - II			
Core IV	**Anatomy and Embryology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem : 60**	**Credits: 4**

Unit I : Tissues-definition and types. Meristems -classification based on position. Shoot apex (Tunica – corpus theory). Root apex (Histogen theory). Permanent tissues-simple -parenchyma, collenchyma,and sclerenchyma; Complex- xylem and phloem.

Unit II : Normal secondary thickening in dicot stem (*Polyalthia*) and root (*Azadirachta*). Anomalous secondary thickening in dicot stem (*Boerhaavia)* and monocot stem (*Dracena*)

Unit III : Anther – structure, anther wall, tapetum. Microsporogenesis. Pollen grain structure and pollen wall development. Pollinium. Development of male gametophyte

Unit IV : Structure of orthotropous ovule. Ovule-types. Megasporogenesis
Structure and development of female gametophyte (Polygonum type). Double fertilization, and post fertilization changes.

Unit V : Endosperm-types (nuclear, cellular and helobial -each one example) and haustorial behavior of endosperm. Dicot embryo-*Capsella* type, Monocot embryo *Luzula* type.

Text Books:

1. Pandey, B.P. 1995. Embryology of Angiosperms S. Chand and Company Ltd. Ram Nagar, New Delhi.
2. Pandey, B.P. 2005. Plant Anatomy S. Chand and Company Ltd. Ram Nagar, New Delhi.

Books for Reference :

1. Bhojwani SS and S.P Bhatnagar. 2007. The embryology of Angiosperms. Vikas Publishing house PVT. Ltd.,
2. Eames, A.J. and L.H. Mac Danniels. 1972. An Introduction to Plant Anatomy, Tata Mc Graw- Hill Publishing Company Ltd, New Delhi.
3. Maheswari, P. 1971. Introduction to embryology of angiosperm. Tata Mc Graw Hill publications and Co.
4. Singh, V., P.C. Pandey and D.K. Jain. 1987. Anatomy of Seed Plants, Rastogi Publication, Meerut.

SEMESTER IV			
Core VI	**Taxonomy of Angiosperms**		
Code: 18UBOC41	**Hrs/week: 4**	**Hrs/Semester: 60**	**Credit: 4**

Unit I : Taxonomy- definition and scope. Contribution of Mathew and Santappa. Botanical nomenclature - vernacular names, binomial, ICBN – principles of the code, principles of priority, type concept and author citation.

Unit II : Systems of classification- natural - Bentham and Hooker and phylogenetic – Engler and Prantl's system, Angiosperm Phylogeny Group (IV)- characteristics, merits and demerits.BSI. Herbarium techniques – botanical collection, pressing, preservation and role.

Unit III: Vegetative, floral characters and economic importance of: Annonaceae, Rutaceae, Caesalpiniaceae, Myrtaceae, Cucurbitaceae.

Unit IV: Vegetative, floral characters and economic importance of: Rubiaceae, Sapotaceae, Apocynaceae, Asclepiadaceae and Acanthaceae.

Unit V: Vegetative, floral characters and economic importance of: Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Arecaceae and Poaceae,.

Text Books

1. Pandey, B.P. 2005. Taxonomy of Angiosperms. S.Chand & Company LTD., New Delhi.
2. Shukla P. and S.P. Misra. 1997. An introduction to Taxonomy of angiosperms, Vikas Pub. House Ltd., New Delhi.
3. Vashista, P.C. 1985. Taxonomy of Angiosperms. Vikas Publications, New Delhi.

Books for Reference:

1. Gurcharan Singh, 2004. *Plant Systematics.* Oxford & IBH Publishing Co. PVT. Ltd., New Delhi.
2. Naik, V.N. 1984. *Taxonomy of Angiosperms*, R. Chand & Co, New Delhi.
3. Rendle, 1979. *The classification of flowering plants vol. II & I.* Vikas Publishing House Pvt. Ltd. Sahibabad, U.P.
4. Sharma, O.P. 1996. *Plant Taxonomy*. Tata MC Graw – Hill publishing Company Limited, New Delhi.
5. Singh, V. and Jain, 1997. *Taxonomy of Angiosperms*.Rastogi publications, New York.

Practical

Hrs/ week: 2

- Dissect out and display the floral parts of the typical members of the families prescribed in the syllabus.
- Survey of locally available plant species belonging to the families prescribed in the syllabus and preparation of digital herbarium
- Taxonomic field trip under supervision and submission of 2 herbarium sheets and 10 photographs. Field notebook to be submitted for external evaluation.
- Study of various modifications and record of economically important products from the members of the families prescribed in the syllabus.

Submission: Record note book/ Herbarium / Field note book

Books for Reference:

- Ashok Bendre and Ashok Kumar. *Text Book of Practical Botany II*. Rastogi Publications, Meerut.
- Gamble J.S. 1997. *Flora of Presidency of madras, Volume I to III*, Adlard and Son., Ltd., London
- Henry A N , Chitra V and Balakrishnan, NP, 1989. *Flora of Tamil Nadu, India, Volume III.* Botanical Survey of India, Southern circle Coimbatore.
- Henry AN, Kumari GR and Chitra V 1987. *Flora of Tamil Nadu, India, Volume II.* Botanical Survey of India.
- Mathew K M, 1981 to 1984. *The flora of Tamil Nadu, Carnatic. Volume I to III.* Rapinet herbarium, St. Joseph's College, Tiruchirapalli.

SEMESTER V			
Core Integral II	**Pharmacognosy**		
Code:18UBOI52	**Hrs/week:4**	**Hrs/semester: 60**	**Credit: 4**

Vision:

- To provide knowledge on significance of medicinal plants and their medicinal potency.

Mission

- To understand the characterization , production and standardization of crude drugs
- To deal with methods for sustainable production of crude drugs and their therapeutic value.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define and identify the more valuable medicinal plants based on their pharmaceutically active compounds	3	Ap
CO-2	formulate medicinal product and apply the knowledge for proper storage and distribution	8	Ap
CO-3	assess and evaluate the purity of herbal medicine.	7	Ev
CO-4	elaborate the cultural practices of important medicinal plants.	6	Re
CO-5	assess the trade opportunities of medicinal plants.	6	Ap
CO-6	define, classify and explain the importance of herbal medicine.	6	Re
CO-7	identify the crude drugs by morphological, organoleptic and histological characters.	6	Un
CO-8	know and expain the important phytoconstituents of therapeutic value.	6	Un

SEMESTER V			
Core Integral II	**Pharmacognosy**		
Code:18UBOI52	**Hrs/week:4**	**Hrs/semester: 60**	**Credit: 4**

Unit I : Definition, scope and applications of herbal medicine. Classification (morphological. therapeutic, chemical. taxonomical and chemotaxonomic classifications) and identification of drugs

Unit II : Drug adulteration. Methods of drug evaluation (morphological, micoroscopic, physical, chemical and biological).

Unit III : Botanical name, family, useful part, chemical constituents, adulterants anduses of the following drug.

Glycosides – Senna, Aloe,
Digitalis, Liquorice Terpenoids
– Coriander, Fennel, Lemon,
CinnamomAlkaloids – Datura,
Opium, Vinca, Pepper
Lipids - Castor, Neem, Sesame oil.

Unit IV Methods of collection, process and storage of medicinal plants; purification of raw drugs; factors causing drug contamination, methods of storage of drugs

Unit V Extraction methods and medicinal uses of *Eucalyptus*, Castor and Lemongrass oil. Conservation of medicinal plants – *in-situ* and *ex-situ* methods

Text book:

Roseline. A. 2011. *Pharmacognosy*, MJP Publishers, Chennai.

Books for Reference

1. Anonymous. 1978. *The Ayurvedic Formulary of India.* Govt. of India, New Delhi
2. Anonymous. 1989. *Formulary of Siddha Medicine.* The Indian Medical Practitioners'Co-operative Pharmacy and Stores Ltd., Chennai
3. Anonymous. 1999. *The Ayurvedic Pharmacopoeia of India. Vol. I (1 & 2).* Ministry ofHealth and Family Welfare, Govt. India, New Delhi.
4. Chauhan, M.G. and A.P.G. Pillai. 2005. Microscopic Profile of Powdered Drugs Used inIndian Systems of Medicine. *Institute of Ayurvedic Medicinal Plant Sciences,* Jamnagar.
5. Daljithsimha, K. 1974. *Unani Dravyaguna Darshana*. Ayurvedic and Tibbi Academy,Lucknow
6. Kumar, N.C. 1993. *An Introduction to Medicinal Botany and Pharmacognosy*. EmkayPublications, Delhi.

7. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. 2004. *A Text book of Pharmacognosy*.Nirali Prakashan, Pune.
8. Murugesh, N. 2002 *A Concise Text Book of Pharmacognosy*. Sathya Publishers, Madurai.

Semester VI			
Core X	**Plant Physiology**		
Code: 18UBOC61	**Hrs/week: 5**	**Hrs/ Semester: 75**	**Credit : 4**

Vision:

- To provide knowledge on orderly metabolic activities in plant to sustain life

Mission:

- To understand the plant functions such as transpiration, photosynthesis and respiration.
- To recognize the intermediary metabolism of plants.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the water relation and root structure and functions that influence the transfer of inorganic nutrients from the soil into the plants	2,3	Un
CO-2	assess the symptom specific nutritional deficiencies and discuss the need of fertilisers for crop improvement	2	An,Ap
CO-3	analyse the mechanism of their assimilation of inorganic molecules into organic molecular components.	3	Un
CO-4	analyse light enhanced photochemical reactions that culminates in the synthesis of ATP and NADPH and fixation of carbon dioxide into organic compounds	3	Un
CO-5	describe respiration with its associated carbon metabolism and releasing of energy stored in chemical bonds in a controlled manner for cellular use	3	Re,Cr
CO-6	investigate plant's functions and adaptations under altered environmental conditions	2	Cr
CO-7	comment on the hormone controlled and light mediated morphogenetic events in plants	2	An
CO-8	design and conduct scientific experiments and analyse the data critically	4,8	Cr

Semester VI			
Core X	**Plant Physiology**		
Code: 18UBOC61	**Hrs/week: 5**	**Hrs/ Semester: 75**	**Credit : 4**

Unit I : **Plant - Water Relations:** Importance of water to plant life. **Physical properties of water:** Imbibition, Diffusion, Osmosis, Plasmolysis and Water potential. **Absorption and transport of water:** active and passive absorption, ascent of sap – path and mechanism (Dixon's cohesion theory). **Transpiration:** types, mechanism of stomatal movement (starch- sugar interconversion theory and proton transport and hormonal regulation theory), factors affecting transpiration, importance of transpiration

Unit II : **Solute relations: Mineral nutrition** – role of essential macro elements in plant nutrition, deficiency and toxicity symptoms. **Translocation of organic solutes:** mechanism of phloem transport, source-sink relationship, factors affecting translocation. **Nitrogen metabolism:** Nitrogen fixation: symbiotic fixation - importance of nitrate reductase and its regulations - ammonia assimilation.

Unit III : **Photosynthesis:** photosynthetic apparatus, pigment systems, red drop and Emerson enhancement effect. **Photochemical reaction:** cyclic and non cyclic photophosphorylation. **CO_2 fixation:** C_3 and C_4 cycles. Factors affecting photosynthesis.

Unit IV : **Respiration:** Respiratory substrates, **types of respiration:** aerobic – glycolysis, Krebs cycle, ETC and oxidative phosphorylation. **Anaerobic respiration:** lactic acid fermentation, alcohol fermentation. Pentose Phosphate Pathway (PPP).Factors affecting respiration.

Unit V : **Growth:** definition, phases of growth- factors affecting growth. **Plant growth regulators:** occurrence, physiological effects and practical applications of auxin, gibberellin and cytokinin. **Physioloy of flowering:**Photoperiodism and vernalization. **Seed dormancy:** causes and methods of seed dormancy, physiology of seed germination.

Text Book:

1. Jain, V.K. 2004. *Fundamentals of Plant Physiology*. S. Chand & Company Ltd. NewDelhi.

Books for Reference:

1. Noggle, G. R. and G. J. Fritz, 2008. *Introductory Plant Physiology*. Prentice Hall of India, Pvt. Ltd., New Delhi.
2. Pandey, K.K. and B.K. Sinha, 2005. *Plant Physiology*. Vikas publications, New Delhi.
3. Salisbury, F.B. and C.W. Ross 2007. *Plant physiology*. Thompson. Asia. Pvt. Ltd. Singapore.

Practical Hrs per Week: 2

- Imbibition by direct weight method
- Determination of water potential by Chardakov's method
- Determination of differential transpiration of leaf surface using cobalt chloride method
- Estimation of magenisum in plant tissue
- Determination of effect of light intensity on photosynthesis
- Rate of photosynthesis in different concentration of bi-carbonate (bubble count method)
- Extraction and separation of chloroplast pigments by ascending paper chromatography
- Demonstration of aerobic respiration by Retort's method
- Demonstration on fermentation
- Determination of growth curve by leaf area method
- Estimation of auxin

Submission: Record note book

Books for Reference: Francis H Witham, David F Blaydes and Robert N Devlin, 1970.
Experiments in Plant Physiology.VanmostrandRainhold Company, New Delhi

SEMESTER VI			
Core XI	**Marine Botany**		
Code:18UBOC62	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Vision:

- To give elaborate account on marine environment and its role in controlling the Earth's climate.

Mission:

- To understand the different types of marine habitats and the adaptation of life there in.
- To understand the role of marine products and their socio economic and environmental significance

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyze how marine organism adapt to their dynamic environment	5	Un
CO-2	understand the marine environment and classify them	7	Un
CO-3	able to signify the characteristic feature of sandy shore and sand dunes and their economic importance	1	An
CO-4	achieve practical skills in processing, preserving and culturing marine plants	6	Ev
CO-5	evaluate the uses of marine resources and realize the role of marine plants in the economy of the ocean	5	Ap
CO-6	able to signify the characteristic feature of coral reefs and their role in biodiversity conservation	1	An
CO-7	able to identify and understand the role of mangroves in coastal protection and their adaptation to its hostile environment	5	Ap
CO-8	explain the ecological relationship between organisms and their environment	2	An

SEMESTER VI			
Core XI	**Marine Botany**		
Code: 18UBOC62	**Hrs/week: 5**	**Hrs/semester: 75**	**Credits: 4**

Unit I : Marine environment- classification, physical and chemical properties of sea water, characteristics and adaptations of pelagic (planktonic), benthic (littoral and deep sea) organisms.

Unit II : Introduction to marine plants - Phytoplankton – sea weeds and sea grasses - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit III : Coastal vegetation – sandy shore and sand dunes - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit IV : Coastal shore vegetation – salt marshes and mangroves - introduction, adaptation, biology, ecology, economic and medicinal significances.

Unit V : Laboratory culture of marine algae, commercial cultivation of seaweeds – general methods – *Gracilaria* and *Porphyra*. Economic importance of marine algae – in food and agriculture. Phycocolloids – agar agar, algin, alginate, carrageenan – commercial production, properties and uses, diatomite, antibiotics and vitamins. Conservation of coastal ecosystem with special reference to coral reef and mangroves.

Text Books:

1. Bilgrami, K.S. and L.C. Saha, 2004. *Textbook of Algae.* CBS publishers & Distributors, New Delhi.
2. Tait, 1978. *Elements of marine ecology*. Butterworth & Co. (Publishers) Ltd. London.

Books for Reference:

1. Boaden P.J.S. and R. Seed 1985. *An Introduction to coastal ecology.* Thomas Press Limited, New Delhi.
2. Chapman, V.J. and Chapman, 1980. *Seaweeds and their uses* – Chapman and Hall, London.
3. Dawes, C.J. 1981. *Marine Botany*. John Wiley & Sons, New york.
4. Lobban, C.S. and M. J. Wynne. 1981. *The biology of Seaweeds*. Blackwell Scientific publications. Oxford, London.
5. Newell and Newell.1977. *Marine Plankton a practical guide.* Hutchinson and Co. Ltd.
6. Sinha, P. C. 1998. *Marine pollution*, Anmol publications Pvt. Ltd. New Delhi.
7. Sverdrup H.U. 1972. *The Oceans* – Modern Asia Edition.
8. Venkataraman, G.S. 1969. *The cultivation of algae*, IARI.

Practical Hrs per week: 2

- Phytoplanktons - Collection and identification
- Culture of micro algae
- Seaweeds- *Ulva, Sargassum, Hypnea* and *Gracilaria*
- Study of sand dune, salt marsh and mangrove vegetation in their natural habitat,
- Submission of photographs and field report for internal evaluation.

Books for Reference:

Murugesan A.G. and Rajakumari 2005. *Environmental Science and Biotechnology andBiotechnology, Theory and Techniques,* MJP Publishers.

Semester VI			
Core XII	**Ecology and Phytogeography**		
Code;18UBOC63	**hrs/week:4**	**Hrs/semester: 60**	**Credit : 4**

Vision:

- To learn about the interconnectedness of life with the environment

Mission:

- To understand the structure and function of ecosystem
- To analyze the different types of vegetation and their distribution pattern.

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	reveal the range of plant diversity in terms of structure, function and their environmental relationships.	5	Un
CO-2	describe the climatic and edaphic factors and ecological succession	5	Un
CO-3	categorize the plants based on adaptation	3	An
CO-4	address the global environment crisis and the strategies applicable for environmental problem mitigation	7	Ev
CO-5	learn the global level environmental summit organized that focused for sustainable future	7	Cr
CO-6	know the importance of remote sensing in finding the current status of global health	7	Cr
CO-7	recognize the causes of environmental problems	7	Un
CO-8	discuss ecological issues and concept	5	Re

Semester VI			
Core XII	**Ecology and Phytogeography**		
Code:18UBOC63	**hrs/week:4**	**Hrs/semester: 60**	**Credit : 4**

Unit I : Introduction. Ecological factors: Climatic factor – light, temperature, wind, precipitation and humidity. Biotic factors – Interaction between plants and animals, interaction between plants growing in a community and interaction between plants and microorganisms. Edaphic factors – soil temperature, soil nutrients and soil organisms.

Unit II : Plant adaptations – morphological, anatomical and physiological adaptations of hydrophytes, xerophytes and halophytes.

Unit III : Plat communities – Characteristic features, methods of analysis- quadrats and transect methods, units of vegetation.

Unit IV : Plant succession - types, causes, processes. Hydrosere and xerosers. Climax and its concepts.

Unit V : Geographical regions of India. Vegetational types of Tamil Nadu. Structure and distribution of evergrren and deciduous forests, mangroves, scrub jungle and grassland, Endemism.

Text Books:

1. Sharma, P.D1999.*Elements of ecology*. Rastogi Publications, Shivaji Road, Meerut.
2. Shukla, R.S. and Chandal, S.S 1991. *Plant Ecology*. S, Chandal and Co. New Delhi

Books for Reference:

1. Asthana and Meera Asthana, 2001. *Environmental problems and solutions*. S.Chand and Co. Ltd., New Delhi.
2. Balasubramanian,D; C.F.a. Bryee, K.Dharmalingam, J.Green and K. Jeyaraman, 2005. *Concepts in Biotechnology*. Universities Press.
3. Dash, M.C.2001.*Fundamentals of ecology*. Tata McGraw Hill publishing Co. Ltd., New Delhi.
4. Murugesan, A.G.and Rajakumari , 2005. *Environmental Science and Biotechnology, theory and Techniques.* M.J.P. Publishers, chennai.
5. Trivedi P.R, P.L Sharma and KN Sundarshan 1994. *Natural environment and Constitution of India,* Efficient offset printers, New Delhi.
6. Tyller Miller G., 2004. *Environment Science* Thompson Brooks/Cole. Singapore.
7. Varshney C.K 1989. *Water pollution and management*, S.P. Printers, Noida.

Practical Hrs per week: 2

- Determination of soil pH (at least 3 types of soil)
- Determination of soil texture.
- Determination of soil moisture.
- Determination of soil bulk density.
- Determination of soil porosity.
- Determination of soil organic matter content.
- Estimation of dissolved O_2 in water samples.
- Estimation of BOD in water samples.
- Estimation of COD in water samples.
- Adaptation of plants- hydrophytes, xerophytes and halophytes,

Submission - Record Note Book

Books for Reference : Murugesan A.G. and Rajakumari 2005.Environmental Science andBiotechnology and Biotechnology, Theory and Techniques, MJP Publishers

SEMESTER- III			
Part III	**Core V**	**Physical Chemistry- I**	
Code :15UCHC31	**Hrs./Week:4**	**Hrs/ Sem 60**	**Credits:4**

OBJECTIVES:

- To have an overall knowledge about different states of matter
- To understand the importance of colloids and application.
- To correlate the colligative properties with the molecular weight
- To understand the phase rule and distribution law.

UNIT I GASEOUS STATE

Kinetic theory of gases-justification of postulates-statement of Charle's law, Boyle's law, Avogadro's law, ideal gas equation-Dalton's law of partial pressure- Maxwell's law of distribution of velocities (derivation)–Types of molecular velocities-root mean square velocity-average velocity- most probable velocity-relation between them-–graphical representation and its significance. Collision diameter – collision number – collision frequency – mean free path – viscosity of gases-calculation of mean free path and collision diameter from Chapman equation-Law of equipartition energy -degrees of freedom –molecular basis of heat capacities.

UNIT II SOLID STATE

Crystalline and amorphous solids. Concept of space lattice and unit cell-the seven crystal systems and Bravais lattices.Cube-simple cubic-face centered cubic –body centered cubic lattices-types of packing – hexagonal close packing-cubic close packing – types of voids – tetrahedral and octahedral site. Determination of structure of crystals by rotating crystal method and powder method. Internal structural analysis of NaCl and KCl. Lattice energy of ionic crystal - Born-Haber cycle -calculation of lattice energy. Crystal defects-Frenkel, Schottky –. Crystal growth – from Melt (Czochralski method) from solution (Hydro-thermal method) and gel method.

UNIT III COLLOIDS

Classification of Colloids –comparison of lyophilic and lyophobic colloids.Preparation of sols-Dispersion method(Bredig's Arc method) –Aggregation method(oxidation , reduction,

double decomposition)-Properties – Optical(Tyndall effect) – kinetic(Brownian movement) Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze law- Hoff meister series – protective colloids – gold number – Gels – classification, preparation , properties(imbibition,synerisis and thixotropy). Emulsion – types and their distinction. Emulsifiers – surfactants. Donnan membrane equilibrium – applications of colloids-food, medicine, thixotropic paints, clarification of municipal water, formation of delta.

UNIT IV COLLIGATIVE PROPERTIES

Colligative Properties **-**definition- lowering of vapour pressure- its determination (Ostwald and Walker's Dynamic method). Raoult's Law – statement and derivation - elevation of boiling point and its determination.(Landsberger's method). Depression of freezing point and its determination. (Beckmann's method). Osmotic pressure and its determination (Berkely and Hartley's method). Osmotic pressure and vapour pressure lowering- laws of osmotic pressure. Isotonic solutions.Relation between colligative properties and molar mass of the solute – Van't Hoff factor –determination of degree of dissociation and degree of association-simple problems.

UNIT V PHASE RULE

Mathematical statement – definition of terms used – thermodynamic derivation – application of phase rule to one component system – water, CO_2, sulphur – two component systems – condensed system and reduced phase rule – simple eutectic – Ag-Pb system – Pattinson's process of desilverisation of lead. Freezing mixture -definition– principle of formation of freezing mixture using KI-H_2O system.

Systems forming compounds with congruent (Zn – Mg) and incongruent melting points (sodium sulphate – water).

Solid – Vapour equilibria – $CuSO_4.H_2O$ system – explanation of deliquescence and efflorescence on the basis of vapour pressure.

BOOKS FOR REFERENCE

1. B.R.Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Company Ltd., New Delhi, 2008.

3. Sadhan Kr.Dutta Principles of Physical pharmacy and Biophysical Chemistry , Books and Allied(P) Ltd.Kolkata , 2007 .
4. Text book of Physical chemistry (A modern approach) incorporating SI units, P.L. Soni, O.P. Dharmaha, Sultan chand & sons publishers, Revised edition, 2010.

SEMESTER IV			
Part III	**Core VI**		**Organic Chemistry II**
Code :15UCHC41	**Hrs./Week:4**	**Hrs/ Sem :60**	**Credits:4**

OBJECTIVES:

- To acquire knowledge about the conformational analysis
- To study the mechanism and importance of molecular rearrangement.
- To appreciate the structure and reactions of carbohydrates
- To know the importance of organometallic compounds in synthesis
- To know the applications of dyes .

UNIT I ALICYCLIC COMPOUNDS AND CONFORMATIONAL ANALYSIS

General methods of preparation– spectroscopic properties- general chemical characteristics-relative stability of cycloalkanes – Baeyer's strain theory – Sachse Mohr theory - coulson and moffit's concept– Conformational analysis –cyclohexane-monosubstituted cyclohexanes- synthesis of civetone and muscone

UNIT II TAUTOMERISM AND MOLECULAR REARRANGEMENT

Resonance – definition – resonance energy – resonance theory.

Tautomerism **–** Definition – Types of tautomerism – Keto **-** enol, Nitro **-** acinitro, Lactam **-** lactim, p**-**Nitrosophenol **-** Quinone monoxime and amido **-** imido tautomerism.

Molecular Rearrangement **–** Mechanism of the following rearrangements Pinacol **-** pinacolone rearrangement, Lossen rearrangement, Curtius rearrangement, Fries rearrangement, Benzidine rearrangement and Benzil **-** benzilic acid rearrangement .

UNIT III CARBOHYDRATES

Introduction and classification – laboratory and industrial preparation of glucose and fructose – reactions of glucose and fructose – structure of glucose and fructose – open chain and ring structure – epimerisation – mutarotation – interconversion of glucose and fructose and vice versa – ascending and descending the series – (Kiliyani & Wohl's synthesis). Manufacture of sucrose – Structure of maltose, lactose and sucrose (elucidation not included) – Starch and cellulose – reactions –uses – differences between starch and cellulose.

UNIT IV ORGANOMETALLIC COMPOUNDS AND REAGENTS OF SYNTHETIC IMPORTANCE

Organometallic Compounds – definition – examples. Organomagnesium compound (Grignard reagents) – preparation, general characteristics and synthetic applications – organo zinc compounds (diethyl zinc–Frankland reagent) – general characteristics and synthetic applications. Organo lead compounds (tetraethyl lead) -preparation and synthetic applications.

Synthetic applications of the following reagents in organic synthesis – Aluminium isopropoxide, N-Bromo succinimide (NBS), Lithium Aluminium hydride, Periodic acid, Sodamide and Selenium dioxide.

UNIT V REACTIVE METHYLENE COMPOUNDS AND DYES

Reactive methylene compounds – preparation, synthetic applications and structure of acetoacetic ester and malonic ester.

Dyes – Theories of colour and constitution- Witt's chromophore –auxochrome theory, resonance theory and valence bond theory – requirements of a dye – classification of dyes based on chemical structure and based on method of application. Preparation and uses of nito dye- picric acid -azo dyes- Bismarck brown - triphenyl methane dye – malachite green- xanthenes dye- fluorescein -indigoid dyes – indigo-anthroquinone dye- alizarin

BOOKS FOR REFERENCE

1. Arun Bahl and B.S.Bahl,Advanced Organic chemistry,S.Chand and Company Ltd., Reprint 2005.
2. K.S.Tewari,N.K.Vishnoi,S.N.Mehrotra. A Text Book of Organic Chemistry, 2nd Revised Editions, 1998.
3. C. D. George P.M.Thomas and C. D.Joseph, Physical and theoretical chemistry.
4. N.Tewari, Advance Organic Reaction mechanism Books and allied (P) Ltd. Kolkata 700010 India Second revised edition 2005
5. M. K. Jain and S. C. Sharma, Modern Organic Chemistry, Vishal Publishing Company, 2008.

SEMESTER V			
Part III	**Core VII**		**Organic Chemistry III**
Code :15UCHC51	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 5**

OBJECTIVES:

- To know the concept of chirality and stereoisomerism..
- To understand aromatic substitution.
- To study specific name reactions.
- To have an idea on green chemistry.

UNIT I STEREOISOMERISM

Stereoisomerism-Optical activity of compound with one and two chiral centres – Elements of symmetry – plane of symmetry, axis of symmetry and centre of symmetry. Enantiomers and diastereo isomers (d,l and meso forms) with examples- asymmetric and dissymmetric molecules. Cahn Ingold Prelog coversion DL and RS configuration- notations for compounds containing one and two asymmetric C-atoms- racemisation and methods of resolution of racemic mixture- Walden inversion – Stereochemistry of diphenyl compounds, allenes and spiranes with examples — Geometrical isomerism (Maleic and Fumaric acid)– definition – cis – trans and syn – anti concept E-Z notation. determination of configuration- method of cyclisation- conversion of a compound into known configuration.

UNIT II AROMATICITY AND AROMATIC SUBSTITUTION:

The concept of aromaticity- Aromatic, antiaromatic and non-aromatic compounds– Huckel's rule for aromaticity – mechanism of electrophilic aromatic monosubstitution (nitration, halogenations, sulphonation, Friedel Craft's alkylation, acylation) – disubstituion. Orientation – Korner's absolute method of orientation – directive influence of substitution: o- , p- and m- directing – activating and deactivating influence of substituents – electronic interpretation – nucleophilic substitution – unimolecular and bimolecular reactions – elimination – addition mechanism (Benzyne mechanism)

UNIT-III HYDROXY AND NITROGEN COMPOUNDS

Hydroxy compounds- Acidic characters of phenol – effect of substituents on acidity of phenols – mechanism of Kolbe's reaction, Gattermann reaction, Riemer Tiemann reaction, Houben Hoesch reaction. Oxidation and reductions of phenols.

Nitro compounds – preparation of o-, and p-dinitrobenzene, trinitrobenzene (TNB), m-nitrotoluene, trinitrotoluene (TNT) amines – effect of substituents (-NH_2, -CH_3,- NO_2 ,-SO_3H, -COOH and -X,) on the basicity of aromatic amines. Preparation and properties of o-, p- and m-phenylene diamines. Diphenyl amines and triphenyl amines. Diazonium compounds – preparation of benzene diazonium chloride and its synthetic applications.

UNIT IV AROMATIC CARBONYL COMPOUNDS AND CARBOXYLIC ACIDS

Carbonyl compounds-Mechanism of the following reactions- Claissen condensation – Reformatsky reaction – Benzoin condensation – Perkin reaction – Knoevenagel condensation – Wittig reaction – Willgerodt reaction – haloform reaction. Carboxylic Acid –Preparation of salicyclic acid, Phthalic acid, terephthalic acid, cinnamic and anthranilic acids.

UNIT V GREEN CHEMISTRY

Introduction – need for green chemistry – twelve principles of green chemistry – green chemistry in day-to-day life – dry cleaning, versatile bleaching agent – atom economy – green solvents – supercritical fluid CO_2, ionic liquids and water

Microwave assisted organic synthesis – introduction – microwave assisted reactions in water – Hofmann elimination and hydrolysis of benzyl chloride – microwave assisted reactions in organic solvents – esterification and Fries rearrangement – microwave assisted reactions in solid state – deacylation, oxidation of alcohols using clayfen.

BOOKS FOR REFERENCE :

1. Bhupinder Mehta, Manju Mehta, Organic chemistry, PHI Learning pvt. Ltd., 2005.
2. Arun Bahl and B. S. Bahl Advanced Organic chemistry, S. Chand and Company Ltd., Reprint 2005.

3. K.S. Tewari, N.K. Vishnoi, S.N. Mehrotra. A Text Book of Organic Chemistry, 2nd Revised Editions, 1998
4. Rashmi Sanghi, Green Chemistry Environmental Friendly Alternatives Editors M.M.Srivatsava Narosa Publishing House, Reprint 2008.
5. V. Kumar, An introduction to green chemistry, Vishal Publishing Company, Jabudhar Delhi Edition, May 2007.
6. I.L.Finar Organic chemistry, The Fundamental Principles, Volume I, 6th edition, 1973.
7. N.Tewari Advance Organic Reaction mechanism Books and allied (P) Ltd. Kolkata 700010 India Second revised edition 2005.
8. M.K.Jain and S.C.Sharma Modern organic chemistry, Vishal publishing co.,2012 4th edition

SEMESTER V			
Part III	**Core VIII**	**Physical Chemistry II**	
Code :15UCHC52	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 5**

OBJECTIVES:

- To study the various thermodynamic parameters and its applications in different physical states of the systems.
- To understand the kinetics of the reaction and to determine the reaction mechanism.
- To know the concepts of photochemical reactions.
- To understand the importance of nanochemistry

UNIT I THERMODYNAMICS I

Terminology – thermodynamic equilibrium – types of thermodynamics system – thermodynamic processes – (Isothermal, adiabatic, isobaric, isochoric) – definition and example – sign conventions – first law of thermodynamics – enthalpy of a system – relation between ΔH and ΔE – molar heat capacities – definition – molar heat capacity at constant volume – molar heat capacity at constant pressure – relation between C_p and C_v. Joule Thomson effect – Joule Thomson coefficient – inversion temperature.

UNIT II THERMODYNAMICS II

Limitations of first law of thermodynamics – second law of thermodynamics – different statements – concept of entropy – entropy changes in isothermal expansion of an ideal gas – entropy changes in reversible and irreversible processes – work function and free energy function – variation of free energy with temperature and pressure – Gibbs Helmholtz equation– derivation and significance – partial molar properties – chemical potential – Gibb's Duhem equation – derivation and significance.

UNIT III THERMODYNAMICS III

Claussius-Claypeyron equation – application in ice skating – derivation (integral and differential forms) and significances – derivation of Van't Hoff isotherm and isochore. Concept of fugacity– fugacity of a gas in a gaseous mixture –physical significance of fugacity. Nernst heat theorem – third law of thermodynamics – statement – determination of absolute entropy of solids, liquids and gases – experimental verification of the third law of thermodynamics –

entropy change in chemical reactions – derivation of the Boltzmann entropy equation – residual entropy – zeroth law

UNIT IV CHEMICAL KINETICS

Reaction rate – measurement (graphical method)-units of rates – order and molecularity of a reaction. Differential and integrated forms of rate expressions for first, second and zero order reactions (derivation required) – examples. Time for half change for first and second order reactions. Pseudo unimolecular reactions – experimental determination of rate constant of inversion of cane sugar and alkaline hydrolysis of ester. Determination of order of the reactions (integrated rate equation method, differential method,dilution method- graphical method,Van't Hoff dilution method and half life method).

Temperature dependence of reaction rate – Arrhenius equation – activation energy – and its significance – collision theory and derivation of rate constant of a bimolecular reaction– limitations of collision theory – Lindemann's theory of unimolecular reactions – absolute reaction rate theory – comparison of collision theory and absolute reaction rate theory

UNIT V NANOCHEMISTRY

Nano particles – definition – size relationship – nanoparticles of metals, semiconductors and oxides – synthesis of nano sized compounds(Bottom up and Top down Approach) – reduction methods, sol-gel method and chemical vapour deposition method – nanoclusters – nanorod – nano wire and uses. Carbon nanotubes – single walled nanotube- multiwalled nanotube – nano horns – Fullerite – torus – properties – (strength, kinetic and electrical) – inorganic nanotube (boron nitride) – and its uses. Application of nanochemistry in various fields.

BOOKS FOR REFERENCE

1. Keith J. Laidler, Chemical Kinetics, 3rd edition, Harper International Ltd., New Delhi
2. B.S. Bahl, Arun Bahl & G.D. Tuli, Essential of Physical Chemistry,S.Chand & company
3. Samuel Glasstone, Thermodynamics for chemists, Afflliated East-West Press (P)Ltd, New Delhi.
4. Rajaram and Kuriacose, Thermodynamics for students of chemistry.
5. Patrick Solomon, A Hand Book of Nanochemistry, Dominant publishers and distributor New Delhi, 1st Edition, 2008.

SEMESTER VI			
Part III		**Core IX**	**Inorganic Chemistry II**
Code :15UCHC61	**Hrs/Week : 6**	**Hrs/ Sem : 90**	**Credits : 5**

OBJECTIVE:

- To provide knowledge about zero, s, p, d and f block elements

UNIT I ZERO GROUP ELEMENTS

Position of zero group in the periodic table – Ramsay- Rayleigh's method – Fisher-Ringe's method – separation of noble gases from liquid air –compounds of xenon – preparation, properties and structure (valence bond approach) of XeF_2, XeF_4, XeF_6, XeO_2F_2, XeO_3, XeO_4, $XeOF_4$, clathrates- type of clathrates –preparation, stability and structure of clathrates. Wrap around complexes (supra molecules).

UNIT II s and p- BLOCK ELEMENTS

General characteristics of alkali and alkalaine group elements – diagonal relationship of lithium with magnesium — extraction of lithium and beryllium. Sodium carbonate and sodium bicarbonate – manufacture – properties and uses – Preparation and uses of basic beryllium acetate, epsum salt, gypsum, plaster of Paris and lithopone.

Boron – preparation, structures and uses of diborane. Halogens – manufacture of fluorine – preparation and structure of interhalogen compounds.

UNIT III d- BLOCK ELEMENTS I

General characteristics of d-block elements – comparative study of Ti,Zr,Hf-extraction,properties and uses of titanium-preparation and uses of titaniumdioxide and titanium tetrachloride. Comparative study of V, Nb, Ta – extraction, properties and uses of vanadium – polyvalency of vanadium. Comparative study of Cr, Mo, W – polyvalency of chromium-extraction, properties and uses of molybdynum and tungsten.

UNIT IV d- BLOCK ELEMENTS II

Group discussion of Fe, Co, Ni.(similarities and dissimilarities)

Iron - Preparation and uses of Ferric chloride, Potassium ferro and ferricyanides

Cobalt - Extraction, properties and uses – Preparation and uses of sodium cobaltinitrite

Platinum - Extraction, properties and uses. Platinum sponge, platinum black, platinized asbestos and colloidal platinum, potassium chloroplatinate.

Group discussion of Zn, Cd, Hg .(similarities and gradation in properties of the elements and compounds)

Group discussion of of Cu, Ag, Au .(similarities and gradation in properties of the elements and compounds)

.UNIT V f- BLOCK ELEMENTS

General characteristics of lanthanides – separation of lanthanides – precipitation –thermal reaction – fractional crystallization – complex formation – solvent extraction – valency change method – ion exchange method. Extraction of a mixture of lanthanides from monazite sand – applications of lanthanides and their compounds – lanthanide contraction – causes and consequences. General characteristics of actinides – comparison between lanthanides and actinides- extraction of Th and U. Preparation and uses of UF_6 and uranyl acetate.

BOOKS FOR REFERENCE

1. B.R.Puri,L.R.Sharma,K.C.Kalia,Principlesof InorganicChemistry,Milestone publishers and distributers, Delhi.
2. R.D.Madan Modern Inorganic Chemistry, S.Chand & Co. Ltd.
3. Gurdeep Raja, Advanced inorganic Chemistry, Goel Publishing house1986.
4. Sathya Prakash and R.D. Madan, Advance Inorganic Chemistry 2005, Chand and Co.

SEMESTER VI			
Part III	**Core X**		**Organic Chemistry IV**
Code :15UCHC62	**Hrs/Week : 6**	**Hrs/ Sem : 90**	**Credits : 5**

OBJECTIVES:

- To understand the important applications of photochemistry in organic compounds
- To know the importance of heterocyclic compounds, alkaloids and terpenes.
- To know and study the spectral applications in organic compounds.

UNIT I ORGANIC PHOTOCHEMISTRY

Introduction – Photochemical vs thermal reactions – singlet and triplet states – allowed and forbidden transitions – Jablonski diagram – photosensitization – photochemical reaction – elimination reaction – Norrish type I and Type II – photolysis of cyclic ketone – photolysis of aldehyde – photolysis of compounds containing Nitrogen – Barton reaction – photocycloaddition– Paterno-Buchi reaction – photo induced reaction of α,β-unsaturated ketone.

UNIT II POLY NUCLEAR HYDROCARBONS

Isolated Systems – Preparation of diphenyl, triphenylmethane and 1,2-diphenyl ethane.

Condensed systems – Synthesis, reactions and structure of naphthalene and anthracene.

Phenanthrene – synthesis and structure of phenanthrene. Derivatives of naphthalene and anthracene – Naphthols - Naphthyl amines, Naphtha quinones, Anthraquinone. Alizarin - structural elucidation of alizarin.

UNIT III HETEROCYCLIC COMPOUNDS

Introduction **–** preparation and reactions of furan, pyrrole and thiophene. Aromatic character and basic nature – comparative reactivity. Preparation and reactions of pyridine – preparation and reactions of quinoline, isoquinoline and indole. Structural elucidation of pyridine, quinoline and isoquinoline.

UNIT IV - ALKALOIDS AND TERPENOIDS

Alkaloids – definition – classification – occurrence – extraction – general characteristics. General methods of identification –functional nature of oxygen, nitrogen. Oxidation, Hofmann's exhaustive methylation – structure and synthesis of coniine, piperine and nicotine

Terpenoids – introduction – classification – isolation of terpenoids – isoprene rule – general properties of terpenoids. General procedure for determining structure of terpenoids – synthesis and structure of geraniol, Citral, dipentene and menthol.

UNIT V ORGANIC SPECTROSCOPY

UV Spectroscopy – Chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic and hypochrmic effect – instrumentation- types of electronic transitions – forbidden and allowed transitions. Woodward-Fieser rule for calculation of absorption maxima of dienes and α, β unsaturated ketones .

IR Spectroscopy – number of fundamental vibrations. Finger print region, characteristics of IR absorption frequencies, intermolecular and intramolecular hydrogen bonding.

NMR Spectroscopy – introduction – number of signals – internal standard(TMS) – chemical shift – factors influencing chemical shift – splitting of the signals, spin-spin coupling, coupling constant. NMR spectrum of ethanol, benzyl alcohol, propionic acid, anisole, benzaldehyde, 2,3-dibromopropene, ethyl methyl ketone and mesitylene. C^{13} NMR -Applications of NMR spectroscopy.

BOOKS FOR REFERENCE

1. I.L Finar Organic Chemistry Volume II, Stereochemistry and the Chemistry of Natural Products Edition V Reprint 1986.
2. Y.R. Sharma, Elementary Organic Absorption spectroscopy –S.Chand & company Ltd, New Delhi 1998.
3. P.R. Singh & S. K. Dikshit, Molecular Spectroscopy, S. Chnad & Co., New Delhi, 1976.
4. Jerry March Advanced organic chemistry Wiley-Interscience Publication
5. Arun Bahl and B. S. Bahl Advanced Organic chemistry, S. Chand and Company Ltd., Reprint 2005.
6. K.S. Tewari, N.K. Vishnoi, S.N. Mehrotra. A Text Book of Organic Chemistry, Vikas publishing house (P) Ltd.2002.

SEMESTER VI			
Part III	**Core XI**	**Physical Chemistry III**	
Code :15UCHC63	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 4**

OBJECTIVES

- To apply the concept of group theory to various molecules.
- To study the importance of electrochemistry and its applications.
- To apply phase rule to different physical states of system.
- To get an idea about the principle behind sonochemical reactions.

UNIT I GROUP THEORY

Symmetry elements – explanation with examples – centre of symmetry, axis of symmetry and plane of symmetry. Symmetry operations – identity – inversion – rotation about an axis – order of symmetry. Reflection – types of planes – improper rotation. Point groups – classification – symmetry elements and point groups assigned to the following molecules – water, ammonia, methane and borontrifluoride. Group postulates and types of groups – finite and infinite – sub group – abelian and non-abelian groups – cyclic groups – order of a group – construction of multiplication table – general principle – multiplication table for C_{2V}.

UNIT II ELECTROCHEMISTRY - I

An elementary treatment of Debye-Huckel theory of strong electrolytes – significance of Debye-Huckel Onsagar equation (Derivation not required) – transport number – determination by Hittorff's and moving boundary methods – abnormal transport numbers – absolute velocity of an ion and its determination – Kohlrausch's law and its applications – mobilities of hydrogen and hydroxyl ions .Hydrolysis – expression for hydrolysis constant and degree of hydrolysis for salts of different types – salts of strong acid-strong base, strong acid-weak base, weak acid-strong base and weak acid-weak base. Calculation of pH of salt solutions (due to hydrolysis). Buffers – types – (acid buffer, basic buffer and neutral buffer) buffer action – Henderson-Hasselbalch equation-significance.

UNIT III ELECTROCHEMISTRY - II

Reversible cells – cell representation, cell reaction, single electrode potential – standard electrode potential. Types of electrodes – metal-metal ion – gas electrode – metal-insoluble metal salt electrode, membrane and redox electrodes.

EMF – definition – determination of EMF of a cell – electrochemical series and significance – thermodynamics of reversible / irreversible electrodes – electrical energy in galvanic cell – free energy of cell reaction. Relation between EMF and ΔG of the cell reaction– determination of ΔH, ΔG, ΔS of the cell reaction. Relation between EMF and equilibrium constant. Effect of concentration of electrolyte on cell potential – Nernst equation – derivation and applications. Concentration cells – electrode concentration cells – electrolyte concentration cells with and without transference.Applications of EMF – solubility product, pH (Using hydrogen, glass and quinhydrone electrodes)

UNIT IV CHEMICAL REACTIONS UNDER LIGHT AND SOUND

Photochemistry – Beer-Lambert law(derivation)– photochemical rate law – Grotthus – Draper law, Stark – Einsteins law of photochemical equivalence – quantum yield – validity of Einstein's law – reason for low and high quantum yield – determination of quantum yield using actinometer – flash photolysis.. Kinetics of decomposition of HI – combination of H_2 and Cl_2 reaction. Photophysical processes – explanation of fluorescence and phosphorescence using Jablonski diagrams. Luminescence – chemiluminescence – thermoluminescence – bioluminescence. **Sonochemistry –** Definition , principle-cavitation-sonoluminescence and applications.

UNIT V SOLUTION

Liquids in liquids –completely miscible liquids- distillation of homogenous binary liquid mixtures -Theory of fractional distillation –Azeotropic distillation.

Partially miscible liquids – Phenol-water, Triethylamine-water and Nicotine-water systems – Variation of solubility with temperature – vapour pressure of partially miscible liquids-critical solution(consolute) temperature-upper, lower,upper and lower - influence of impurity on CST and applications.

Immiscible liquid systems- vapour pressure of mixtures of immiscible liquids- theory of steam distillation and its applications.

Nernst distribution law – statement–conditions - thermodynamic derivation –-deviations from the law(molecular association and dissociation) -— applications-distribution indicators- study of complex ions-solvent extraction

BOOKS FOR REFERENCE

1. P.K. Bhattacharya, Group Theory and its Chemical Applications, Himalaya Publishing House, Mumbai, 1988.
2. K.V. Raman, Group Theory and its Application to Chemistry, Tata McGraw, Hill Publishing Company Ltd., New Delhi.
3. Samuel Glasstone, An introduction to electrochemistry, Thermodynamics for chemists, Affliated East-West Press (P)Ltd, New Delhi.
4. B.S. Bahl, Arun Bahl & G.D.Tuli, Essential of Physical Chemistry, S. Chand & Co.
5. Puri, Sharma and Pathania, Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co.
6. Timothy J. Mason Advances in Sonochemistry , Volume 5; JAI press INC, 5th Edition, 1999.
7. Margulis ,Sonochemistry and Cavitation,Gordon and Breach publishers,1993.

SEMESTER III & IV			
Core Practical II Inorganic Qualitative Analysis			
Code :15UCHCR2	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 1**

Systematic qualitative analysis of a mixture containing two anions and two cations. One of the anions should be an interfering radical which should be eliminated. The two cations should be of different groups.

Principles of flame testing – concept of solubility and solubility product – concept of pH and Buffer action – common ion effect - theory of testing anions (Simple and interfering) – Principle of grouping of cations –Theory of testing cations.

The combination of mixture containing two halides,(sulphates along with lead, barium, strontium and calcium),(oxalate and carbonate), &(one oxidizing and one reducing group), should be avoided.

Anions:

(i) Carbonate (ii) Sulphide (iii) Sulphate (iv) Chloride (v) Bromide (vi) Iodide.
(vii) Nitrate (viii) Borate (ix) Oxalate (x) Fluoride (xi) Chromate (xii) Phosphate

Cations :

(i) Lead (ii) Copper (iii) Bismuth (iv) Cadmium (v)Antimony (vi) Nickel (vii) Manganese
(ix) Zinc (x) Barium (xi) Strontium (xii) Calcium (xiii) Magnesium (xiv) Ammonium.

BOOKS FOR REFERENCE

1. J. N. Gurtu and R. Kapoor, Advanced Experimental Chemistry Volume II, S.Chand & Company Ltd.
2. A.O. Thomas, Practical Chemistry for B. Sc. Main students, Scientific book centre, Cannanore.

SEMESTER V	
Major Practical III Gravimetry And Inorganic Preparation	
Code : 15UCHCR3	**Credits : 3**

OBJECTIVE:

- To enable the student to get analytical skills and help them to plan and execute experimental projects.

a) Gravimetric Analysis

1. Estimation of Lead as Lead Chromate.
2. Estimation of Barium as Barium Chromate
3. Estimation of Zinc as Zinc Oxinate
4. Estimation of copper as copper (I) thiocyanate
5. Estimation of calcium as calcium oxalate.

b) Inorganic Preparations

1. Preparation of Potash alum
2. Preparation of Hexamminenickel(II)chloride
3. Preparation of Tetramminecopper(II)sulphate
4. Preparation of Prussian blue.
5. Preparation of Potassiumtrioxalatochromate (III) trihydrate
6. Preparation of Potassiumtrisoxalatoferrate(III)
7. Preparation of Tristhioureacopper(I) sulphate

Course work

1. Estimation of Nickel as Nickel – DMG complex
2. Determination of physical constant(melting point/boiling point)

BOOKS FOR REFERENCE

1.Advanced Practical Chemistry - Raghupati Mukhopadhyay, Pratul Chatterjee Books and Allied (P) Ltd. Third Edition-2007

2.Vogel's text book of quantitative chemical analysis.7th edition,ELBS/Longman England,1994.

3.Arthur I.Vogel, A text book of quantitative inorganic analysis including elementary instrumental analysis,Longman Group Ltd.ELBS edition,1975

SEMESTER VI			
Major Practical IV Organic Analysis And Organic Preparations			
Code : 15UCHCR4	**Hrs/Week : 3**	**Hrs/ Sem : 45**	**Credits : 3**

OBJECTIVE:

- To enable the students to develop analytical skill in organic qualitative and quantitative analysis and to develop skill in preparing organic compounds.

1. Organic Analysis:

Analysis of simple organic compounds

a) Nature of the compound- Aromatic / Aliphatic

b) Test for saturation/ unsaturation.

c) Detection of element present/ absent

d) Characterization of functional groups (Acids, amide, amines, phenol, aldehyde, ketone, anilide, ester, carbohydrates , nitro compounds), Confirmation by preparation of a solid derivative.

2. Preparation of Organic compounds involving the following chemical conversions

1.Oxidation 2. Hydrolysis 3. Nitration 4. Bromination

5**.** Diazotization 6.Benzoylation 7.Osazone formation

3.Course work

Organic Estimation and separation

i) Estimation of Phenol/Aniline

ii) Determination of physical constants

BOOKS FOR REFERENCE

1. Raghupati Mukhopadhyay, Pratul Chatterjee ,Advanced Practical Chemistry - Books and Allied (P) Ltd. Third Edition-2007

2. J.N. Gurtu and R. Kapoor, Advanced experimental chemistry, S.Chand and Co., 1987.

3.Arthur I.Vogel,A text book of practical organic chemistry including qualitative analysis,Longman Group Ltd.ELBS edition,1975

4.N.S.Gnanapragasam,G.Ramamoorthy,Organic Chemistry Lab Manual,S.Viswanathan printers and publishers Pvt. Ltd.2007.

SEMESTER VI			
Major Practical V	**Physical Chemistry Experiments**		
Code : 15UCHCR5	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 6**

OBJECTIVE:

- To enable the student to get analytical skills and help them to plan and execute experimental projects.

LIST OF EXPERIMENTS:

1. Critical solution temperature of phenol water system and effect of impurities on CST.
2. Transition Temperature of a salt hydrate – determination of molecular weight
3. Kinetics of Ester Hydrolysis
4. Conductometric Acid base Titration
5. Conductometric precipitation Titration
6. Potentiometric Redox Titration
7. Molecular weight determination by Rast Method
8. Phase Diagram – Simple eutectic
9. Phase Diagram – Compound formation
10. Heat of solution by solubility method ($K_2Cr_2O_7$/ oxalic acid)
11. Adsorption kinetics of oxalic acids/acetic acid on charcoal. Determination of concentration of the given acid.

BOOKS FOR REFERENCE

1. J.N. Gurtu and R. Kapoor, Advanced experimental chemistry, S.Chand and Co., 1987.
2. Dr. S. Sundaram, Dr.Krishnan and Dr. P.S.Raghavan, S.Viswanathan, Practical chemistry, (Printers & Publishers), Pvt. Ltd., 2007
3. R.Mukhopadhyay P.Chatterjee Advanced practical chemistry, Books and allied (p)Ltd. Kolkata,Third Edition 2007.

SEMESTER V			
Part III	**Core Elective I**	**Co-ordination and Bio-Inorganic Chemistry**	
Code :15UCHE51	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits: 4**

OBJECTIVES:

- To study the formation and bonding in coordination compounds
- To study the reaction mechanism in complexes
- To know the importance of metals in biological systems and the application of metal chelates in various fields.

UNIT I CO-ORDINATION COMPOUNDS I

Co-ordination compounds –definition –addition (or) molecular compounds double salts-complex salts. Terminology – complex ions (central metal ion) coordination number- ligands - types of ligands (monodentate– bidentate- polydentate- bridging ligands) – oxidation number, co-ordination sphere, effective atomic number (EAN). Nomenclature of coordination compounds – isomerism in co-ordination compound – structural and stereo isomerism. Hydrate isomerism – ligand isomerism – linkage isomerism – coordination isomerism – coordination position isomerism – polymerisation isomerism.

UNIT II CO-ORDINATION COMPOUNDS II

Valence bond theory (Pauling's theory) – salient features of valence bond theory. Valence Bond theory as applied to octahedral complexes (inner and outer orbital complexes) – square planar and tetrahedral complexes. Limitation of valence bond theory – crystal field theory –postulates of Crystal field theory- CF splitting in tetrahedral, square planar and octahedral complexes. Strong and weak field ligands,Crystal field stabilization energy (CFSE) – factors influencing the magnitude of CF splitting — applications of crystal field theory - magnetic properties, colour of transition metal complexes – Jahn Teller theorem,
Consequences of Jahn- Teller distortion.

UNIT III REACTION MECHANISM IN CO-ORDINATION COMPOUNDS

Stability of complexes in solution – thermodynamic stability-factors influencing the stability of complexes-kinetic stability – factors influencing the liability of complexes –stabilisation of

unusual oxitation states by complexation. – substitution reaction in octahedral complexes – dissociative(S_N2), associative(S_N1) mechanism. Substitution reactions in octahedral complexes (acid and base hydrolysis) and substitution reactions in square planar complexes. Trans effect- pi bonding theory of trans effect – uses of trans effect .

UNIT IV METAL CARBONYLS

Definition – low oxidation state of metal ion in metal carbonyls – classification of carbonyls- based on the number of metal atoms present in carbonyl- based on the structure of carbonyls -General methods of preparation, properties of transition metal carbonyls.Nature of M-CO bonding in metal carbonyls.Evidences for back bonding. Structure of carbonyls on the basis of VB theory. Structure and bonding in metal carbonyls of mono, bi nuclear and poly nuclear carbonyls of Ni,V,Cr,Fe,Co and Mn [$(Ni(CO)_4.)$ $V(CO)_6$, $Fe(CO)_5$, $Cr(CO)_6$, $Co_2(CO)_8$, $Fe_2(CO)_9$, $Mn_2(CO)_{10}$, and $Fe_3(CO)_{12}$] .

UNIT V BIO-INORGANIC CHEMISTRY

Role of metal ion in living systems (excess and deficiency of trace metals) – metallo-proteins, metallo-enzymes – characteristics of metallo-enzymes – characteristics of metal activated enzymes – functions of metal in enzymes – elementary idea of metallo-porphyrins. Structure and function of haemoglobin, chlorophyll and vitaminB_{12} .Function of Na/K pump. Applications of co-ordination compounds in medicine, industry, biological systems and analytical chemistry.

BOOKS FOR REFERENCE

1. Puri B.R. Sharma L.R. Kalia Principles of Inorganic Chemistry K.K. Milestone Publishers & Distributors, Delhi-110002
2. Lee J.D. Concise Inorganic Chemistry, Blackwell Science, 5th Edn.1996.
3. P.Basalo and Johnson Benjamin ,Co-ordination Chemistry Ink,1964
4. R.Gopalan V.Ramalingam, Concise co-ordination Chemistry Vikas Publishing House Pvt Ltd.
5. R.D.Madan Modern Inorganic Chemistry, S.Chand&Co,Ltd.

SEMESTER V			
Part III	**Core Elective II**		**Polymer Chemistry**
Code :15UCHE52	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 4**

Objectives :

1. To understand the chemistry and technology of different types of polymers.
2. To study their applications in various fields.

UNIT I INTRODUCTION TO POLYMERS

Introduction-Classification based on chemical structure,mode of synthesis and composition –Characteristics of the polymers-nomenclature of polymers – Homopolymers and Hetero polymers — Conducting polymers- Tacticity – isotactic, atactic, syndiotactic polymers – Copolymer-types-statistical, random, alternating,block and graft copolymer.Plastics(thermoplast and thermosets)–elastomers –fibres. Degree of polymerization – functionality – linear, branched and cross linked polymers.

UNIT II PROPERTIES OF POLYMERS

Glassy stage – glass transition temperature, factors affecting it crystallinity of polymers. Viscosity, solubility, optical, electrical, thermal and mechanical properties of polymers – Degradation of polymers of thermal, oxidative, mechanical and chemical methods.

Molecular mass – Number average, weight average, viscosity average moleculer mass and their determination– practical significance of moleculer mass distribution – size of polymers and carother's equation.

UNIT III POLYMERIZATION AND POLYMERIZATION TECHNIQUES

Classification of polymerization reactions-addition polymerization , condenzation polymerization-difference between addition and condensation polymerization-ionic polymerization and coordination polymerization.Polymerization.techniques - bulk, suspension emulsion and solution polymerization.

UNIT IV POLYMER REACTIONS

Initiators-types – azo, free radical, peroxide and redox initiators. Inhibitors and its applications. Retarders-definition and examples. Mechanism of ,anionic and cationic(Whitmore mechanism, Hunter and Yohe mechanism and Chmelir mechanism) polymerization. Kinetics of free radical ,anionic and Ziegler- Natta polymerisation.

UNIT V SOME IMPORTANT SYNTHETIC RESINS AND POLYMERS

Outline of synthesis and their uses of the following

Resins-Phenol formaldehyde resin, Melamine – formaldehyde resin, Epoxy resins – grades, and curing process.

Synthetic Polymers:Poly olefins – Polyethylene – HDPE, LDPE,LLDPE – Polypropylene – Polyvinyl chloride – grades of PVC – Teflon.Polymethylmethacrylate (pexiglass) polystyrene, polyamide – Nylon6, Nylon66, Nylon610 Nylon11, - polyester – polyurethanes – polycarbonates

Synthetic rubber – Styrene rubber, Nitrile rubber, Butyl rubber, Polysulphide rubber and Neoprene.

Biomedical Applications of polymers.

Books For Reference

1. Introduction to polymers – R.J.Young and P.A. Lovell,II Edition,Replika press Pvt.Ltd.India
2. Polymer chemistry, M.G.Arora,M.Singh – Anmol publications Pvt.Ltd. 4374/4B,Ansari Road,Daryaganj,New Delhi.
3. Applied Chemistry K. Bagavathi Sundari -MJP Publishers, Tamilnadu Book House Chennai
4. Polymer science – V.R. Gowarikar, N. V. Viswanathan and J. streedhar
5. Engineering chemistry –P.C. Jain andMonika Jain ,Eleventh Edition 1995,Dhanpat rai & sons. Delhi 110006

SEMESTER VI			
Part III Core Elective III Analytical Chemistry			
Code :15UCHE61	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 5**

OBJECTIVES

- To study the analytical uses of thermal, electrical and colorimetric methods.
- To study the applications of various spectral measurements in analysis.
- To study different types of chromatography and their application in analysis.
- To have a knowledge about the interpretation of experimental results.

UNIT I SEPARATION AND PURIFICATION TECHNIQUES

Purification of solid organic compounds – recrystallization, use of miscible solvents – use of drying agents – sublimation – purification of liquids – distillation – fractional distillation– use of immiscible solvents –solvent extraction.

Chromatography – principle of adsorption and partition chromatography – column chromatography, adsorbents – classification of adsorbents – solvents – preparation of column, adsorption, recovery of substances. Thin layer chromatography – choice of adsorbent – choice of solvent – preparation of chromatogram.

UNIT II COLORIMETRY AND SPECTROPHOTOMETRY

Visible colorimetry – Beer-Lambert Law – principles of colorimetric analysis– photoelectric colorimeter – spectrophotometer – UV spectroscopy – theory and instrumentation. Fluorometry – principle – instrumentation – applications. Flame photometry – principle – instrumentation – applications. Nephelometry and turbidimetry –theory and instrumentation – turbidimetric titrations and applications.

UNIT III SPECTROSCOPY

Types of molecular spectra. Micro wave (rotational) spectra – theory – instrumentation and applications in the determination of bond distances in diatomic molecules –microwave oven. Vibrational (IR) spectra – theory – modes of vibrations – instrumentation – applications in the

determination of bond strength. Raman spectra – theory – instrumentation and Mutual exclusion principle – applications to CO_2 and HCN molecules. NMR spectra – theory – instrumentation – Magnetic Resonance Imaging. Types of NMR spectra .Atomic Absorption Spectra – basic principle only.

UNIT III THERMO ANALYTIC METHOD

Thermo analytic method – principle of thermogravimetry, differential thermo analysis – instrumentation for TGA, DTA and DSC – characteristics of TGA and DTA curves – factors affecting TGA and DTA curves – applications – TGA of calcium oxalate monohydrate – DTA of calcium oxalate monohydrate – electrogravimetric analysis – electrolytic separation of metals – principle of separation of copper and nickel

UNIT V ANALYTICAL TREATMENT OF EXPERIMENTAL DATA

Principles of gravimetric analysis – precipitation methods – conditions of precipitation– factors influencing the precipitation and solubility – co-precipitation and post precipitation – digestion, washing and drying, ignition of the precipitate.

Mean – median – mode – precision – accuracy – confidence limits – determinate errors– indeterminate errors – rules for improving accuracy of data deviation, standard deviation. Rejection of data – significant figure – reporting of data – presentation of tabulated data – scatter diagrams – method of least squares.

BOOKS FOR REFERENCE

1. R. Gopalan, P.S. Subramanian and K. Rengarajan ,Elements of Analytical Chemistry, Sultan Chand & Sons, Educational Publishers – New Delhi.
2. Mahinder Singh, Analytical Chemistry, Instrumental Techniques – Vol I, II Edition 2002, Dominant Publishers and Distributors.
3. Hobart H. Willard, Lynne L. Merritt, J.R., John A. Dean, Frank A. Settle, J.R., Instrumental Methods of Analysis, Sixth Edition, CBS Publishers & Distributors.
4. Douglas A. Skoog, Donald M. West, F. James Holler Harcourt, Fundamentals of Analytical Chemistry, Seventh Edition, College Publishers.
5. G. Aruldhas, Molecular Structure and Spectroscopy, 2005, Prentice Hall of India.

SEMESTER IV			
Part III	**Non-Major Elective**	**Industrial Chemistry**	
Code :15UCHN41	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

OBJECTIVES:

- To learn about the various ceramics and abrasives.
- To provide information about paints.
- To earn knowledge about the manufacture sugar and paper.

UNIT I CERAMICS AND ABRASIVES

Ceramics-general properties-classification of ceramic products- raw materials for ceramics- outline of the manufacturing process- glazing- colouring- manufacture of porcelain. Abrasives- outline of the manufacture of calcium carbide, silicon carbide, boron carbide and their uses.

UNIT II SURFACE COATING

Purpose of surface coating – Paint – characteristics of good paint - constituents of paints - classification of paints – fluorescent paints (traffic signal), fire retardant paints – Varnishes – constituents and their functions. Emulsion paints.

UNIT III SUGAR AND PAPER INDUSTRY

Manufacture of sugar – recovery of alcohol from molasses – fermentation – beverages manufacture of beer and wine – Bagasse. Paper industry- Manufacture of paper.

Books for Reference

1.Fundamental concepts of Applied chemistry, Jayashree Ghosh Edition 2006, S. Chand & company Ltd. New Delhi.

2. Engineering chemistry by P.C. Jain and Monika Jain Dhanpat Rai & Sons, New Delhi.

3. Industrial Chemistry B.K.Sharma Goel Publishing House,2003,Meerut.

SEMESTER III			
Part IV	**Skill Based Elective**	**Basic Computer Techniques in Chemistry**	
Code :15UCHS31	**Hrs./Week:2**	**Hrs/ Sem 30**	**Credits:2**

OBJECTIVES

- To impart computer knowledge to chemistry students.

UNIT I MS WORD

Introduction – File-create- save-copy-delete- typing in the document-selecting the styles – editing text – previewing the document – printing – inserting page number and date – formatting text and paragraphs.

Overview of page setup – changing page size and margin, create headers, footers and selection use columns – find and replace text – spellcheck – use of thesaurus-working with tables and graphics – entering and editing data in a table – insertion of a picture.

UNIT II MS EXCEL

Introduction of MS Excel-define work book-create work sheet-Changing columns and rows —formatting-aligning and wrapping cell contents- border to cell-number formats. Mathematical functions -Create a chart with wizard-working with tables and graphs

UNIT III MS POWERPOINT

Features and components of the power point-presentations-creating a power point presentation —add, insert and delete slides-adding text to slide-slide layout-enter and edit text to slides- animation effect.

UNIT IV E-MAIL AND INTERNET

E-mail – creating an e-mail id – receiving incoming messages – sending messages.

UNIT V CHEMISTRY RELATED WEBSITES

A brief study of Websites and softwares related to chemistry.

Drawing simple chemical structures using Chemdraw and Chem finder

REFERENCES

1. MS-EXCEL in a Nutshell, Sanjay Saxena, Vikas Publishing House Pvt., Ltd., 2000
2. Create powerpoint presentations in a weekend, Brain Reilly, Galgotia publication Pvt., Ltd.,
3. Advanced Microsoft Office 2000, Meredith Flynn, Nita Rutkosky, BPB publications, First edition, 2000
4. Mashbra's Internet for Students, Sharat Jain, B.M.Agarwal, Mashbra Industries (P) Ltd.,2000.
5. Vikas Gupta , Windows XP with office 2007 , Publishers , Dreamtech Press

SEMESTER IV			
Part III	**Skilled Based Elective**		**Pharmaceutical Chemistry**
Code :15UCHS41	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

OBJECTIVES

- To understand the concept of drug, its action common drugs and their uses.
- To know the causes of common diseases and their treatment
- To study the various clinical analysis and techniques for diagnosis.

UNIT I CLASSIFICATION AND METABOLISM OF DRUGS

Classification of drugs – biological and chemical classification-metabolism of drugs- bio transformation-oxidative, reductive and hydrolytic biotransformations — conjugate reactions — glucuronides ,amino acids, ethereal sulphate, methylated and acetylated conjugations.

UNIT II CAUSES OF COMMON DISEASES AND THEIR TREATMENT BY DRUGS

Common diseases and their treatment:

Insect borne diseases- Air borne diseases- Water borne diseases.

Important Indian medicinal plants and trees and their uses:

Hisbisscus Rosa-sinensis adathoda vasica , ocimum sanctum, mangifera indica, azadirachta indica, phyllanthus Niruri, solanum trilobatum.

UNIT III CLINICAL CHEMISTRY

Determination of sugar (glucose) in serum-Folin and Wu' s method — determination of serum cholesterol Sackett' s method for total cholesterol --tests for cholesterol — estimation of glucose in urine-Benedict's test-detection of anemia — estimation of hemoglobin (Hb concentration).First aid for accidents-important rules — composition of first aid box — some common poisons and their antidotes.

UNIT IV BLOOD PRESSURE AND CARDIO VASCULAR DRUGS

Hypertension- types of treatment. Functions and uses of the following drugs-cardiovascular drugs-antiarrhythmic drugs-quinidine-antihypertensive agents (hypotensive drugs) — clonidine and reserpine.

UNIT V DIABETES AND SOME COMMON DRUGS

Diabetes- control–oral hypoglycemic drugs–-tolubutamide, chlorpropamide, Anti Convulsant agents-structure and uses of Barbiturates- Anaesthetics- general Anaesthetics -advantages and disadvantages of vinyl ether, halothane.

Books for References

I. Text Book of pharmaceutical chemistry Jayashree Ghosh —S.Chand and company

New Delhi , 2003

2. Pharmaceutical chemistry-Dr.S. Lakshmi, Sultan Chand & Sons, NewDelhi, Edition 2004

3. Medicinal chemistry- Ashutosh Kar New age International (P) Limited, Publishers,

New Delhi , 1997

4. General Organic & Biochemistry — Bettelheim Brown, Campbell and Farrell, Books/cole Cengage Learning, Publishers India Edition.

5.Fundamental Concepts of Applied chemistry Jayashree Ghosh , S.Chand and Company, New Delhi. 2006

SEMESTER V			
Part IV Skill Based Elective	**Applied Chemistry**		
Code :15UCHS51	**Hrs./Week:4**	**Hrs/ Sem 30**	**Credits:3**

OBJECTIVES

- To know the chemical aspects of soap and detergents
- To know the adverse effects of corrosion and study the means to prevent it.
- To be aware of the importance as well as the impacts of residual chemicals related with petroleum industry

UNIT I PETRO CHEMICALS

Occurrence – composition of petroleum. Refining of petroleum – purification – cracking – types of cracking – catalytic cracking – thermal cracking – synthetic petrol – knocking and antiknocking properties – octane number – activation. Gasoline – cetane number – flash point. Petrochemicals – important hydrocarbons – derivatives and uses. Synthetic petrol. Important petro chemical industries in India.

UNIT II CORROSION AND PROTECTIVE COATING

Corrosion of metals – definition – disadvantages – types of corrosion-theories of corrosion (Direct Chemical corrosion, electrochemical corrosion) – methods of preventing corrosion-corrosion inhibitors

Types of protective coating (metallic, organic, organic lining and ceramic coating) paint-characteristics of a good paint – constituents of paints and their functions varnish, resins and lacquers, their characteristics – uses – difference between paint, varnish and lacquer

UNIT III RUBBER INDUSTRY AND FIBRES

Manufacture of rubber – rubber latex – coagulation – crude rubber, Gutta-parcha – properties of rubber – compounding of rubber – vulcanisation, properties of vulcanized rubber– synthetic rubber – SBR rubber, Neoprene rubber, Butyl rubber, Silicone rubber, and their properties. Reclaimed rubber and foam rubber –uses.

Difference between natural and synthetic fibres – manufacture of rayons – nylons and polyesters – uses.

UNIT IV FATS, OILS AND WAXES:

Fats and oils – definition – physical and chemical properties - Analysis of fats and oils– Saponification value, iodine value, acid value, Reichert-Meissel value – manufacture of vanaspathi or vegetable ghee.

Waxes – definition, manufacture and classification.

Soaps – definition – manufacture of different types of soaps – toilet soaps, transparent soaps and liquid soaps and their uses – cleansing action of soaps.

Detergents – classification of detergents (cationic, anionic and nonionic) – comparison of soaps and detergents.

UNIT V FOOD INDUSTRY

Manufacture of sugar from beetroot and sugarcane – molasses – manufacture of alcoholic beverages – manufacture of vinegar food additives – baking soda – food color natural and artificial – intentional food additives – acid base and their salts – antioxidants – stabilizers– bleaching – maturing agents – leavening agents – humectants and preservatives.

BOOKS FOR REFERENCE

1. Jayashree Ghosh, Fundamental concepts of Applied chemistry Edition 2006, S. Chand & company Ltd New Delhi
2. Harish Kumar Chopra, Anupama Parmar, Engineering Chemistry Narosa Publishing House New Delhi.
3. K.Bagavathi Sundari Applied Chemistry Mjp publishers, Tamil Nadu Book House Chennai
4. B.S.Bahl, Arun Bahl, Advanced Organic chemistry –S.Chand & company.
5. Siva sankar B., Food processing and preservation Prentice–hall of India Pvt., ltd New Delhi 2002.

SEMESTER- V			
Core VIII	**Organic Chemistry III**		
Code :18UCHC52	**Hrs./Week:5**	**Hrs/ Sem: 75**	**Credits:4**

Vision: Develop novel molecules and methods to synthesize Organic molecules

Mission:

- Understand Retrosynthesis and its relay approach to synthesis
- Study Specific name reactions
- Have an idea on Green Chemistry

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	compare the general reactions of aldehydes and ketones	5	Ap
CO - 2	explain the mechanism of Claisen, Benzoin, Perkin, Knovenegal reaction- Wittig reaction-iodoform reaction explain the factors influencing strength of acid - effect of substituent in benzene ring	2	Un
CO - 3	generalize the properties of carbonyl and carboxyl compunds	1,6	Cr
CO - 4	classify the polynuclear hydrocarbons Structure Elucidation of alizarin	1.5	Ap Cr
CO - 5	state synthons and synthetic equivalent- Protection and deprotection of different groups	3	Re
CO - 6	explain Retrosynthesis of 5-hexanoic acid	1,3,6	Un
CO - 7	apply green chemistry in day-to-day life, dry cleaning, versatile bleaching agent	4,7	Ap
CO - 8	implement an awareness about green chemistry and the methods of microwave assisted synthesis	3,8	Ap

SEMESTER- V			
Core VIII	**Organic Chemistry III**		
Code :18UCHC52	**Hrs./Week:5**	**Hrs/ Sem: 75**	**Credits:4**

Unit I- Carbonyl Compounds

Aliphatic aldehyde& ketones-Reactivity of carbonyl groups-general reactions of aldehydes and ketones-mechanism of addition and condensation reaction- Cannizzaro reaction-Aldol condensation-Distinction between aldehydes and ketones-Reduction reaction-MPV reduction-Wolf-kishner- Clemmenson reaction

Aromatic aldehydes and ketones- general methods of preparation, reaction and test-Mechanism of Claisen, Benzoin, Perkin, Knovenegal reaction- Wittig reaction-iodoform reaction

Unit-II Carboxylic Acid And Their Derivative

Aliphatic monocarboxylic acid- general methods of preparation and reactions- acidic nature-factors influencing strength- dicarboxylic acid- Blanc's rule-Aromatic monocarboxylic acid-effect of substituent in benzene ring- Aromatic dicarboxylic acid-Reactions of phthalic acid –Test for Carboxylic acid – Aliphatic hydroxy acids – Preparation reactions of maleic acid and citric acid – Action of heat on hydroxy acid – aliphatic acid derivative- reaction of ester, acid halide and acid amide.

Unit - III Polynuclear Hydrocarbons

Isolated Systems – Preparation of diphenyl, triphenylmethane and 1,2-diphenyl ethane.**Condensed systems –** Synthesis, reactions and structure of naphthalene and anthracene. Phenanthrene – synthesis and structure of phenanthrene. Derivatives of naphthalene and anthracene – Naphthols - Naphthyl amines, Naphtha quinones, Anthraquinone. Alizarin -structural elucidation of alizarin.

Unit-IV Organic Synthesis – An Introduction

Synthons and synthetic equivalent (electrophilic and nucleophilic). Carbon-carbon bond forming reactions involving Michael and Dieckmann reaction-Protection of functional groups and removal of protecting groups-Application of Protection and deprotection to alcohols, aldehydes, ketones, acids, phenols and amines. Retrosynthetic analysis of 5-hexanoic acid

Unit – V Green Chemistry

Introduction – need for green chemistry – twelve principles of green chemistry – green chemistry in day-to-day life – dry cleaning, versatile bleaching agent – atom economy – green solvents – supercritical fluid CO_2, ionic liquids and water

Microwave assisted organic synthesis – introduction – microwave assisted reactions in water – Hofmann elimination and hydrolysis of benzyl chloride – microwave assisted reactions in organic solvents – esterification and Fries rearrangement – microwave assisted reactions in solid state – deacylation, oxidation of alcohols using clayfen.

Text Books

1. K.S. Tewari, N.K. Vishnoi, S.N. Mehrotra. A Text Book of Organic Chemistry, 2nd Revised Editions, 1998
2. Arun Bahl and B. S. Bahl Advanced Organic chemistry, S. Chand and Company Ltd., Reprint 2005.

Books for Reference

1. Bhupinder Mehta, Manju Mehta, Organic chemistry, PHI Learning pvt. Ltd., 2005.
2. Rashmi Sanghi, Green Chemistry Environmental Friendly Alternatives Editors M.M.Srivatsava Narosa Publishing House, Reprint 2008.
3. V. Kumar, An introduction to green chemistry, Vishal Publishing Company, Jabudhar Delhi Edition, May 2007.
4. V. K. Ahluwalia, Green Chemistry , Ane Books Pvt. Ltd; Second edition.2012
5. I.L.Finar Organic chemistry, The Fundamental Principles, Volume I, 6th edition, 1973.
6. N.Tewari Advance Organic Reaction mechanism Books and allied (P) Ltd. Kolkata 700010 India Second revised edition 2005.
7. M.K.Jain and S.C.Sharma Modern organic chemistry, Vishal publishing co., 4th edition 2012.

SEMESTER V			
Core IX	**Physical Chemistry II**		
Code :18UCHC53	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 4**

Vision:

Educate the students about the chemistry behind living system and physical processes.

Mission:

- Inculcate a wide understanding about
- Reaction kinetics and its applications
- Chemistry behind light and sound
- Concept of group theory to various molecule
- Probe into the importance of electrochemistry and its application

Course Outcome

CO.No.	Upon completion of this course, students should be able to	PSO addressed	CL
CO - 1	understand the kinetics of the reaction and to determine the reaction mechanism	1	Un
CO - 2	apply reaction kinetics to determine the rate of chemical reactions; understand the factors that influence rates of reaction.	2 , 3	Ap
CO - 3	summarize the chemical reactions under light and sound	3	Un
CO - 4	outline the principle behind sonochemical reactions	3	Re
CO - 5	apply the concept of group theory to various molecules	1	Ap
CO - 6	have a thorough knowledge of symmetry elements, symmetry operations and point groups	1, 2	Re
CO - 7	build an Elementary treatment of Debye-Huckel theory of strong electrolytes ,conductometric titrations, hydrolysis and calculation of pH.	1 , 3	An
CO - 8	probe into the importance of electrochemistry and its application	4	Ev

SEMESTER V			
Core IX	**Physical Chemistry II**		
Code :18UCHC53	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 4**

Unit I Chemical Kinetics

Reaction rate –units of rates –rate laws- order and molecularity of a reaction– differences between order and molecularity of a reaction- Pseudo unimolecular reactions – examples- Experimental determination of inversion of cane sugar- Differential and integrated forms of rate expressions for first, second and zero reactions – first order reaction – examples- Experimental determination of rate constant of decomposition of N_2O_5 in CCl_4 - second order reaction—examples-experimental determination of alkaline hydrolysis of ester. Time for half change for first, second order reactions – determination of order of the reactions (integrated rate equation method ,differential method, graphical method ,half life method)

Effect of temperature on reaction rate – Arrhenius equation – Activation energy and its significance. Collision theory and derivation of rate constant of a bimolecular reaction – Limitations of collision theory – unimolecular reactions and Lindemann's theory –Transition state theory –potential energy diagram for activation energy as applied to catalysis-endothermic and exothermic reaction.

Unit II Chemical Reactions under Light and Sound

Photochemistry – photochemical reaction – Beer-Lambert law(derivation)– photochemical rate law – Grotthus-Draper law, Starck-Einsteins law of photochemical equivalence – quantum yield – validity of Einstein's law – reason for low and high quantum yield – determination of quantum yield using actinometer – flash photolysis. Photolysis of NH_3 and chlorination of methane. Kinetics of decomposition of HI – combination of H_2 and Cl_2 reaction – kinetics of the H_2 and Br_2 reaction. Photophysical processes – explanation of fluorescence and phosphorescence using Jablonski diagrams. Incandescence – luminescence – chemiluminescence– thermoluminescence – bioluminescence. Applications of photochemistry.

Sonochemistry – definition, principle and applications.

Unit III Group Theory

Symmetry elements and symmetry operations –centre of symmetry –axis of symmetry- plane of symmetry -proper axis of rotation- improper axis of rotation– Inversion and identity operations – symmetry elements in water, ammonia, boron trifluoride, benzene, allene and 1,2-dichloro ethylene. Group postulates and types of groups - abelian and non-abelian groups-cyclic groups-order of a group–sub group-multiplication table forC_{2V} and C_{3V}– molecular point groups.

Unit IV Electrochemistry - I

An Elementary treatment of Debye-Huckel theory of strong electrolytes – Significance of Debye-Huckel Onsagar equation (Derivation not required) – Transport Number – Determination by Hittorff's and moving boundary methods – Abnormal transport numbers – Absolute velocity of an ion and its determination – Kohlrausch's law and its applications – Mobilities of hydrogen and hydroxyl ions – Conductometric titrations – Different types – Advantages – Hydrolysis – Expression for hydrolysis constant and degree of hydrolysis for salts of different types –Salts of strong acid-strong base,strong acid-weak base,weak acid-strong base and weak acid-weak base. Calculation of pH of salt solutions (due to hydrolysis). Buffers – types-(acid buffer,basic buffer and neutral buffer) buffer action –Henderson-Hasselbalch equation-significance.

Unit V Electrochemistry - II

Reversible cells – cell representation, cell reaction, single electrode potential-standard electrode potential. Types of electrodes- metal – metal ion- gas electrode- metal-insoluble metal salt electrode(calomel), membrane and redox electrodes.

EMF –definition-determination of EMF of a cell Electrochemical series and significance – Thermodynamics of reversible / irreversible electrodes – Electrical energy in galvanic cell – Free energy of cell reaction. Relation between EMF and ΔG of the cell reaction – Determination of ΔH, ΔG, ΔS of the cell reaction. Relation between EMF and equilibrium constant. Effect of concentration of electrolyte on cell potential – Nernst equation – Derivation and applications. Concentration cells – Electrode concentration cells – Electrolyte concentration cells with and without transference liquid junction potential –salt bridge.

Applications of EMF- solubility product, pH (Using hydrogen, glass and quinhydrone electrodes) and Potentiometric titration (acid-base, redox and precipitation) .

Text Books

1. B.R.Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Company Ltd., New Delhi, 2008.
3. F.Albert Cotton, Chemical Applications of Group Theory,III Edition, John Wiley and Sons, 1999.

Books for Reference

1. P.K. Bhattacharya, Group Theory and its Chemical Applications, Himalaya Publishing House, Mumbai, 1988.
2. Samuel Glasstone, An introduction to electrochemistry, Afflliated East-West Press (P)Ltd, New Delhi, 1965.
3. V.Ramakrishnan and M.S.Gopinathan, Group Theory in Chemistry, Vishal Publications, NewDelhi1991.
4. Morris Sylvin, Photochemistry and Sonochemistry, Ivy Publishing House, NewDelhi, 2003.

SEMESTER- VI			
Core X	**Inorganic Chemistry - II**		
Code :18UCHC61	**Hrs./Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Vision

Obtain an intense knowledge about coordinating chemistry and its applications in various fields

Mission

- Know the theories behind the formation of coordination complexes.
- Understand the nature of metal carbonyls and their applications
- Identify the role of metal ions in biological systems

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	acquire knowledge in the chemistry of coordination compounds and their properties.	1	Un
CO - 2	characterize and synthesize of coordination compounds	1, 5,6	Ap
CO - 3	explain the definition of coordination compounds, naming them and decide isomerism	1	Re
CO - 4	describe the formation and bonding in coordination compounds	1, 6	An
CO - 5	grasp the knowledge of bonding in metal carbonyls	1, 2	Re
CO - 6	identify the structure and bonding in metal carbonyls of mono, bi nuclear and poly nuclear carbonyls	3, 6	Ap
CO - 7	formulate independent research ideas in the field of bioinorganic chemistry	1, 3, 7	Cr
CO – 8	recall the importance of metals in biological systems and the application of metal chelates in various fields	1, 4, 8	Re

SEMESTER- VI			
Core X	**Inorganic Chemistry - II**		
Code :18UCHC61	**Hrs./Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Unit I Co-ordination Compounds I

Co-ordination compounds –definition –addition (or) molecular compounds double salts-complex salts. Terminology – complex ions (central metal ion) coordination number-ligands - types of ligands (monodentate– bidentate-polydentate- bridging ligands) – oxidation number, co-ordination sphere, effective atomic number (EAN). Nomenclature of coordination compounds – isomerism in co-ordination compound – structural and stereo isomerism. Hydrate isomerism – ligand isomerism – linkage isomerism – coordination isomerism – coordination position isomerism – polymerisation isomerism.

Unit II Co-ordination Compounds II

Valence bond theory(Pauling's theory) – salient features of valence bond theory. Valence Bond theory as applied to octahedral complexes (inner and outer orbital complexes) – square planar and tetrahedral complexes. Limitation of valence bond theory – crystal field theory –postulates of Crystal field theory- CF splitting in tetrahedral, square planar and octahedral complexes. Strong and weak field ligands,Crystal field stabilization energy (CFSE) – factors influencing the magnitude of CF splitting — applications of crystal field theory - magnetic properties, colour of transition metal complexes – Jahn Teller theorem-Consequences of Jahn- Teller distortion.

Unit III Reaction Mechanism in Co-ordination Compounds

Stability of complexes in solution – thermodynamic stability-factors influencing the stability of complexes-kinetic stability – factors influencing the lability of complexes – stabilisation of unusual oxitation states by complexation. – substitution reaction in octahedral complexes – dissociative(S_N^2), associative(S_N^1) mechanism. Substitution reactions in octahedral complexes (acid and base hydrolysis) and substitution reactions in square planar complexes. Trans effect- pi bonding theory of trans effect – uses of trans effect.

Unit IV Metal Carbonyls

Definition – low oxidation state of metal ion in metal carbonyls – classification of carbonyls-based on the number of metal atoms present in carbonyl- based on the structure of carbonyls - General methods of preparation, properties of transition metal carbonyls. Nature of M-CO bonding in metal carbonyls -Evidences for back bonding-Structure of carbonyls on the basis of VB theory. Structure and bonding in metal carbonyls of mono, bi nuclear and poly nuclear carbonyls of Ni,V,Cr,Fe,Co and Mn [$(Ni(CO)_4.)$ $V(CO)_6$, $Fe(CO)_5$, $Cr(CO)_6$, $Co_2(CO)_8$, $Fe_2(CO)_9$, $Mn_2(CO)_{10}$, and $Fe_3(CO)_{12}$] .

Unit V Bio-Inorganic Chemistry

Role of metal ion in living systems (excess and deficiency of trace metals) – metallo-proteins, metallo-enzymes – characteristics of metallo-enzymes – characteristics of metal

activated enzymes – functions of metal in enzymes – elementary idea of metallo-porphyrins. Structure and function of haemoglobin, chlorophyll and vitaminB_{12} .Function of Na/K pump. Applications of co-ordination compounds in medicine, industry, biological systems and analytical chemistry.

Text book

1. Puri B.R. Sharma L.R. Kalia Principles of Inorganic Chemistry K.K. Milestone Publishers & Distributors, Delhi, 2016 – 2017.

Books for Reference

1. Lee J.D. Concise Inorganic Chemistry, Blackwell Science, 5th Edn.1996.
2. P.Basalo and Johnson Benjamin ,Co-ordination Chemistry Ink,1964
3. R. Gopalan, V.Ramalingam, Concise co-ordination Chemistry Vikas Publishing House Pvt Ltd, 2001.
4. R.D.Madan Modern Inorganic Chemistry, S.Chand & Co,Ltd, 2005.

SEMESTER- VI			
Core XI	**Organic Chemistry-IV**		
Code :18UCHC62	**Hrs./Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Vision: Empathize the structure, reactions, properties Organic compounds and contribute to the future of humanity

Mission:

- Understand the different applications of Photochemistry in Organic compounds
- Know the importance of Heterocyclic compounds, Alkaloids and Terpenes
- Analyze structure of different types of nucleotides

Course Outcome:

CO No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO -1	identify the type of the photochemical and thermal reactions	1,7	Re
CO - 2	understand the important applications of photochemistry in organic compounds	1	Un
CO - 3	illustrate the mechanisms of specific reactions	1	Ap
CO - 4	know about the importance of heterocyclic compounds, alkaloids and terpenes Identify the nature of compounds in heterocyclic compounds	1, 5	Re
CO - 5	apply the methods of extraction of Alkaloids	1, 2,6	Ap
CO - 6	compare quinoline and isoquinoline	1,4	Ap
CO - 7	analyse amino acid spectrophotometrically	1, 2, 8,	An
CO - 8	recall the colour reactions of proteins Classify the structure of DNA and RNA	1, 3 5	Re Un

SEMESTER- VI			
Core XI	**Organic Chemistry-IV**		
Code :18UCHC62	**Hrs./Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit – I Organic Photochemistry

Introduction – Photochemical vs thermal reactions – singlet and triplet states – allowed and forbidden transitions – Jablonski diagram – photosensitization – photochemical reaction – elimination reaction – Norrish type I and Type II – photolysis of cyclic ketone – photolysis of aldehyde – photolysis of compounds containing Nitrogen – Barton reaction – photocycloaddition– Paterno-Buchi reaction – photo induced reaction of α,β-unsaturated ketone

Unit-II Name Reactions and their Mechanism

Reformatsky reaction-Birch reduction- Cope elimination- Bayer-villiger oxidation-Ritter reaction-Jones oxidation-Hell-Volhard –Zelinsky reaction-Dakin reaction- Darzens reaction.

Unit- III Heterocyclic Compounds

Introduction – preparation and reactions of furan, pyrrole and thiophene. Aromatic character and basic nature – comparative reactivity. Preparation and reactions of pyridine – preparation and reactions of quinoline, isoquinoline and indole. Structural elucidation of pyridine, quinoline and isoquinoline.

Unit-IV Alkaloids and Terpenoids

Alkaloids – definition – classification – occurrence – extraction using soxhelet apparatus pigment analysis using flame photometer-extraction of oil from plants using Clevenger-general characteristics. General methods of identification –functional nature of oxygen, nitrogen. Oxidation, Hofmann's exhaustive methylation – structure and synthesis of coniine, piperine and nicotine

Methods of extraction –Qualitative analysis of phytochemicals –Quantitative estimation of tannin, phenolic compounds.

Terpenoids – introduction – classification – isolation of terpenoids – isoprene rule – general properties of terpenoids. General procedure for determining structure of terpenoids – synthesis and structure of geraniol, Citral, dipentene and menthol.

Unit-V Amino acids and Proteins

Amino acids - classification, general methods of preparation and reactions of amino acids, zwitter ion - isoelectric points, action of heat on □□□□and □□□amino acids. Peptides and proteins - Peptide linkage - polypeptide - classification of proteins - synthesis of peptides - Merrifield synthesis - primary structure - end group analysis - Dangyl chloride, Edman method - secondary structure - tertiary structure - denaturation - colour reactions of proteins – nucleotides- Structure of DNA-Watson and Crick model- structure and types of RNA.

Estimation of folic acid , amino acid and protein by colorimetry/spectrophotometrically

Text Books

1.K.S. Tewari, N.K. Vishnoi, S.N. Mehrotra. A Text Book of Organic Chemistry, Vikas publishing house (P) Ltd.2002.

2.Arun Bahl and B. S. Bahl Advanced Organic chemistry, S. Chand and Company Ltd., Reprint 2005.

3. Organic Reaction Mechanisms, V. K. Ahluwalia and Rakesh Kumar Parashar, 2011,Narosa Publishing House, New Delhi

Books for Reference

1. I.L Finar Organic Chemistry Volume II, Stereochemistry and the Chemistry of Natural Products Edition V Reprint 1986.
2. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013

SEMESTER VI			
Core XII	**Physical Chemistry III**		
Code :18UCHC62	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 4**

Vision:

Inspiring and educating the students the core concepts in Physical Chemistry

Mission:

Enable the young Chemistry buds to sustain a deep knowledge in thermodynamics, solutions and thermochemistry

Course Outcome

CO No.	Upon completion of this course, students should be able to	PSO addressed	CL
CO - 1	study various thermodynamic parameters and its applications in different physical states of the systems	1 ,2 , 3	Re
CO - 2	understand the kinetics of the reaction and to determine the reaction mechanism	1,2,4	Re
CO - 3	apply reaction kinetics to determine the rate of chemical reactions; understand the factors that influence rates of reaction.	1,2 , 3,5	Ap
CO - 4	catagorise fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, engineering, medicine, and the environment	1,2 , 3,5	An
CO - 5	outline the concepts of top down and bottom up methods of nanomaterials preparation	2, 3,5,6	An
CO - 6	have a thorough Learning of miscible and immiscible liquids	2,3,4	Re
CO - 7	comparison of vapour pressure of partially miscible liquids and mixture of immiscible liquids and understand the theory of fractional distillation and steam distillation and its applications.	2,3	An
CO - 8	outline the statement of Nernst distribution law , its deviations and applications	1, 2,3,4	An

SEMESTER VI			
Core XII	**Physical Chemistry III**		
Code :18UCHC62	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 4**

Unit I Thermodynamics I

Terminology – thermodynamic equilibrium – types of thermodynamic system – thermodynamic processes – (Isothermal, adiabatic, isobaric, isochoric) – definition and example – sign conventions – first law of thermodynamics – enthalpy of a system – relation between ΔH and ΔE – molar heat capacities – definition – molar heat capacity at constant volume – molar heat capacity at constant pressure – relation between C_p and C_v. Joule Thomson effect – Joule Thomson coefficient – inversion temperature.

Unit II Thermodynamics II

Limitations of first law of thermodynamics .Second law of thermodynamics – Different statements – Concept of entropy – Entropy changes in isothermal expansion of an ideal gas – Entropy changes in reversible and irreversible processes – Work function and free energy function – Variation of free energy with temperature and pressure – Gibbs Helmholtz equation – Derivation and significance – Partial molar properties – Chemical potential – Gibb's Duhem equation – Derivation and significance ..

Unit III Thermodynamics III

Claussius-Claypeyron equation – application in ice skating – derivation (integral and differential forms) and significances – derivation of Van't Hoff isotherm and isochore. Concept of fugacity– fugacity of a gas in a gaseous mixture –physical significance of fugacity. Nernst heat theorem – third law of thermodynamics – statement – determination of absolute entropy of solids, liquids and gases – experimental verification of the third law of thermodynamics – entropy change in chemical reactions – derivation of the Boltzmann entropy equation – residual entropy – zeroth law – energy relations in living systems.

Unit IV Solution

Liquids in liquids –completely miscible liquids- ideal and non-ideal mixtures-Raoult's law - distillation of homogenous binary liquid mixtures -Theory of fractional distillation – Azeotropic distillation.

Partially miscible liquids – Phenol-water, Triethylamine-water and Nicotine-water systems –Variation of solubility with temperature – vapour pressure of partially miscible liquids-critical solution(consolute) temperature-upper, lower,upper and lower - influence of impurity on CST and applications.

Immiscible liquid systems- vapour pressure of mixtures of immiscible liquids- theory of steam distillation and its applications.

Nernst distribution law – statement–conditions - thermodynamic derivation –-deviations from the law(molecular association and dissociation) -— applications-distribution indicators-study of complex ions-solvent extraction

Unit V Chemical Equilibrium

Reversible reactions- nature of chemical equilibrium- characteristics-law of mass action-explanation of the law of mass action based on the molecular collision theory-equilibrium constant; equilibrium law-relationship between K_c and K_p-Application of law of mass action to the equilibria involving the formation of NH_3 , dissociation of $CaCO_3$ and the dehydration of $CuSO_4.5H_2O$. Lechatelier's principle – statement-application to the formation of NH_3

Text Books

1. B.R.Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Company Ltd., New Delhi, 2008.

Books for Reference

1. Samuel Glasstone, Thermodynamics for chemists, Afflliated East-West Press (Pvt.) Ltd, New Delhi, III printing, 2010.
2. Sadhan Kr.Dutta, Principles of Physical Pharmacy and Biophysical Chemistry, Books and Allied (P) Ltd. Kolkata, 2007
3. P.L.Soni, O.P.Dharmaha,Text Book of Physical Chemistry(A Modern Approach), Sultan Chand and Sons Publishers, Revised Edition, 2010.
4. Iran.Levine, Physical Chemistry, Mc Graw Hill, Kogakusha Ltd. 1978.

SEMESTER V			
Core Practical III	**Physical Chemistry Experiments**		
Code : 18UCHCR3	**Hrs/Week : 5**	**Hrs/ Sem : 75**	**Credits : 3**

Objective: Enable the student to get analytical skills and help them to plan and execute experimental projects.

List of Experiments:

1. Critical solution temperature of phenol water system and effect of impurities on CST.
2. Transition Temperature of a salt hydrate – determination of molecular weight
3. Kinetics of Ester Hydrolysis
4. Conductometric Acid base Titration
5. Conductometric precipitation Titration
6. Potentiometric Redox Titration
7. Molecular weight determination by Rast Method
8. Phase Diagram – Simple eutectic
9. Phase Diagram – Compound formation
10. Heat of solution by solubility method ($K_2Cr_2O_7$/ oxalic acid)
11. Adsorption kinetics of oxalic acids/acetic acid on charcoal. Determination of concentration of the given acid.

Course Work

1. Verification of Beer's Law using spectrophotometer.

Books for Reference

1. J.N. Gurtu and R. Kapoor, Advanced experimental chemistry, S.Chand and Co., 1987.
2. Dr. S. Sundaram, Dr.Krishnan and Dr. P.S.Raghavan, S.Viswanathan, Practical chemistry, (Printers & Publishers), Pvt. Ltd., 2007
3. R.Mukhopadhyay P.Chatterjee Advanced practical chemistry, Books and allied (p)Ltd. Kolkata,Third Edition 2007.

SEMESTER V & VI			
Core Practical IV	**Organic Analysis and Organic Preparations**		
Code : 18UCHCR4	**Hrs/Week : 3**	**Hrs/ Sem : 45**	**Credits : 3**

Objective: Enable the students to develop analytical skill in organic qualitative and quantitative analysis and to develop skill in preparing organic compounds.

1. Organic Analysis:

Analysis of simple organic compounds

a) Nature of the compound- Aromatic / Aliphatic

b) Test for saturation/ unsaturation.

c) Detection of element present/ absent

d) Characterization of functional groups (Acids, amide, amines, phenol, aldehyde, ketone, anilide, ester, carbohydrates , nitro compounds), Confirmation by preparation of a solid derivative.

2. Preparation of Organic compounds involving the following chemical conversions

1.Oxidation 2. Hydrolysis 3. Nitration 4. Bromination

5. Diazotization 6.Benzoylation 7.Osazone formation

3. Determination of physical constant(melting point/boiling point)

4.Course work

i) Extraction of various phytochemicals using soxhelet apparatus and to analyse plant pigments

using flame photometer

ii) Extraction of oil from plants using Clevenger apparatus.

Books for Reference

1. Raghupati Mukhopadhyay, Pratul Chatterjee ,Advanced Practical Chemistry - Books and Allied (P) Ltd. Third Edition-2007

2. J.N. Gurtu and R. Kapoor, Advanced experimental chemistry, S.Chand and Co., 1987.

3.Arthur I.Vogel,A text book of practical organic chemistry including qualitative analysis,Longman Group Ltd.ELBS edition,1975

4.N.S.Gnanapragasam,G.Ramamoorthy,Organic Chemistry Lab Manual, S.Viswanathan printers and publishers Pvt. Ltd.2007

SEMESTER VI			
Core Practical V Gravimetry and Inorganic Preparation			
Code : 18UCHCR5	**Hrs./Week:5**	**Hrs/ Sem: 75**	**Credits : 2**

Objective:

Enable the student to get analytical skills and help them to plan and execute experimental projects.

a) Gravimetric Analysis

1. Estimation of Lead as Lead Chromate.
2. Estimation of Barium as Barium Chromate
3. Estimation of Zinc as Zinc Oxinate
4. Estimation of copper as copper (I) thiocyanate
5. Estimation of calcium as calcium oxalate.

b) Inorganic Preparations

1. Preparation of Potash alum
2. Preparation of Hexamminenickel(II)chloride
3. Preparation of Tetramminecopper(II)sulphate
4. Preparation of Prussian blue.
5. Preparation of Potassiumtrioxalatochromate (III) trihydrate
6. Preparation of Potassiumtrisoxalatoferrate(III)
7. Preparation of Tristhioureacopper(I) sulphate

Course work

1. Estimation of Nickel as Nickel – DMG complex
2. Estimation of Iron/ Nickel by spectrophotometer.

SEMESTER- V			
Core Integral I	**Essentials of Inorganic Chemistry**		
Code :18UCHI51	**Hrs./Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Vision

Acquire knowledge about the different groups present in periodic table

Mission

- Have a profound understanding of carbon and nitrogen group elements
- Know the chemistry behind d and f block elements

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	provide knowledge about non-aqueous solvents	1	Un
CO - 2	helps to learn the positions of the zero, d– and f-block elements in the periodic table	1	Ev
CO - 3	explain the general characteristics of non-aqueous solvents d– and f–block elements and the general horizontal and group trends in them	1	Ap
CO - 4	recall relevant oxidation states for the zeros, d and f block elements	1	Re
CO - 5	appreciate the relative stability of various oxidation states in terms of electrode potential values	1, 7	Ev
CO - 6	derive equations for reactions of compounds of the zero , d and f block elements	1, 2, 8	Cr
CO - 7	describe the synthesis of the zeros, d and f block elements	3, 5, 6	Ap
CO - 8	recall the structures, the properties, applications of silicones and silicates	1, 2	Re

SEMESTER- V			
Core Integral I	**Essentials of Inorganic Chemistry**		
Code :18UCHI51	**Hrs./Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Unit I Reactions in non-aqueous solvents

Solvent- definition- water as a universal solvent - classification of solvents – factors affecting the solvating ability– liquid range-dielectric constant – dipole moment and viscosity.

Liquid NH_3 as non aqueous solvent-reason –auto ionisation – ammono acid and bases. Reactions - neutralization, precipitation, solvolysis, complex formation and redox reactions. Advantages and disadvantages of liquid NH_3 as a solvent.

Liquid SO_2 as non aqueous solvent – reason. Reactions- precipitation, neutralization, solvolysis, complex formation and redox reactions**.** Advantages and disadvantages of liquid SO_2 as a solvent.

Unit II Zero Group Elements

Position of zero group in the periodic table – Ramsay- Rayleigh's method – Fisher-Ringe's method – separation of noble gases from liquid air –compounds of xenon – preparation, properties and structure (valence bond approach) of XeF_2, XeF_4, XeF_6, XeO_2F_2, XeO_3, XeO_4, $XeOF_4$, clathrates - type of clathrates –preparation, stability and structure of clathrates

Unit III d- Block Elements

General characteristics of d-block elements – comparative study of Ti,Zr,Hf-extraction,properties and uses of titanium-preparation and uses of titanium dioxide and titanium tetrachloride. polyvalency of vanadium. Comparative study of Cr, Mo, W – polyvalency of chromium-extraction, properties and uses of molybdynum and tungsten. Platinum-Extration,properties and uses. Platinum sponge, Platinum black,platinized asbestos and colloidal Platinum, potassium chloroplatinate. Comparative study of Cu,Ag,Au.(similarities and dissimilarities)

Unit IV f- Block Elements

General characteristics of lanthanides – separation of lanthanides – precipitation – thermal reaction – fractional crystallization – complex formation – solvent extraction – valency change method – ion exchange method. Extraction of a mixture of lanthanides from monazite sand – applications of lanthanides and their compounds – lanthanide contraction – causes and consequences. General characteristics of actinides – comparison between lanthanides and actinides- extraction of Th and U. Preparation and uses of UF_6 and uranyl acetate.

Unit V Inorganic materials

Inorganic polymers – general properties - Classification of inorganic polymers - polymer containing phosphorous – preparation, properties and structure of polyphosphonitrilic chloride - polymer containing sulphur - preparation, properties and structure of polymeric sulphur nitride - polymer containing boron – preparation, properties, structure of borazine, substituted borazine – boron nitride and polycarbonates – polymer containing silicon - preparation, properties, structure and uses of silicone fluids, silicone rubbers and silicon resins. Silicates – classification and structure of silicates.

Text book

1. B.R.Puri, L.R.Sharma, K.C.Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributers, Delhi. 2016 – 2017.

Books for Reference

1. R.D.Madan Modern Inorganic Chemistry, S.Chand& Co. Ltd, 2005
2. Gurdeep Raj, Advanced inorganic Chemistry, Goel Publishing house1986.
3. Sathya Prakash and R.D. Madan, Advance Inorganic Chemistry, Chand and Co. 2005.

SEMESTER- VI			
Core Integral II	**Spectroscopy**		
Code : 18UCHI61	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 4**

Vision:

Aware of the excitement of science behind electromagnetic radiation and structural elucidation of molecules

Mission:

Understand how molecules and materials behave, interact and transform at molecular, atomic and electronic level.

Discover the applications of spectroscopic techniques which fundamentally relate to the interaction of light with matter.

Course Outcome

CO No.	Upon completion of this course, students should be able to:	PSO addressed	CL
CO - 1	have a basic knowledge of electromagnetic spectrum and various types of spectra	1 , 2 , 3	Re
CO - 2	understand the theory , instrumentation and applications of rotational spectroscopy	1, 2	Un
CO - 3	know the types of electronic transitions and various selection rules	1,3	Re
CO - 4	apply Woodward-Fieser rule for calculation of absorption maxima of dienes and α, β unsaturated ketones and enumerate the applications of UV spectroscopy in coordination complexes.	2, 3,6	Ap
CO - 5	generalise the theoretical principle, selection rules and instrumentation of IR and Raman spectroscopy	1, 2,4,6	Cr
CO - 6	categorise IR absorption frequencies and applications of IR and Raman spectroscopy	1 , 2,4	An
CO - 7	assess C^{13} NMR and the principle behind 31P, 19F and 15N NMR , Magnetic Resonance Imaging and applications of NMR spectroscopy.	1 ,2 ,4,6,7,8	Ev
CO - 8	know the basic principles and instrumentation of mass spectrometry	3,7,8	Re

SEMESTER- VI			
Core Integral II	**Spectroscopy**		
Code : 18UCHI61	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 4**

Unit-I Electromagnetic Spectrum and Rotational Spectroscopy

Regions of electromagnetic spectrum - interaction of radiation with matter – Different types of energy levels in molecules – rotation, vibration and electronic levels. Various types of spectra – atomic spectroscopy – molecular spectroscopy.

Rotational spectroscopy - Micro wave (rotational) spectra – theory – instrumentation and applications in the determination of bond distances in diatomic molecules –microwave oven

Unit-II UV Spectroscopy

Theory – types of electronic transitions - selection rules – forbidden and allowed transitions - Chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic and hypochrmic effect – instrumentation – Woodward - Fieser rule for calculation of absorption maxima of dienes and α, β unsaturated ketones (simple problems can be asked using Woodward-Fieser rule)

Unit-III IR Spectroscopy and Raman spectroscopy

Vibrational (IR) spectra – theoretical principle – harmonic oscillator and unharmonicity – modes of vibrations – selection rules – Number of fundamental vibrations – Force constant – Fermi resonance – zero point energy - instrumentation.. Finger print region, characteristics of IR absorption frequencies, intermolecular and intramolecular hydrogen bonding. – Applications in the determination of bond strength.

Raman spectra – theoretical principle – selection rules – stokes and anti stokes line – PQR branches – instrumentation and Mutual exclusion principle – applications to CO_2 and HCN molecules.

Unit-IV NMR Spectroscopy

Introduction – spin moment-theory – number of signals - instrumentation - internal standard (TMS) –chemical shift – factors influencing chemical shift – splitting of the signals, spin-spin coupling, coupling constant. NMR spectrum of ethanol, benzyl alcohol, propionic acid, anisole, benzaldehyde, 2,3-dibromopropene, ethyl methyl ketone and mesitylene. C^{13} NMR - Applications of NMR spectroscopy-Magnetic Resonance Imaging.

Unit-V Mass spectrometry

Basic Principles - instrumentation– isotope abundance - techniques of Ion production - EI, CI - Base peak- molecular ion – meta stable ion - daughter ion--calculation of molecular formula - fragmentation pattern of various classes of organic compounds- hydrocarbons, alcohols, amines, aldehyde, ketone, ether, ester, acids and phenols- Mc-Lafferty rearrangement.

Text Books

1. B.R.Puri. L.R. Sharma, Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co., 2008.
2. Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, S. Chand & Company Ltd., New Delhi, 2008.
3. P.S.Kalsi, Spectroscopy of Organic compounds, IV Edition, New Age International (P) Ltd., New Delhi, 1999.
4. B.K.Sharma,Spectroscopy,Goel Publishing House, Fourteenth Edition, 2000.

Books for Reference

1. C.N.Banwell, Fundamentals of Molecular Spectroscopy, Mc.graw Hill, Fourth Edition, 2003.
2. John.R.Dyer, Applications of Absorption Spectroscopy of organic compounds, Sixth Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 1984.
3. Jag Mohan, Organic Spectroscopy- Principles and Applications, Second Edition, Alpha Science International Limited, Harrow, U.K., 2000.
4. Robert.M.Silverstein, G.Clayton Bassler, Terrence .C. Morrill, . Spectroscopic Identification of Organic Compounds John Wiley and Sons, Inc., Newyork, 1974.

SEMESTER- VI			
Core Integral III	**Selected Topics In Chemistry**		
Code :18UCHI62	**Hrs/Week:5**	**Hrs/ Sem: 75**	**Credits: 4**

Vision

Provide adequate knowledge about the chemistry behind the products that we use in our daily life.

Mission

- Grasp the principles behind milk processing, corrosion and polymer processing
- Employ the separation process effectively for solid and liquids in our daily life
- Recognize the nature and the function of food additives in our food.

Course Outcome :

CO No.	**Upon completion of this course, students should be able to**	**PSO addressed**	**CL**
CO - 1	have a basic knowledge about milk and its composition	1 , 2 , 3	Re
CO - 2	understand the theory behind fermented milks	1, 2	Un
CO - 3	know the types of different types of purification techniques	1,3	Re
CO - 4	apply Chromatographic techniques for the recovery of Organic substances	2, 3,6	Ap
CO - 5	generalize the types of corrosion	1, 2,4,6	Cr
CO - 6	categorize the constituents of paint and its uses	1 , 2,4	An
CO - 7	assess the properties of conductive polymers	1 ,2 ,4,6,7,8	Ev
CO - 8	know the preparation of synthetic polymers	3,7,8	Re

SEMESTER- VI			
Core Integral III	Selected Topics In Chemistry		
Code :18UCHI62	Hrs./Week:5	Hrs/ Sem: 75	Credits: 4

Unit I – Dairy Chemistry

Milk – definition – composition and constituents of milk – factors affecting the composition of milk – properties of milk – physical state – flavour – aroma – acidity – density – viscosity – boiling point – freezing point – acid-base equilibria – estimation of acid number – saponification number – iodine number – RM number – estimation of fat in milk – Babcock method – Majonnier method – nutritive value of milk.

Non-Fermented milks – definition and manufacture of special milks – sterilized milk – flavoured milk – sterilized-flavoured milk – irradiated / vitaminised milk – standardised milk – reconstituted milk – recombined milk – toned milk – condensed milk.

Unit II Separation and Purification Techniques

Purification of solid organic compounds – recrystallization, use of miscible solvents – use of drying agents – sublimation – purification of liquids – distillation – fractional distillation– use of immiscible solvents –solvent extraction.

Chromatography – principle of adsorption and partition chromatography – column chromatography, adsorbents – classification of adsorbents – solvents – preparation of column, adsorption, recovery of substances. Thin layer chromatography – choice of adsorbent – choice of solvent – preparation of chromatogram.

Unit III Corrosion and Protective Coating

Corrosion of metals – definition – disadvantages – types of corrosion-theories of corrosion (Direct Chemical corrosion, electrochemical corrosion) – methods of preventing corrosion-corrosion inhibitors

Types of protective coating (metallic, organic, organic lining and ceramic coating) paint-characteristics of a good paint – constituents of paints and their functions varnish, resins and lacquers, their characteristics – uses – difference between paint, varnish and lacquer

Unit IV Food Chemistry

Manufacture of sugar from beetroot and sugarcane – molasses – manufacture of alcoholic beverages – manufacture of vinegar food additives – baking soda – food color natural and artificial – intentional food additives – acid base and their salts – antioxidants – stabilizers– bleaching – maturing agents – leavening agents – humectants and preservatives.

Unit V Polymer Chemistry

Introduction-Classification based on chemical structure,mode of synthesis and composition –Characteristics of the polymers - nomenclature of polymers – Homopolymers and Hetero polymers — Conducting polymers- Tacticity – Copolymer - types.Plastics(thermoplast and thermosets)–elastomers –fibres. Degree of polymerization.

Synthetic Polymers:Poly olefins – Polyethylene – HDPE, LDPE,LLDPE – Polypropylene – Polyvinyl chloride – grades of PVC – Teflon.Polymethylmethacrylate

(pexiglass) polystyrene, polyamide – Nylon6, Nylon66, Nylon610 Nylon11, - polyester – polyurethanes – polycarbonates

Text books

1. K. Bagavathi Sundari, Applied Chemistry MJP Publishers, Tamil Nadu Book House, Chennai, 2006.
2. Jayashree Ghosh, Fundamental concepts of Applied chemistry Edition, S. Chand & company Ltd New Delhi, 2006.

Books for Reference

1. Siva Sankar B, Food processing and preservation, Prentice, Hall of India Pvt., Ltd., New Delhi 2002.
2. Arora M.G., Singh M., Polymer Chemistry-Anmol Punblications Pvt.Ltd., New Delhi, 2002.
3. B.K. Sharma, Industrial Chemistry Goel Publishing House, , Meerut, 2003.

SEMESTER III			
Core Skill Based	**Agricultural Chemistry and Water Management**		
Code :18UCHS31	**Hrs./Week:4**	**Hrs/ Sem : 60**	**Credits:4**

Vision

Facilitate the students to know the basic knowledge about agriculture and soil

Mission

- Realize the importance of agriculture
- Understand the chemistry behind fertilizers and pesticides
- Idea to create vermincompost
- Analyze the quality of drinking water

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	understand the importance of soil its constituents, fertility and to promote agriculture.	1, 7	Un
CO - 2	know the preparation and importance of fertilizers in agriculture	1, 7	Re
CO - 3	realize the importance of pesticides and insecticides	1, 7	Ap
CO - 4	understand the water quality standards and water quality parameters.	2, 3, 7	Un
CO - 5	aware of the harmful effects of pollutants Produce vermi compost and gobar gas	2, 3, 8	An,Cr
CO - 6	understand the processes used for purification of municipal water	4	Un
CO - 7	treat waste water by using different methods	4, 7, 8	Cr
CO - 8	estimate the amount of carbonate, chloride, nitrate, phosphate, zinc and calcium present in soil.	4, 7	Ap

SEMESTER III			
Core Skill Based Agricultural Chemistry and Water Management			
Code :18UCHS31	Hrs/Week:4	Hrs/ Sem 60	Credits:4

Unit I Soil Nature and Plant Nutrients

Saline, alkali and acid soils. Buffering capacity of soil - Soil reclamation. Liming of soil – measurement of soil pH - Soil fertility – essential plant nutrients and their functions – deficiency symptoms – macro and micro nutrients & their functions. Natural and synthetic manures-qualities of a good fertilizer- classification of fertilizers – nitrogeneous fertilizers - Preparation and importance of urea, calcium cyanamide - phosphatic fertilizers - preparation and importance of super phosphate, triple super phosphate- potash fertilizers - preparation and importance of potassium chloride and potassium nitrate -complex fertilizers - preparation and importance of DAP, mixed fertilizers (NPK) and human effluent from gobar gas plant as a manure. Vermiculture -vermi compost.

Unit II Pesticides

Pesticides, Insecticides, Repellants, Fungicides- Definition-classification – on the basis of their mode of action, target organisms they control, method of application- environmental hazards - preparation and uses of DDT, BHC, lead arsenate, bordeaux mixture, dithiocarbamates.

Unit III Water Quality Parameters

Water quality standard for drinking water (WHO)- Water quality parameters-pH, EC, alkalinity, Total acidity, hardness, DO, BOD, COD, salinity, nitrate (Methaemoglobinemia), phosphate and fluoride content – Eutrophication- Toxic metals - Heavy metal pollution –Hg, As, and Cd. Case studies (Minamata, arsenic poison in West Bengal, Itai-itai)

Unit IV Water Treatment

Waste water treatment-methods and equipments used-preliminary treatment (screening, skimming) - primary treatment (sedimentation, coagulation) - secondary treatment (trickling filters, oxidation pond, anaerobic digestion)-tertiary treatment (adsorption, ion-exchange, reverse osmosis, electrodialysis, disinfection)-treatment of water of municipal purposes-domestic sewage treatment-industrial waste water treatment.

Unit V LABORATORY WORK (Using Water analyzer and HPLC)

(Internal Evaluation Only)

1. Analysis of carbonate, chloride, nitrate, phosphate, zinc and calcium in soil.
2. Determination of Total Organic Carbon (TOC) in soil.
3. Determination of pH and conductivity of water from different sources.
4. Determination of DO, COD and hardness of water.
5. Samples will be collected from agro ecosystem. Presence of pesticides are recorded / Analysis using HPLC

Industrial Visit

A visit may be made to an industry or a premier institution.

*A report of the industrial visit may be submitted as an assignment.

Text Books

1. Text Book of pharmaceutical chemistry Jayashree Ghosh S.Chand and company, New Delhi 2003

2. K.Bagavathi Sundari, Applied Chemistry , MJP Publishers.2008

Books for Reference

1.B.K.Sharma, Industrial Chemistry, Goel Publishing House, Fifth Edition., 1993-94

2.P.S. Sindhu, Environmental Chemistry, New Age International Publishers.2010

SEMESTER III	
Self Study I	**Applied Chemistry**
Code :18UCHSS1 (Optional)	**Credit : +2**

Vision: Create awareness for employability in cottage industries

Mission: Develop a knowledge about the manufacture of soaps, paper, beverages and house hold articles

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	describe the process of manufacture of soaps	1,7	Re
CO - 2	aware of comparison of soaps and detergents.	5	Ap
CO - 3	list out the characteristics of good paint	1,7	Re
CO - 4	understand the constituents of varnishes and their functions	2,7	Un
CO - 5	describe the manufacture of sugar	2,5	Re
CO - 6	understand the manufacture of paper	2, 5,7	Un
CO - 7	know the chemistry of oils, fats and waxes and their manufacturing process	1, 7	Re
CO - 8	know the government regulations required for the usage of food additives in food products.	1,5,7	Re

SEMESTER III	
Self Study I	**Applied Chemistry**
Code :18UCHSS1 (Optional)	**Credit : +2**

Unit I Soaps and Detergents

Soap – definition and types – manufacture of different types of soaps (toilet soaps, transparent soaps and liquid soaps) and their uses – cleansing action of soaps. Detergents – classification of detergents (cationic, anionic and non-ionic) – comparison of soaps and detergents.

Unit II Paint and Varnishes

Purpose of surface coating – Paint – characteristics of good paint – constituents of paints – classification of paints – fluorescent paints (traffic signal), fire retardant paints – Varnishes – constituents and their functions. Emulsion paints.

Unit III Sugar and Paper Industry

Manufacture of sugar – recovery of alcohol from molasses – fermentation. Beverages preparation of beer and wine. Paper industry – Manufacture of paper.

Unit IV Pigments and Perfumes

Pigments – Definition – Examples – colours imparted by the pigments and their uses (lithopone, titanium dioxide, ultramarine blue, Red lead, chrome green)

P**erfumes –** Ingredients of perfumes- Isolation of essential oils – Artificial flavours – apple, grape, banana, pineapple, jackfruit (Naming of a few compounds only structure not needed)

Unit V Articles Of Day Today Life

An Outline of the preparation and uses of the following:

i) Candle ii) Tooth paste iii) Blackboard chalk iv) Moth balls
v) boot polish vi) Phenoyle vii) Cleaning powder viii) Face powder
ix) Lipstick x) Eyetex

Text book

1. Fundamental concepts of Applied chemistry, Jayashree Ghosh Edition S. Chand & company Ltd. New Delhi, 2006,

Books for Reference

1. Engineering chemistry by P.C. Jain and Monika Jain Dhanpat Rai & Sons, New Delhi, 1995.
2. Industrial Chemistry B.K.Sharma Goel Publishing House, Meerut, 2003.

SEMESTER V	
Self study Chemistry For Competitive Examination	
Code :18UCHSS3 (Compulsory)	**Credits : 2**

Vision: Prepare students to face competitive examinations

Mission:

- Classify the elements based on electronic configuration
- Know the importance of fullerenes in Nanoscience
- Know the importance of Hydrogen bonding in day today life

Course Outcome :

CO No.	Upon completion of this course, students should be able to	PSO addressed	CL
CO - 1	classify homogeneous and heterogeneous mixtures	1	Re
CO - 2	understand the separation principles used in metallurgy	1, 7	Un
CO - 3	know the Rutherford, J.J Thomson and Bohr's atomic models	1	Re
CO - 4	apply the principles governing the filling up of electrons in the orbitals	1	Ap
CO - 5	classify elements into s, p, d and f block	1, 3	Un
CO - 6	categorise Ionic, Covalent and Coordinate bond	1, 3	An
CO - 7	assess the difference between diamond and graphite.	1 ,6	Ev
CO - 8	know the desalination of water using Reverse Osmosis	5,7	Re

SEMESTER V	
Self Study **Chemistry for Competitive Examination**	
Code :18UCHSS3 (Compulsory)	**Credits : 2**

Unit I Matter

Definition— classification — physical classification, properties of solids, liquids and gases changes of physical state — chemical classifications — elements, compounds, mixtures — elements — definitions and their classifications viz. metals, non-metal and metalloids with example — physical states of some important elements. Compounds — definition — classifications viz. inorganic and organic compounds with examples. Some important compounds and their common names and uses — characteristics of compounds. Mixtures — definitions- classifications — homogenous and heterogeneous — examples — properties of mixtures — differences between compounds and mixtures. Separation of mixtures — techniques, principles and examples : Handpicking, sieving, magnetic separation, sublimation, sedimentation, Decantation, filtration, evaporation, Distillation, Crystallization.

Unit II Structure of Atoms

Atoms – Definition – Dalton's atomic theory - sub atomic particles - charges of sub - atomic particles discoveries of subatomic particles - atomic and mass number - isotopes - - symbols for elements - principles governing filling up of electrons in the orbitals - Electronic configurations of first twenty elements. Rutherford; J.J Thomson and Bohr!s atomic models - valency; formula and naming of compounds - Molecular mass and mole concept.

Unit III Classification of Elements and Periodicity of Properties

Classification of elements Doberiner, Newlands, Mendeleev and modern Periodic tables - Groups & Periods - classifications of elements into s, p, d and f block with examples - periodicity of properties - metallic character, atomic - ionic radii,. ionization potential energy, electron affinity and electronegativity.

Unit IV Chemical Bonding and Non - Metals

Need for the Chemical bond formation - introduction to ionic bond, covalent bond, co-ordinate bond and metallic bond - ionic bond formation - definition, and explanation using NaCl, - covalent bond - definition and explanation using H_2, O_2, N_2, CH_4, Properties of ionic and covalent compounds Noble gases and their applications - Halogens and their applications preparation and uses of hydrogen, phosphorus and sulphur, Differences between diamond and graphite.- Fullerenes.

Unit V Air and Water

Atmosphere - different layers of atmosphere and their compositions - composition of air - uses of various components of air - air pollution - sources, effects and control measures - water - abnormal properties of water and its explanation using H-bonding - Hard and soft water - temporary and permanent. hardness - Removal of hardness - Boiling, Clarks process, washing soda process, Calgon - Reverse osmosis -preparation and uses of distilled water.

Reference: Question Bank

SEMESTER- V			
Core VII (Common Core) Solid State and Material science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Vision: Understand the usage of the appropriate materials while designing electronic system.

Mission: Enrich the students to know the background theory and properties of different materials.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	understand the basic symmetry elements and operations of crystals.	1, 2	Un
CO - 2	distinguish the types of crystals and enumerate the various crystal imperfections.	3,4	An
CO - 3	get a clear knowledge about metallic glasses, ceramics and biomaterials.	1, 3, 5,7, 8	Re
CO - 4	justify the wave nature of matter and its experimental study.	1,3	Ev
CO - 5	apply Bragg's law for x-ray study.	2	Ap
CO - 6	distinguish magnetic materials based on susceptibility.	2	An
CO - 7	usage of magnetic materials in various field.	2	Ap
CO - 8	discuss the synthesis methods of nano materials.	2	Un

SEMESTER- V			
Core VII (Common Core) Solid State and Material science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/ Sem : 90**	**Credits : 4**

Unit-I Crystal structure and crystal imperfections

Crystal lattice -primitive and unit cell- Basic symmetry elements and operations - Plane of symmetry, centre of symmetry & axis of symmetry -Types of crystals - Bravais lattices - Simple cubic, body centered cubic, FCC, structures with an example - miller indices, inter planar spacing – crystal imperfections – point defects – Schottky and Frenkel defects – line defects – Edge & screw dislocations – surface defects – volume defects (imperfection).

Unit-II New materials

New materials – metallic glasses – Fiber reinforced plastics – Fiber reinforced metals – Bio materials – Ceramics – Cements – High temperature materials – intermetallic compounds - Alloys - Smart materials.

Unit-III Wave nature of matter and X-ray diffraction

Wave nature – introduction – De Broglie Hypothesis – experimental study of matter waves – Davison – Germer's experiment – Heisenberg's Uncertainity principle.

Bragg's law – Derivation of Bragg's equation - Experimental methods of X-ray study – Laue, rotating crystal and powder methods.

Unit-IV Magnetic and dielectric materials

Classification of magnetic materials – Langvein theory of diamagnetism – theory of paramagnetism– Domain theory of ferromagnetism – Antiferro magnetic materials – Application of Different magnetic materials.

Dielectric materials – Types of dielectric materials – different types of electric polarization –-Internal field – Clausius-Mossotti equation – Frequency and temperature dependence of dielectric constant.

Unit- V Nanomaterials

Nanomaterials- Synthesis- Plasma arcing – Chemical vapour deposition – Sol gels- Electro deposition – Ball milling –Properties of nano particles and applications. Carbon nanotubes fabrication – Arc method –Pulsed laser deposition- Chemical vapour deposition- Structure- Properties- Applications.

Text books

1. M.Arumugam, Material Science, Anuradha Publication 2008.
2. C M Sri Vasta & C Srinivasan, Science of Engineering materials, New Age International (P) Ltd, Second Edition,1999.
3. P. K. Palanisamy, Solid state Physics Copyright (2003), Scitech Publication (India) Pvt Ltd Chennai, 3rd reprint 2008.

4. R.Mureghesan, Modern Physics, Kiruthiga Sivaprasath, S.Chand & Co Ltd, 17th Edition, 2013.
5. Dr. P.Mani, A Text Book of Engineering Physics, Dhanam Publications Chennai, Revised Edition, 2008.

Books for Reference

1. Charles Kittel, Introduction to solid state Physics, John Wiley and Sons 2010
2. P. K. Palanisamy, Material Science, Scitech Publication (India) Pvt Ltd., Chennai, 2005.
3. M.H Fulekar, Nano Technology Importance and applications, I.K International Publishing House Pvt Ltd,2010.

SEMESTER I			
Part III Allied – I	**Allied Biochemistry -I**		
Course Code: 21UCBA11	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

OBJECTIVES:

- To acquire knowledge about the chemical composition of life.
- To Understand fundamental biochemical processes.
- To knowledge about vitamins and their deficiency.
- To study the functions of hormones.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	explain about the chemical composition and the elements of life.	1	Un
CO 2	differentiate direct and indirect method for the determination of energy requirement of man.	2	Un
CO 3	express the importance of bioenergetics.	7	Un
CO 4	compare the biological reaction such as exergonic reaction and endergonic reaction.	3	An
CO 5	demonstrate about the various energy rich compounds such as adenosine triphosphate, guanosine triphosphate, uridinetriphosphate, cytidinetriphosphate and acyl phosphate.	5	Ap
CO 6	distinguish water soluble and fat-soluble vitamins and analyze their composition, functions and deficiency symptoms.	3	An
CO 7	interpret the hormones producing organs and their functions and to know about the plant as well as animal hormones.	3,5	Cr ,Re
CO 8	identify the antibiotics which are all responsible for affecting cell wall synthesis, cytoplasmic membrane and enzyme systems.	7	Re

SEMESTER I			
Part III Allied – I Allied Biochemistry -I			
Course Code: 21UCBA11	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

UNITI: Introduction to Biochemistry

Introduction to biochemistry - scope – chemical composition of life – elements of life – water – biological importance – Energy requirements of the body – Measurement of energy value of foods – Determination of energy requirement of man – Direct method, Indirect method, Respiratory quotients (RQ) of food stuffs – Total heat production – Significance of RQ Basal metabolism – Definition – Conditions for measurement – Factors influencing, Measurement, Significance, Specific dynamic action.

UNIT: II Bioenergetics

Introduction – Importance of bioenergetics - Energy and work – thermodynamic principles - Biological reactions – Exergonic reaction – Endergonic reaction – Energy and its forms - Energy rich compounds – Adenosine triphosphate – Guanosine triphosphate – Uridine triphosphate – Cytidine triphosphate – Acyl phosphate - Energy coupling.

UNIT: III VITAMINS

Introduction – definition - Sources of vitamin – Deficiency diseases – provitamins – biological functions - Properties of Vitamins – Classification of vitamins - water soluble (Vitamin B_1, B_2, B_3, B_5, B_6, B_7, B_9 and B_{12}Vitamin C) and fat soluble vitamins (Vitamin – A, D, E and K) and their composition, functions and deficiency symptoms.

UNIT:IV Hormones

Introduction –Definition – Properties – Biological Functions – Chemical Nature – Hormones secreting glands – Hormones producing organs and their functions - Classification of hormones: based on chemical nature – Functions of Hormones – Plant hormones(Auxins, Gibberllins, Cytokinins, Ethylene, Traumatic acid, Absicisic acid, Morphactins) – Animal hormones (STH, TSH, FSH, LH, LTH, Insulin)

UNIT:V Antibiotics

Introduction – Definition – Antibiotics affecting cell wall synthesis (pencillin, cephalosporin) – Antibiotics affecting the cytoplasmic membrane – Antibiotics interfering with Nucleic acid function – Antibiotics inhibiting protein synthesis (streptomycin, erythromycin, neomycin)– Antibiotics affecting enzyme systems – Drug resistance.

Text Books:

1. Dulsy Fatima, Narayanan L.M, MeyyanPillai R.P, Nallasingam K, Prasanna Kumar S and Arumugam N. *Biochemistry*.Saras Publications, 2010.
2. Patricia trueman.*Nutritional Biochemistry*. MJP publisher, 2011.
3. Veerakumari L. *Biochemistry*. MJP Publishers, 2010.

Reference Books:

1. Dr. Deb A.C. Concepts of *Biochemistry.*Kolkatta:New Central Book Agency, 2001.
2. Powar C.B, Chatwal G.R, *Biochemistry.* Himalaya Publishing Ltd, 2002.

SEMESTER II			
Part III Allied - I	**Allied Biochemistry –II**		
Course Code: 21UCBA21	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

OBJECTIVES:

- To achieve broad based knowledge in concepts and principles of biochemistry.
- To provide an opportunity in acquiring knowledge about nutritional biochemistry.
- To understand the various pathways involved in cell respiration.
- To grasp in-depth knowledge about the biochemistry of blood and respiration.
- To familiarize the learners with the techniques involved in biochemistry.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	discuss in detail about the nutritional values of milk, egg, meat, fish, vegetable foods, fruits, tea, coffee, cocoa and alcohol.	1	U
CO 2	demonstrate the theories of biological oxidation decarboxylation, electron transport system and oxidative phosphorylation.	5	C
CO 3	describe the functions of blood and to discuss in brief about red blood cells, white blood cells, blood platelets, plasma and plasma protein.	1	An
CO 4	formulate how the minerals are important in our life.	1	U
CO 5	relate the physical and chemical transport of blood.	1	U
CO 6	interpret the various minerals and their recommended levels in food.	2	R
CO 7	compare the relation between optical and electron microscope.	1	E
CO 8	identify the separated components using paper as well as gel electrophoresis.	6	Ap

SEMESTER II			
Part III Allied - I	**Allied Biochemistry –II**		
Course Code: 21UCBA21	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 3**

UNIT I: Nutritional Biochemistry

Nutritive value ofMilk – Egg – Meat - Fish – Vegetable food (Cereals, Pulses, Nuts, Roots and Tubers, Green leafy vegetables) – Fruits – Tea – Coffee – Cocoa – Alcohol – Principles in balancing a diet - Bioavailability – absorption –effect of drugs on food intake, body weight, nutrient requirements and growth, vitamins and minerals – Energy yielding, Body building and Protective foods.

UNIT II: Cell Respiration and Biological Oxidation

Introduction – Importance of Biological oxidation – Theories of biological oxidation : oxygen activation theory, hydrogen activation theory – Hydrogen acceptors – Nicotinamide nucleotide – Flavin nucleotide – Cytochrome – Sites – Pathways – Oxidative decarboxylation – Electron transport system – Oxidative Phosphorylation – Energetics of Biological oxidation.

UNIT III: Biochemistry of Blood

Introduction –Composition -Colour of Blood - Functions of Blood – (Homeostatic functions, Blood as transport system)- Red Blood Cells – White Blood Cells– Blood Platelets – Plasma – Plasma proteins – Albumin, Globulin (alpha, beta and gamma), Fibrinogen – Functions of plasma proteins - Blood groups – Prevention of Blood Loss -Hemoglobin – Variation in structure Hemoglobin with reduced solubility, altered oxygen affinity.

UNIT IV: Minerals

Introduction – Classification (Macro elements, Micro elements) –Functions, Distribution, Content level in blood , sources, Recommended Dietary allowances, Absorption and excretion, Factors affecting absorption, Deficiency Disease of Calcium, Phosphorous, Sodium, Potassium, Iron, Copper, Iodine, Fluorine, Zinc and Chromium.

UNIT V: Biochemical Techniques

Introduction –Cell Fractionation (Homogenization, Centrifugation) - Centrifuge – Principle, types – Hand Centrifuge, High Speed Centrifuge – pH meter – Principle, Electrodes used, Applications – Microscopy: Optical and electron Microscope – comparison – Ion probe analysis – Electrophoresis – Paper electrophoresis, Gel electrophoresis – Applications.

Text Books:

1. Dulsy Fatima, Narayanan L.M, MeyyanPillai R.P, Nallasingam K, Prasanna Kumar S and Arumugam N. *Biochemistry*. Saras Publications, 2010.
2. Patricia trueman.*NutritionalBiochemistry*. MJP publisher, 2011.
3. Veerakumari L. *Biochemistry*. MJP Publishers, 2010.

Reference Books:

1. Dr. Deb A.C.*Concepts of Biochemistry.*Kolkata: Central Book of Agency, 2001.

2. Powar C.B, Chatwal G. R. *Biochemistry*. Himalaya Publishing Ltd, 2002.

SEMESTER I			
Part III Allied - I	**Allied Chemistry -I**		
Course Code: 21UCH A11	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Objective

- To develop an appreciation of Chemistry and its application in daily life.
- To understand the importance of quantum numbers.
- To know the fundamental concepts in organic chemistry.
- To know the basic concepts of nuclear reactors.
- To recognize the significance of Chromatography.
- To develop skills to separate the plant materials using Chromatographic technique.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Know the quantum numbers and electronic configuration	**1**	**Un**
CO 2	Compare the configuration of H_2,N_2 ,O_2	**2**	**Ap**
CO 3	Understand hybridization of different organic molecules	**1**	**Un**
CO 4	Differentiate resonance and tautomerism	**1**	**An**
CO 5	Know the difference between chemical reaction and nuclear reaction	**1**	**Re**
CO 6	Identify the importance of rock dating and carbon dating	**3**	**An**
CO 7	Describe the configuration of D-glucose, D-fructose, D-mannose and D-galactose and recognize the test for identification of proteins	**5**	**Ap**
CO 8	Identify the good adsorbent for Chromatographyand Correlate the importance of chromatography in the field of phytochemistry	**3, 5**	**An**

UNIT I: Atomic Structure and Chemical Bonding

Quantum numbers and their significance- Pauli's exclusion principle – Aufbau principle – Hund's rule – Electronic configuration of elements (atomic number 1 to 36)

Lattice energy – Born-Harber cycle–Factors affecting the dissolution of ionic compounds – M.O. Theory of covalent bond – Bonding, antibonding and non bonding orbital – M.O. Configuration of H_2,N_2 ,O_2-Bond order – Band theory of metallic bond- Conductors, insulators, semi conductors- Hydrogen bonding – types and effects – Vander Wall's London forces.

UNIT II: Basic Concepts in Organic Chemistry

Hybridization -Hybridization in methane(sp3) , ethylene (sp2), acetylene(sp). electrophilies – nucleophilies –Types of organic reactions- Substitution – Addition – ,elimination- polymerization reactions – Aromaticity - Huckel's rule - benzenoid and non-benzenoid- aromatic compounds-Examples.

Isomerism-Optical isomerism-symmetry-elements of symmetry-cause of optical activity- Resolution-racemisation- Geometrical isomerism-illustrated by maleic and fumaric acid-keto enol tautomerism-examples- difference between resonance and tautomerism.

UNIT III: Nuclear Chemistry

Fundamental particles of nucleus - isotopes, isobars, isotones and nuclear isomers. Differences between chemical reactions and nuclear reactions-fusion and fission and its applications - radioactive series, group displacement law- mass defect- Applications of radio isotopes-carbon dating-rock and medicinal applications.

UNIT IV Biomolecules

Carbohydrates- classification- configurations of D-glucose, D-fructose, D-mannose and D-galactose (structures only) – interconversions of glucose and fructose-interconversions of arabinose and glucose-epimerisation- muta rotation- general study of starch and cellulose.

Amino acids - classification-essential amino acids-isolation from proteins- peptide linkage-polypeptides. Proteins- classification- colour reactions- structure.

UNIT V Chromatography

Chromatography-Classification-AdsorptionChromatography-Principle–Adsorbents Characteristics of good Adsorbents- Principle, Experimental method and applications of Column Chromatography- -Thin layer Chromatography- Ion Exchange Chromatography

Text Books:

1. Arun Bahl and Bahl. B.S. *Advanced Organic Chemistry*. S.Chand and Company Ltd, Reprint, 2005.

2. Puri B.R, Sharma L.R and Kalia K.C .*Principles of Inorganic Chemistry*. Delhi: Milestone Publishers and Distributers, 2010.

3. Arun Bahl B.S. and Bahl, Tuli. G.D. *Essentials of Physical Chemistry*,New Delhi: S.Chand & Company Ltd, 2008.

Books for Reference :

1. Jerry March. *Advanced Organic Chemistry, Reactions Mechanisms and Structure*. 4th Edition, 2013.

2. Tewari, K.S., Vishnoi, N.K. and S.N.Mehrotra.*A Text Book of Organic Chemistry*. 2 nd Revised Edition, 1998.

3. Puri B.R, Sharma L.R and Madan Pathania S. *Principles of Physical Chemistry*. Vishal Publishing Co, 2008.

4. Jain M.K and Sharma S.C.*Modern Organic chemistry*. Vishal Publishing Co.,2012.

SEMESTER II			
PartIIIAllied - I	**ALLIED CHEMISTRY -II**		
Course Code: 21UCHA21	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Objective

- To acquire an appropriate knowledge and understanding in Chemistry underlying inmetallurgical process and industrial important polymers.
- To knowledge on steps involved in metallurgical process
- To know the importance of colloids in day to-day life
- To know the importance of synthetic reagents in organic chemistry.
- To appreciate the importance of nanochemistry in various fields.

Course outcomes

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Explain the methods of purification of ores and differentiate ores and minerals.	**1**	**Un**
CO 2	Know the types of furnaces.	**1**	**Un**
CO 3	Correlate the importance of colloids in day to day life.	**5**	**An**
CO 4	Know the types of emulsions and emulsifiers.	**4**	**Re**
CO 5	Know the importance of synthetic reagents.	**1**	**Re, Un**
CO 6	Know the importance of Saccharin-chloramine-T-Salicylic acid –Aspirin.	**1**	**Un**
CO 7	Determine the structure of various alkaloids and know the importance of isoprene rule in terpenoids.	**4, 1**	**ApRe , Un**
CO 8	Describe the synthesis methods of nano materials and Correlate the importance of nanochemistry in various fields.	**5**	**Un, An**

UNIT I: Metallurgy

Ores and Minerals- types of ores – methods of ore dressing- roasting –calcination, reduction of metal oxide by aluminium (aluminothermic process)-smelting- flux and slag -purification by electrolysis and ion exchange method - oxidative refining- zone refining- Kroll process - van Arkel de Boer method- types of furnaces – kilns – blast – reverberatory- muffle and electric furnace. Extraction, properties and uses of titanium and vanadium. Preparation of Titanium tetrachloride and Vanadium pentoxide.

UNIT II: Colloids and Emulsions

Definition- Classification of Colloids –comparison of lyophilic and lyophobic colloids- Preparationof sols-Dispersion method(Bredig's Arc method) –Aggregation method(oxidation , reduction,double decomposition)-Properties – Optical(Tyndall effect) – kinetic(Brownian movement)Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze law – protective colloids – gold number – Gels – classification, preparation properties(imbibition,synerisis and thixotropy). Emulsion – types and their distinction.Emulsifiers – surfactants– applications of colloids-food, medicine, thixotropic paints, clarification of municipal water, formation of delta.

UNIT III: Synthetic Reagents and Some Important Organic Compounds

Synthetic reagents-preparation, properties of ethyl zinc-methyl lithium-diethyl malonate and tetra ethyl lead (TEL)

Preparation and properties and uses of Saccharin- chloramines -T-Salicylic acid– Aspirin.

UNIT IV: Alkaloids and Terpenoids

Alkaloids-Definition-General methods of structure determination- Hoffmann's exhaustive methylation with coniine as example- structure and synthesis of coniine and nicotine.

Terpenes-Definition-classification-examples-isoprene rule-general methods of structure determination- structure and synthesis of citral and menthol.

UNITV Nanochemistry

Nanoparticles – Definition – Types– nanoparticles of metals, semiconductors and oxides – Synthesis of nano sized compounds – reduction methods, sol-gel method– nanoclusters – nanorod- nano wire and uses . Carbon nanotubes – single walled nanotube- multiwalled nanotube. Application of nanochemistry in various fields.

Text Books:

1. Arun Bahl and Bahl B.S. .*Advanced Organic Chemistry*. S.Chand and Company Ltd. Reprint, 2005.
2. Puri B.R, Sharma L.R. and Kalia K.C .*Principles of Inorganic Chemistry*.Delhi: Milestone Publishers and Distributers, 2010.
3. Arun Bahl B.S. and Bahl, Tuli G.D. *Essentials of Physical Chemistry*. S.Chand& Company Ltd.New Delhi, 2008.

Books for Reference :

1. Jerry March. *Advanced Organic Chemistry, Reactions Mechanisms and Structure.* 4th Edition,2013.
2. Tewari N, Vishnoi K.S, and Mehrotra S.N. *A Text Book of Organic Chemistry*. 2 nd Revised Edition,1998.
3. Puri B.R, Sharma L.R and Madan S. Pathania. *Principles of Physical Chemistry*. Vishal Publishing Co, 2008.
4. Jain M.K. and Sharma S.C. *Modern Organic chemistry*. Vishal Publishing Co., 2012.

SEMESTER III			
Part III Allied - I	**ALLIED CHEMISTRY -I**		
Course Code:21UCHA31	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Vision : Develop an appreciation of Chemistry and its application in daily life

Mission :

- Understand the importance of quantum numbers.
- Know the fundamental concepts in organic chemistry.
- Know the basic concepts of nuclear reactors.
- Recognize the significance of Chromatography.
- Develop skills to separate the plant materials using Chromatographic technique.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Know the quantum numbers and electronic configuration	**1**	**Un**
CO 2	Compare the configuration of H_2,N_2 ,O_2	**2**	**Ap**
CO 3	Understand hybridization of different organic molecules	**1**	**Un**
CO 4	Differentiate resonance and tautomerism	**1**	**An**
CO 5	Know the difference between chemical reaction and nuclear reaction	**1**	**Re**
CO 6	Identify the importance of rock dating and carbon dating	**3**	**An**
CO 7	Describe the configuration of D-glucose, D-fructose, D-mannose and D-galactose	**5**	**Ap**
CO 8	Recognize the test for identification of proteins	**1**	**Re**
CO 9	Identify the good adsorbent for Chromatography	**3**	**An**
CO 10	Correlate the importance of Chromatography in the field of phytochemistry	**5**	**An**

UNIT I ATOMIC STRUCTURE AND CHEMICAL BONDING

Quantum numbers and their significance- Pauli's exclusion principle – Aufbau principle – Hund's rule – Electronic configuration of elements (atomic number 1 to 36)
Lattice energy – Born-Harber cycle–Factors affecting the dissolution of ionic compounds – M.O. Theory of covalent bond – Bonding, antibonding and non bonding orbital – M.O. Configuration of H_2,N_2 ,O_2-Bond order – Band theory of metallic bond- Conductors, insulators, semi conductors- Hydrogen bonding – types and effects – Vander Wall's London forces

UNIT II BASIC CONCEPTS IN ORGANIC CHEMISTRY

Hybridization -Hybridization in methane(sp3) , ethylene (sp2), acetylene(sp). electrophilies – nucleophilies –Types of organic reactions- Substitution – Addition – ,elimination- polymerization reactions – Aromaticity - Huckel's rule - benzenoid and non-benzenoid- aromatic compounds-Examples.

Isomerism-Optical isomerism-symmetry-elements of symmetry-cause of optical activity- Resolution-racemisation- Geometrical isomerism-illustrated by maleic and fumaric acid-keto enol tautomerism-examples- difference between resonance and tautomerism

UNIT III NUCLEAR CHEMISTRY

Fundamental particles of nucleus - isotopes, isobars, isotones and nuclear isomers. Differences between chemical reactions and nuclear reactions-fusion and fission and its applications - radioactive series, group displacement law- mass defect- Applications of radio isotopes-carbon dating-rock and medicinal applications.

UNIT IV BIOMOLECULES

Carbohydrates- classification- configurations of D-glucose, D-fructose, D-mannose and D-galactose (structures only) – interconversions of glucose and fructose- interconversions of arabinose and glucose-epimerisation- muta rotation- general study of starch and cellulose

Amino acids - classification-essential amino acids-isolation from proteins- peptide linkage-polypeptides. Proteins- classification- colour reactions- structure.

UNIT V CHROMATOGRAPHY

Chromatography-Classification-AdsorptionChromatography-Principle–Adsorbents
Characteristics of good Adsorbents- Principle, Experimental method and applications of Column Chromatography- -Thin layer Chromatography- Ion Exchange Chromatography

Text Books:

1. Arun Bahl and B.S. Bahl, Advanced Organic Chemistry. S.Chand and Company Ltd., Reprint, 2005.

2. Puri, B.R., Sharma, L.R. and K.C.Kalia, Principles of Inorganic Chemistry. Milestone Publishers and Distributers, Delhi, 2010.

3. Arun Bahl, B.S. and Bahl, G.D.Tuli, Essentials of Physical Chemistry. S.Chand &Company Ltd., New Delhi, 2008..

Books for Reference :

1. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure. 4th Edition, 2013.

2. Tewari, K.S., Vishnoi, N.K. and S.N.Mehrotra, A Text Book of Organic Chemistry. 2 nd Revised Edition, 1998..

3. Puri, B.R., Sharma, L.R. and Madan S. Pathania, Principles of Physical Chemistry, Vishal Publishing Co, 2008..

4. Jain, M.K. and S.C.Sharma, Modern Organic chemistry. Vishal Publishing Co. 2012

SEMESTER IV			
Part III Allied - I	**ALLIED CHEMISTRY -II**		
Course Code: 21UCHA41	**Hrs/Week :4**	**Hrs/ Sem : 60**	**Credits : 3**

Vision : Acquire an appropriate knowledge and understanding in Chemistry underlying inmetallurgical process and industrial important polymers.

Mission :

Knowledge on steps involved in metallurgical process

Know the importance of colloids in day to-day life

Significance of synthetic reagents in organic chemistry.

Importance of nanochemistry in various fields.

Course outcomes

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Explain the methods of purification of ores and differentiate ores and minerals	**1**	**Un**
CO 2	Know the types of furnaces	**1**	**Un**
CO 3	Correlate the importance of colloids in day to day life	**5**	**An**
CO 4	Know the types of emulsions and emulsifiers	**4**	**Re**
CO 5	Know the importance of synthetic reagents	**1**	**Re, Un**
CO 6	Know the importance of Saccharin-chloramine-T-Salicylic acid -Aspirin	**1**	**Un**
CO 7	Determine the structure of various alkaloids	**4**	**Ap**
CO 8	Know the importance of isoprene rule in terpenoids	**1**	**Re, Un**
CO 9	Describe the synthesis methods of nano materials.	**5**	**Un**
CO 10	Correlate the importance of nanochemistry in various fields	**5**	**An**

UNIT I METALLURGY

Ores and Minerals- types of ores – methods of ore dressing- roasting –calcination, reduction of metal oxide by aluminium (aluminothermic process)-smelting- flux and slag -purification by

electrolysis and ion exchange method - oxidative refining- zone refining- Kroll process - van Arkel de Boer method- types of furnaces – kilns – blast – reverberatory- muffle and electric furnace. Extraction, properties and uses of titanium and vanadium. Preparation of Titanium tetrachloride and Vanadium pentoxide

UNIT II COLLOIDS AND EMULSIONS

Definition- Classification of Colloids –comparison of lyophilic and lyophobic colloids- Preparation of sols-Dispersion method (Bredig's Arc method) –Aggregation method(oxidation , reduction,double decomposition)-Properties – Optical(Tyndall effect) – kinetic(Brownian movement)Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze law – protective colloids – gold number – Gels – classification, preparation properties(imbibition,synerisis and thixotropy). Emulsion – types and their distinction.Emulsifiers – surfactants– applications of colloids-food, medicine, thixotropic paints, clarification of municipal water, formation of delta.

UNIT III SYNTHETIC REAGENTS AND SOME IMPORTANT ORGANIC COMPOUNDS

Synthetic reagents-preparation, properties of ethyl zinc-methyl lithium-diethyl malonate and tetra ethyl lead (TEL)

Preparation and properties and uses of Saccharin- chloramines -T-Salicylic acid - Aspirin

UNIT IV ALKALOIDS AND TERPENOIDS

Alkaloids-Definition-General methods of structure determination- Hoffmann's exhaustive methylation with coniine as example- structure and synthesis of coniine and nicotine

Terpenes-Definition-classification-examples-isoprene rule-general methods of structure determination- structure and synthesis of citral and menthol

UNIT V NANOCHEMISTRY

Nanoparticles – Definition – Types– nanoparticles of metals, semiconductors and oxides – Synthesis of nano sized compounds – reduction methods, sol-gel method– nanoclusters – nanorod- nano wire and uses . Carbon nanotubes – single walled nanotube- multiwalled nanotube. Application of nanochemistry in various fields.

Text Books:

1. Arun Bahl and B.S. Bahl.. Advanced Organic Chemistry. S.Chand and Company Ltd., Reprint, 2005
2. Puri, B.R., Sharma, L.R. and K.C.Kalia,. Principles of Inorganic Chemistry. Milestone Publishers and Distributers, Delhi, 2010.
3. Arun Bahl, B.S. and Bahl, G.D.Tuli. Essentials of Physical Chemistry. S.Chand &Company Ltd., New Delhi, 2008..

Books for Reference :

1. Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure. 4th Edition, 2013.
2. Tewari, K.S., Vishnoi, N.K. and S.N.Mehrotra. A Text Book of Organic Chemistry. 2 nd Revised Edition, 1998..
3. Puri, B.R., Sharma, L.R. and Madan S. Pathania, Principles of Physical Chemistry. Vishal Publishing Co, 2008.
4. Jain, M.K. and S.C.Sharma, Modern Organic chemistry. Vishal Publishing Co. 2012.

SEMESTER- I			
Part III	**Core I**	**General Chemistry - I**	
Course Code :21UCHC11	**Hrs/Week:6**	**Hrs/ Sem: 90**	**Credits:5**

Objectives

- To apply methods of balancing redox reactions
- To communicate the concepts and results of their laboratory experiments clearly and concisely to both chemists and non-chemists through effective writing and oral communication skills
- To inculcate the students the basic principles and concepts in Chemistry.
- To understand the basic chemical principles in Inorganic, Organic and Physical Chemistry.

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	explain the periodic properties of the different groups of compounds focusing on production methods.	1	Un
CO 2	know the nomenclature of different class of organic compounds.	1	Re
CO 3	associate polarization of a bond with electronegativity.	1	Un
CO 4	know the basic knowledge about the fundamental concept of quantum mechanics.	1	Un
CO 5	understand quantum numbers and to know the rules for filling up of orbitals and predict electronic arrangement in orbits.	4	Ev
CO 6	understand the basis of fundamental particles , natural and artificial radioactivity, nuclear forces and nuclear stability.	1	Un
CO 7	apply the theory of radioactivity and nuclear reactions in various fields.	3	Ap
CO 8	apply the knowledge about interfering radicals, common ion effect and solubility product.	8	Ap

SEMESTER- I			
Part III	**Core I**	**General Chemistry - I**	
Course Code :21UCHC11	**Hrs/Week:6**	**Hrs/ Sem: 90**	**Credits:5**

UNIT I: Periodic Properties and Concept Of Electron Transfer

Modern periodic law- long form of periodic table – merits and demerits– Abundance of elements- cosmic, terrestrial and relative abundance – classification of elements based on their electronic configuration- Major trends in periodic table – Slater's rule- calculation of effective nuclear charge - periodic properties – trends in ionic and covalent radii , ionization energy, electron affinity and electro negativity –factors affecting ionization energy, electron affinity and electro negativity- scales of electro negativity – Alfred-Rochow's scale – Pauling scale – Mulliken approach – applications of electro negativity.

Concept of electron transfer -Oxidation and reduction – Oxidation number concept of oxidation and reduction- Rules for assigning oxidation number –Electronic concept in inorganic reactions – Redox reactions – oxidant- Important Oxidants and their reduction half reaction – Fe(III) and $KMnO_4$–Reductant -important reductants and their oxidation half reaction Fe(II) and oxalic acid. Methods of balancing redox reactions ion electron method, oxidation number method.

UNIT II: Basic Concepts of Organic Chemistry

Classification and nomenclature of organic compounds – Open chain and closed chain compounds- systems of naming organic compounds- rules of IUPAC system of nomenclature branched alkanes, cyclo alkanes – alkenes, alkynes and substituents-compounds having functional groups, poly functional groups.

Molecular weight determination of organic acids and bases by silver salt and platinic chloride methods. Problems arriving empirical and molecular formula using percentage composition of elements and molecular weight.

Structural formula – Shapes of organic molecules. sp^3, sp^2 and sp hybridization in organic compounds with suitable examples.

Polar effects – Inductive (+I, –I), Electromeric effect-Resonance/Mesomeric effect (+R, -R, +M, –M) – examples- Hyper conjugation (Baker Nathan effect) and steric effect.

Bond fission – homolytic and heterolytic fission. Reaction intermediates – carbocation, carbanion, free radicals and carbenes – their generation, shapes and stability. Types of reaction-substitution- elimination –addition – polymerisation-definition and examples.

UNITIII: Basic Quantum Chemistry

Dual character of an electron-de Broglie equation- Heisenberg's uncertainty principle-Introduction to quantum mechanics-fundamental postulates-Schrodinger wave equation- – eigen value – eigen function – significance of ψ and ψ^2-charge cloud concept and orbitals-Shapes of s, p and d atomic orbitals-nodal planes-g and u character in atomic orbitals-Radial and angular parts of the wave functions and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation)-radial and angular nodes and their significance.

Quantum numbers-origin-principal – orbital – angular momentum and spin quantum number-Significance of quantum numbers-Rules for filling electrons in various orbitals-Pauli's exclusion principle-Hund's rule-Aufbau principle- sequence of filling up of orbitals-schematic representation of electronic configuration- anomalous electronic configurations.

UNIT IV: Nuclear Chemistry

Isotopes, isobars and isotones – unit of radioactivity--half-life period – radioactive equilibrium – SoddyFajan's displacement law – Theory of radioactivity – radioactive series – artificial transmutation of elements – natural and induced radioactivity – Constitution of nuclei – stability of nuclei and (n/p) ratio – magic number, mass defect, mass energy relationship, binding energy and calculation of binding energy from mass defect-nuclear fusion and fission reactions – Plutonium and Hydrogen bombs – applications of Radioactivity in medicine-industry-agriculture– tracer technique- carbon dating-rock dating-neutron activation analysis-particle accelerators: linear accelerator – cyclotron.

UNIT V: Analytical Methods

Analytical Chemistry - Chemical Analysis - Types of Chemical Analysis – Qualitative and Quantitative Analysis- Volumetric Analysis – Principle – Standard Solutions – Normality and Molarity – Principles of Titrations – Theory of Indicators - Types of Titrations – Acidimetry, Alkalimetry, Permanganometry, Dichrometry, Iodometry, Argentometry, Complexometry.

Principles of gravimetric analysis – precipitation methods – conditions of precipitation – coprecipitation and post precipitation

Qualitative Inorganic Analysis – Dry Test, Flame Test, Wet Test – Common ion effect and solubility product- Testing of Simple and Interfering Acid Radicals- Test for sulphide, sulphate, nitrate (brown ring test), bromide and iodide (silver nitrate test),chloride and chromate (chromyl chloride test), oxalate and fluoride (calcium chloride test), borate (ethyl borate test), phosphate (ammonium molybdate test) – Elimination of Interfering Acid Radicals – Chromate-Oxalate- fluoride – phosphate -Identifying the Groups of Basic Radicals – Testing of the Basic Radicals belonging to different Groups - Test for lead, copper, cadmium, antimony, bismuth, cobalt, nickel, manganese, zinc, barium, strontium, calcium, magnesium and ammonium-

Error analysis: Accuracy – Precision – Error – Types of Errors – Mean – Median – Mode – Standard Deviation – Variance – Normal Distribution Curve

Text Books:

1. Puri B.R, Sharma L.R., Kalia K.C.. *Principles of Inorganic Chemistry*. Delhi : Milestone publishers and distributers, 2010.
2. Tewari K.S, Vishnoi N.K, Mehrotra S.N. *A Text Book of Organic Chemistry*. Vikas Publishing2nd Revised Editions 1998.
3. ArunBahl, B.S.Bahl, G.D.Tuli.*Essentials of Physical Chemistry*.New Delhi:S.Chand and Company Ltd.,Revised edition 2008.

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Books for Reference:

1. Puri , Sharma B.R, , Madan L.R S. Pathania. *Principles of Physical Chemistry*. Vishal Publishing Co, 2008.
2. Arun Bahl and Bahl B.S. *Advanced Organic chemistry*.S.Chand and Company Ltd., Reprint 2005.
3. Tewari N. *Advance Organic Reaction mechanism Books and allied (P) Ltd*. Kolkata : Second revised edition 2005.
4. Jain M. K and Sharma S. C. *Modern Organic Chemistry*. Vishal Publishing Company, 2008.

SEMESTER- II			
Part III **Core II** **General Chemistry-II**			
Course Code :21UCHC22	**Hrs/Week:6**	**Hrs/ Sem: 90**	**Credits:5**

Objectives

- To recall the basic methods of purification of ores.
- To understand the basic concepts of Stereochemistry.
- To know the importance of halogen compounds.
- To have an idea about the properties of alkenes, alkynes and aromatic substitution.
- To acquire knowledge in colligative properties.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	recall the methods of purification of ores	1	Re
CO 2	understand the concept behind the different types of furnaces	1	Un
CO 3	explain the general characteristics and digital relationship of alkali and alkaline earth metals	2	Un
CO 4	discuss the preparation and uses of some alkali and alkaline earth metal compounds	3	Un
CO 5	interpret the elements of symmetry, chirality, Newman projection ,Sawhorse & Fischer formulae Know about the conformational analysis	1	Un
CO 6	apply the Cahn Ingold Prelog rule for ascertaining the geometric configuration (cis or trans and/or E or Z)	2	Un
CO 7	predict the mechanism of aromatic substitution reactions and effect of o,m& p directing group and discriminate terminal & non-terminal alkynes, the acidic nature of acetylenic hydrogen	3, 6	Cr An
CO 8	apply the principle of colligative properties in day to day life like kidney dialysis, reverse osmosis and know the experimental methods of determining the colligative properties	4	Re Ap

UNITI: General Principles of Extraction of Metals

Minerals and ores -different steps of metallurgy – crushing and grinding of the ore – concentration of the ore – hand picking - gravity separation (Hydraulic Washing) -

electromagnetic separation – electrostatic separation – froth flotation process – leaching-calcination – roasting –difference between calcination and roasting – reduction to free metals – reduction by displacement, thermal decomposition, carbon (smelting), heating in air, an electro positive metal (Gold Schmidt's aluminothermic process) – Kroll's process. Refining of impure metals – thermal refining - distillation, liquation – vapour phase refining - Van Arkel process - Mond's process- electrolytic process- zone refining process. Elingham diagram- Types of furnaces – Fuel fired – blast, reverberatory, vertical retort and muffle – Electric furnace – Arc furnaces – types - resistance furnace.

UNIT II: s and p Block Elements

General characteristics of IA and IIA group elements – diagonal relationship of lithium with magnesium – anomalous behaviour of lithium and beryllium – extraction of lithium and beryllium. Sodium carbonate and sodiumbicarbonate – manufacture – properties and uses – principle of fire extinguisher.Boron – classification and nomenclature of boron hydrides – preparation, structure and uses of diborane – boron trihalides as Lewis acid – relative strength of boron trihalides. Oxo compounds of boron – ortho boric acid – preparation, properties and uses Borax bead test. Carbides – Classification with examples – Preparation, Properties, uses and structure of Calcium Carbide, Boron Carbide, Aluminium Carbide and Silicon Carbide –Preparation, Properties and uses of Carbonyl Chloride and Carbon disulphides.Halogens - Peculiarities of fluorine – manufacture of fluorine – etching on glass. Hydrides of halogens (hydrogen halides) - Interhalogen compounds – preparation and structure of interhalogen compounds. Pseudohalogenpolyhalides and basic nature of iodine.

UNIT III: Stereochemistry

Stereoisomerism – Optical activity of compound with one and two chiral centres. Elements of symmetry – Plane of symmetry, axis of symmetry and centre of symmetry.

Enantiomers and diastereo isomers (d, 1 and meso forms) with examples – asymmetric and dissymmetric molecules.

Conventions used in stereochemistry: Newman, Sawhorse and Fischer notations and their interconversions.

Cahn Ingold Prelog conversion DL and RS configuration.-notations for compounds containing more than one asymmetric C-atoms racemisation and methods of resolution of racemic mixture – Walden inversion – Stereochemistry of diphenyl compounds and allenes with examples. Geometrical isomerism – Definition – cis – trans and syn – anti concept E-Z notation. conformational analysis of cyclohexane.

UNIT IV: Hydrocarbons and Halogen Compounds

Alkenes – Mechanism of addition reaction to alkenes – Markanikow's rule- Peroxide effect epoxidation – ozonolysis. Dienes Classification –Conjugated dienes –(1,2 &1,4-addition)- Diel's Alder reaction. Alkynes – terminal & non-terminal alkynes – acidic nature of acetylenic hydrogen atom. Aromatic hydrocarbon- Concept & Condition – Huckel's Rule-Aromatic, antiaromatic & non- aromatic compounds – Mechanism of aromatic electrophilic & Nucleophilic substitution reactions- Orientation (Electronic concept) – direct influence of substitution o,m & p directing – Benzyne mechanism.

Aliphatic halogen compounds –Mechanism of S_N1, S_N2, E1, E2 reaction – Halogen derivatives- Preparation and properties of Vinyl chloride – Allyl chloride – Preparation & uses of Chloroprene- Aromatic halogen compounds – Preparation and reaction of benzyl chloride – Nuclear & Side chain halogen compounds distinction- relative reactivities of alkyl,aryl, vinyl and allyl halides.

UNIT V: Colligative Properties

Definition- lowering of Vapour Pressure-- Raoult's Law - measurement of vapour pressure lowering-– Ostwald and Walker's Dynamic method – Elevation of boiling point and its determination- Landsberger –walker method. Depression of freezing point and its

determination –Rast's Camphor method –Abnormal molecular masses of electrolytes –

Relation between Van't Hoff factor and degree of association and dissociation

Osmosis-Definition - -Some Interesting Experiments Demonstrating Osmosis-Silica Garden- Semipermeable Membranes -Preparation of Cupric Ferrocyanide Membrane - Osmotic Pressure -Kidney Dialysis-Determination of Osmotic Pressure-Berkeley And Hartley's Method –Modern Osmometer –Isotonic Solutions -Theories of Osmosis - Membrane Solution Theory -Vapour Pressure Theory- Reverse Osmosis-Desalination of Sea Water By Hollow-Fibre Reverse Osmosis-Nanotube Membranes- Laws of Osmotic Pressure –Boyle Van't Hoff Law For Solutions - Charles'-Van't Hoff Law For Solutions- Van't Hoff Equation For Solutions -Avogadro-Van't Hoff Law For Solutions -Van't Hoff Theory of Dilute Solutions - Calculation of Osmotic Pressure-Determination of Molecular Weight – Relation Between Vapour Pressure And Osmotic Pressure Osmotic Pressure of Electrolytes.

Text Books:

1. Puri B.R, Sharma L.R, Kalia K.C . *Principles of Inorganic Chemistry*.Delhi:Milestone Publishers and distributers, 2010.
2. Tewari K.S, Vishnoi N.K, Mehrotra S.N . *A Text Book of Organic Chemistry*. 2nd Revised Editions, 1998.
3. Kalsi P.S .*Stereochemistry Conformation and Mechanism*.New Age International, 2005.
4. ArunBahl, Bahl B.S, Tuli G.D . *Essentials of Physical Chemistry*.New Delhi:S.Chand and Company Ltd.,Revised edition 2008.

Books for Reference:

1. Puri B.R, Sharma L.R, Madan Pathania S. *Principles of Physical Chemistry*. Vishal Publishing Co. 2008.
2. Arun Bahl and Bahl B.S. *Advanced Organic chemistry*.S.Chand and Company Ltd. Reprint, 2005.
3. Tewari N. *Advance Organic Reaction mechanism*.Kolkata: Books and allied (P) Ltd.Second revised edition 2005.
4. Jain M. K and Sharma S. C. *Modern Organic Chemistry*. Vishal Publishing Company, 2008.

SEMESTER- III			
Core IIIPhysical Chemistry-I			
Course Code : 21UCHC31	**Hrs/Week : 4**	**Hrs/ Sem : 60**	**Credits : 4**

Objectives:

- To appreciate the surface phenomenon in industry and biological systems.
- To have an overall knowledge about gaseous and liquid states of matter.
- To understand the importance of colloids in day to day life

Course Outcome:

CONo.	Upon completion of this course, students should be able to	PSOaddressed	CL
CO- 1	enumerate the general characteristics of adsorption and have thorough knowledge of the theory behind physisorption and chemisorptions	1,2,5,7,8	Ap
CO- 2	prioritise the phenomenon of catalysis in industry and biological systems and learn the basic concepts of adsorption and its applications in various walks of life	1 ,2,7	Re
CO- 3	Gainextensive knowledge about kinetic theory of gases and its relation with temperature and velocity ofa gas	1,3	Un
CO-4	understand the deviation of gases from ideal behaviour using Van der Waal's equation	1,2 , 3	Re

CONo.	Upon completion of this course, students should be able to	PSOaddressed	CL
CO- 5	classify, compare and discuss the preparation method and properties of colloids and also know the importance of colloids in day to day life,	1,2,5	Un
CO-6	have a thorough learning of miscible andimmiscible liquids and outline the statement of Nernst distribution law, its deviations and applications	2,3,4	Re
CO- 7	compare the vapour pressure of partiallymiscible liquids and mixture of immiscible liquids and understand the theory of fractional distillation and steam distillation and its applications.	2,3	An
CO-8	appreciate the chemistry behind the reversible reactions and nature of chemical equilibrium and apply Lechatelier's principle in various aspects.	1,2,3,4,	Ap

Unit I Surface Chemistry

Adsorption – types- physisorption and chemisorption – adsorption of gases by solids adsorption isotherm – derivation and significance of Freundlich and Langmuir isotherms – BET isotherm (no derivation) – applications of adsorption – adsorption indicator-production of high vacua-gas mask-removal of colouring matter from solutions- chromatographic analysis.

Catalysis - General characteristics of catalytic reactions – acid-base catalysis and enzymecatalysis– Fischer Lock and key theory – characteristics of enzyme catalysis. Mechanism andkinetics of enzyme catalysed reaction (Michaelis-Menton equation). Activation energy andcatalysis – theories of homogeneous and heterogeneous catalysis – mechanism of thehydrogenation of ethene on nickel surface. Acid base catalysis –

mechanism – promoters –promotion action – catalytic poisoning – negative catalysis – mechanisms ofnegative catalysis, autocatalysis and photocatalysis.

Unit II Gaseous State

Kinetic theory of gases – justification of postulates-derivation of kinetic gas equation deduction of gas laws from the kinetic gas equation-Charle's law, Boyle's law, Avogadro's law, ideal gas equation – Dalton's law of partial pressure – Graham's law of diffusion-kinetic theory and temperature – Maxwell's law of distribution of velocities (no derivation) – types of molecular velocities – graphical representation and its significance- collision diameter –collision number – collision frequency – mean free path - deviations from ideal behavior compressibility factor- effect of pressure and temperature on deviation-explanation of deviation-volume correction-pressure correction – Van der Waal's equation—limitations liquefaction of gases-critical phenomenon—Andrew's isotherms of CO_2- Van der Waal'sequation and critical constants-experimental determination- law of corresponding states.

Unit III Colloids

Definition-Types of colloidal system –lyophilic and lyophobic colloids-characteristics and comparison- Sols- Preparation-Dispersion method (Bredig's Arc method, peptization) – Aggregation method-(double decomposition, reduction, oxidation, Hydrolysis,Change of solvent)-purification of Sols-Dialysis-Properties – Optical (Tyndall effect) – kinetic (Brownianmovement) Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze law-Hoffmeister series – protective colloids – gold number.

Emulsion – types and their distinction-Emulsifiers – surfactants– Gels – classification, preparation, properties (imbibition,synerisis and thixotropy). Applications of colloids-food, medicine, thixotropic paints, clarification of municipal water, formation of delta.

Unit IV Solution

Liquids in liquids –Completely miscible liquids- Ideal and non-ideal solution-Raoult's law - distillation of homogenous binary liquid mixtures -Theory of fractional distillation – Azeotropic distillation.

Partially miscible liquids – Phenol-water-Triethylamine-water and Nicotine-water systems– Variation of solubility with temperature – Vapour pressure of partially miscible liquids- Criticalsolutiontemperature-upper, lower,upper and lower - influence of impurityon CST (Crismer Test) and applications.

Immiscible liquid systems- Vapour pressure of mixtures of immiscible liquids- Theory ofsteam distillation and its applications.

Nernst distribution law – Statement–Conditions - Thermodynamic derivation – Deviationsfrom the law(molecular association and dissociation) –Applications-Distribution indicators-solvent extraction.

Unit V Chemical Equlibrium

Reversible reactions- nature of chemical equilibrium- characteristics-law of mass action-explanation of the law of mass action based on the molecular collision theory-equilibrium constant; equilibrium law-relationship between K_c and K_p-Application of law of mass action to the equilibria involving the formation of NH_3 , dissociation of $CaCO_3$ and the dehydration of $CuSO_4.5H_2O$. Lechatelier's principle – statement-application to the formation of NH_3

Text Books:

1. Puri B.R, Sharma L.R, Madan S. Pathania. *Principles of Physical Chemistry.* VishalPublishing Co., 2008.
2. Arun Bahl, Bahl B.S, Tuli G.D. *Essentials of Physical Chemistry*. New Delhi: S. Chand &Company Ltd., 2008.

Books for Reference:

1. Malligarjunan U.M . *Principles of Physical Chemistry*. SreeVinayaga Publications. First Edition, 2020.
1. Soni P.L, Dharmaha O.P. *Text Book of Physical Chemistry (A Modern Approach).*SultanChand and Sons Publishers, Revised Edition 2010.

SEMESTER- IV			
CoreIV	**OrganicChemistry-I**		
Course Code :21UCHC41	**Hrs/Week:4**	**Hrs/ Sem: 60**	**Credits:4**

Objectives:

- To gain knowledge about the importance of nitro and amino compounds
- To study the synthetic importance of active methylene compounds and know the conformational analysis
- To appreciate the applications of organometallic compounds in synthesis
- To know the laboratory and industrial importance of Carbohydrates
- To understand the concepts of tautomerism &molecular rearrangements

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	compare alcohols, nitroalkanes and alkyl nitrites,Differentiate1^{o}, 2^{o}&3^{o} amines by reactions.	1,3	An
CO - 2	justify the effect of substituent on the basicity of aromaticamines.	1,3	Cr
CO - 3	synthesize and Characterize acetoacetic ester and malonic ester.	5,7	Cr
CO- 4	define Sachse Mohr theory – Newman projection ,Sawhorse & Fischer formulaeKnow about the	1	Re

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
	conformational analysis.		
CO - 5	recall the synthetic importance of organometalliccompounds, RecogniseFrankland reagent and its significance.	1,6,7	Re
CO - 6	know the preparation and properties of Thioalcohols and Mustard gas.	1	Re
CO- 7	classify carbohydrates and compare and contrast the reactions and structure of glucose andfructoseIllustrate the structure and reactions of carbohydrate and discuss epimerization and mutarotation.	5,6,1	Un
CO - 8	illustrate the theory of resonance and tautomerism and identify the product of rearrangement reactions such as pinacol-pinacolone, Benzil-Benzilic acid, Curtius,Lossen,Favorskiiand Friesrearrangement.	1,3	Un, An

Unit I : Nitro compounds and Amino compounds

Preparation and reaction of nitrile and isonitrile – distinction between nitroalkane and alkyl nitrites – reduction reaction of nitroalkane – NEFreaction. Preparation of o, p,m-dinitrobenzene- trinitrobenzene.

Aliphatic amine – separation of mixture of amine –(Hoffmann, Heisenberg method)- Comparison of 1º, 2º&3º amines- Mustard oil reaction- Mannich reaction – ascending and descending of amines.

Aromatic amines – effect of substitutents on the basicity of aromatic amines- preparation and properties ofphenylenediamine

Diazonium compounds- Preparation of diazonium chloride and its synthetic applications.

Unit II: Reactive Methylene compounds and Conformational Analysis

Active methylene compounds –preparation, synthetic applications of acetoacetic ester and malonic ester.

Conformational Analysis Definition – Bayer's strain theory – Sachse Mohr theory – Newman projection - Sawhorse & Fischer formulae –examples- butane, 1,2-diol, - difference between conformation and configurations. Conformation analysis of ethane, 1,2 – dichloro ethane andcyclohexane (boat form, Chair form)—dihedral angle (torsional angle) – factors affecting stability of conformation – Dipole - Dipole interaction, bond opposite strain- factors affecting conformational stability

Unit III: Organometallic compounds and Organosulphur Compounds

Definition – examples- Organomagnesium compound (Alkyl magnesium halides) – preparation, general characteristics and synthetic applications (Nucleophilic substitution reactions,additionreactionandmiscellaneousreactions.)Organozinccompounds(Diethyl Zinc-Frankland reagent)- preparation, properties and synthetic applications (Nucleophilic substitution and addition reactions). Preparation and uses ofTEL.

Preparation and properties of thioalcohols and thioethers – sulphonal-mustard gas and sulphones.

Unit IV: Carbohydrates

Introduction and classification – laboratory and industrial preparation of glucose and fructose – reactions of glucose and fructose – structure of glucose and fructose – open chain and ring structure – epimerisation – mutarotation – interconversion of glucose and fructose and vice versa – ascending and descending the series – (Kiliyani& Wohl's synthesis). Manufacture of sucrose – Structure of maltose, lactose and sucrose (elucidation not included) – Starch and cellulose – reactions –uses – differences between starch and cellulose.

Unit V: Tautomerism and Molecular Rearrangement

Resonance – definition – resonance energy – resonance theory. Tautomerism – Definition – Types of tautomerism – Keto-enol, Nitro -acinitro, Lactam - lactim, p-Nitrosophenol-Quinone monoxime and amido-imidotautomerism.

Molecular Rearrangement

a) Rearrangement involving migration to electron deficient carbon- Pinacol-pinacolone rearrangement, Benzil-benzilicacidrearrangement

b)Rearrangement involving migration to electro deficient nitrogen-Curtiusrearrangement, Lossen rearrangement

c) Rearrangement involving carbanion intermediate –Favorskiirearrangement

Rearrangement involving migration from oxygen to aromatic ring-Friesrearrangement.

Text Books:

1. Tewari K.S, Vishnoi N.K . *A Text Book of Organic Chemistry*. 2nd Revised Edition, 2017.

2.Arun Bahl and Bahl. B.S. *Advanced Organic Chemistry*.S.Chand and Company Ltd., Reprint, 2017.

Books for Reference:

1. Ernest l. Eliel. *Stereochemistry of Organic compounds*.New Delhi:Tata McGRAW–Hill Publication company Ltd., 1975.
2. Nasipuri D. *Stereochemistry of Organic Compounds - Principles and Applications*. New Age International Publishers,1994.
3. Kalsi S. *Stereochemistry-Conformation and Mechanism*. New Age International Publishers, 2008.
4. Anup Pathak, AnupaSaha.*Organic Chemistry*. Kolkata: Books and Allied Pvt Limited, Volume I, 2015.
5. Jain M.K and Sharma S.C. *Modern Organic chemistry*. Vishal Publishing Company,

2017.

6. Jerry March. *Advanced Organic Chemistry Reactions Mechanisms and Structure*. 4th Edition 2013.

7. Tewari N. .*Advance Organic Reaction mechanism*.Kolkata:Books and allied (P) Ltd.

Second revised edition, 2017.

SEMESTER I & II			
Core Practical I	**Quantitative Analysis**		
Course Code : 21UCHCR1	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

QUANTITATIVE ANALYSIS (VOLUMETRIC METHODS)

A double titration involving the preparation of a primary standard, standardization of the link solution, making up of the given solution and its estimation. Concepts of acids, bases, oxidants, complex formation — Theory of Indicators. (Use of digital balance is permitted).

TITRIMETRIC QUANTITATIVE ANALYSIS:

	Substance to be estimated	**Primary Standard**
I Acidimetry and alkalimetry.	1. NaOH/ Na_2CO_3	Na_2CO_3
	2. HC1/H_2SO_4 /oxalic acid	Oxalic acid
II Permanganometry	3. Oxalic acid	Oxalic acid
4. Mohr's salt	Mohr's Salt	
	5. Fe^{2+} Mohr's Salt	
III Dichrometry - External indicator method		
	6. Fe^{2+} Mohr's Salt	
IV Iodometry	7.$CuSO_4$ /$K_2Cr_2O_7$	$K_2Cr_2O_7$
	8. $KMnO_4$	$CuSO_4$
V Complexometry	9. Zn^{2+}	$ZnSO_4.7H_2O$
	10. Pb^{2+} $Pb(NO_3)_2$	
	11. Mn^{2+}	$MnSO_4.H_2O$
	12. Ni^{2+}	$ZnSO_4.7H_2O$

VI Estimation of Phenol /Aniline

VIICourse work (Not for external examination)

1. Estimation of acetic acid in vinegar samples.

2. Estimation of oxalate content in vegetables and fruits such as tomato, guava, grapes, etc.
3. Estimation of sodium carbonate and sodium Bicarbonate in a mixture.
4. Estimation of Total Hardness of water.

BOOKS FOR REFERENCE:

1. Arthur D. Vogel.*Vogel's Textbook of Quantitative Chemical Analysis*. Longman's Green & Co Ltd, London, sixth Edition2004.
2. RaghupatiMukhopadhyay, Pratul Chatterjee.*Advanced Practical Chemistry*. Books and Allied (P) Ltd., Third Edition 2007.

SEMESTER III & IV			
Core Practical II	**Semi-micro Inorganic Qualitative Analysis**		
Course Code :21UCHCR2	**Hrs/Week : 2**	**Hrs/ Sem : 30**	**Credits : 2**

Systematic qualitative analysis of a mixture containing two anions and two cations. One of the anions should be an interfering radical which should be eliminated. The two cations should be of different groups.

Principles of flame testing – concept of solubility and solubility product – concept of pH and Buffer action – common ion effect - theory of testing anions (Simple and interfering) – Principle of grouping of cations –Theory of testing cations.

The combination of mixture containing two halides,(sulphates along with lead, barium, strontium and calcium), (oxalate and carbonate) & (one oxidizing and one reducing group), should be avoided.

Anions:

(i) Carbonate (ii) Sulphide (iii) Sulphate (iv) Chloride (v) Bromide (vi) Iodide.

(vii) Nitrate (viii) Borate (ix) Oxalate (x) Fluoride (xi) Chromate (xii) Phosphate

Cations:

(i) Lead (ii) Copper (iii) Bismuth (iv) Cadmium (v)Antimony (vi) Nickel (vii) Manganese (ix) Zinc (x) Barium (xi) Strontium (xii) Calcium (xiii) Magnesium (xiv) Ammonium.

Course Work:

Detection of sodium and potassium ions by flame photometer

Books for Reference:

1. J. N. Gurtu and R. Kapoor.*Advanced Experimental ChemistryVolume II*. S. Chand & Company Ltd,1980.
2. A.O. Thomas.*Practical Chemistry for B. Sc. Main students*. Scientific Book Centre, Cannanore,1992.

SEMESTER-III			
NMEI	**Everyday Chemistry**		
Course Code :21UCHN31	**Hrs/Week:2**	**Hrs/ Sem: 30**	**Credits:2**

Objectives:

- To study the purification process for drinking purpose.
- To classify solid, liquid and gaseous fuels.
- To study the constituents of paints and varnishes.
- To appreciate the manufacture of sugar.
- To know the preparation of candles, toothpowder.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	understand the biological importance of water.	2	Un
CO -2	aware of the ill effects of water borne diseases and prevention.	2, 5	Ap
CO - 3	know the ignition temperature and flash point of fuels.	1	Re
CO – 4	know the characteristics of solid liquid and gaseous fuels.	1	Re
CO – 5	know the fundamental knowledge about constituents of paints and varnishes and their functions.	2, 5	Re

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-6	aware of fluorescent paints (traffic signal) and fire retardant paints.	2, 5	Ap
CO – 7	understand the recovery of alcohol from molasses and know the chemistry of manufacture of paper.	2, 5	Un, Re
CO – 8	outline the preparation and uses of Candle,ToothPowder,Liquidblues,Blackboard chalk, Moth ballssoap, shampoo, lipstick ..	1, 2,5	Re

UNIT I: Water

Water as universal solvent-Hard and soft water-Purification of water for drinking purpose. Desalination, reverse osmosis, mineral water, pH of water for drinking purpose. Biological importance of water-waterbalance and electrolyte balance in human body. Water borne diseases and prevention.

UNIT II: Fuels

Definition-Classification with examples (solid, liquid and gas)- calorific Value-Ignition temperature-Flash point. Characteristics of solid, liquid, and gaseous fuels and their applications.Nuclear fuels- Rocket fuels- Biofuels.

UNIT III: Surface Coating

Pigments, purpose of surface coating. Constituents of paints and varnishes and their functions. Emulsions.Different kinds of paints-fluorescent paints (traffic signal), fire retardant paints.

UNIT IV: Sugar and Paper Industry

Manufacture of sugar, recovery of alcohol from molasses, fermentation, manufacture of beverages. Bagasse. Paper industry- Manufacture of paper.

UNIT V: Chemicals in Day to Day Use

An Outline of the preparation and uses of the following:

a) Candle b) Tooth Powder c) Liquid blues d) Blackboard chalk e) Moth balls f) Soap

g) Shampoo h) Lipstick i) Phenoyle j) Eyetex k) Cleaning powder l) Face powder

Books for Reference:

1. Jayashree Ghosh. *Fundamental concepts of Applied chemistry*. Edition, New Delhi:S. Chand &company Ltd., 2006.
2. Jain P.C and Monika Jain. *Engineering chemistry.*New Delhi:Dhanpat Rai & Sons, 2020.
3. Prakash Shetty.*Science and Technology of Printing materials.*Chennai: MJP Publishers, 2019.
4. Sharma B.K . *Industrial Chemistry.*Meerut:Goel Publishing House, 2003.

SEMESTER- IV			
NME II Industrial Chemistry			
Course Code :21UCHN41	**Hrs/Week:2**	**Hrs/ Sem: 30**	**Credits:2**

Objectives:

- To know the constituents of petrochemicals.
- To study the importance of reclaimed rubber.
- To know the analysis of fats and oils.
- To identify the nature of artificial and natural food colorants.
- To know the specification and standards in quality control.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOaddressed	CL
CO-1	know the composition of petroleum and refining of petroleum.	1	Un
CO-2	define and explain the octane number and cetane number.	1	Re, Un
CO-3	employ the manufacture of rubber and Gutta-percha.	1	An
CO-4	know the importance of reclaimed rubber and foam rubber.	1	Un
CO-5	analyze fats and oils.	8	An
CO-6	acquire the knowledge about saponification value and RM value.	5	Un
CO-7	understand the characteristics of food colorants and examine the artificial and natural food colorants.	6, 5, 8	Un,An
CO-8	attain the knowledge of PFA, FPO, FDA, drug licence and aware of essential commodities act, consumer protection act, AGMARK.	2,5	Un Ap

SEMESTER- IV			
NME II	**Industrial Chemistry**		
Course Code :21UCHN41	**Hrs/Week:2**	**Hrs/ Sem: 30**	**Credits:2**

Unit I: Petro Chemicals

Occurrence – composition of petroleum – Refining of petroleum – purification –cracking – types of cracking – catalytic cracking – thermal cracking – knocking andantiknocking properties – octane number – activation. Gasoline – cetane number – flash point –synthetic petrol

Unit II: Rubber Industry and Fibres

Manufacture of rubber, Gutta-percha –properties of rubber – compounding of rubber – vulcanization – properties of vulcanized rubber– synthetic rubber – SBR rubber and Neoprene rubber – Reclaimed rubber and foam rubber –uses.

Fibres – Difference between natural and synthetic fibres

Unit III: Fats, Oils and Waxes

Fats and oils – definition – physical and chemical properties – Analysis of fats and oils–

Saponification value, iodine value, acid value, Reichert-Meissel value– manufacture of vanaspathi or vegetable ghee. Waxes – definition and classification.

Unit IV: Food Additives

Baking soda – food color natural and artificial – intentional food additives – acid base and their salts – antioxidants – stabilizers– bleaching – maturing agents – leavening agents – humectants and preservatives.

Unit V: Quality control

Quality control – Specification and standards : PFA, FPO, FDA, drug licence, WHO standards, IS specification packing and label requirements, essential commodities act, consumer protection act, AGMARK

Books for Reference:

1. Siva Sankar B. *Food processing and preservation*.New Delhi:Prentice — Hall of India Pvt.Ltd., 2002.

2. BagavathiSundari K. .*Applied Chemistry.*Chennai:MJP Publishers, TamilNadu Book House, 2006.

3. Agarwal. *Natural Products Volume II (Organic)*.Meerut: Krishna Prakashan Media P. Ltd 2015.

SEMESTER- II			
Allied II	**Digital Principles**		
Code: 18UCSA21	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 3**

Vision:

To Understand the basic concepts used in the design and analysis of digital systems .

Mission:

Acquire knowledge in Boolean functions and MSI and LSI logic circuits .

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand various number systems and boolean functions.	9	Un
CO-2	apply various methods to simplify boolean function.	4	Cr
CO-3	construct digital circuits for boolean functions with logic gates.	6	Cr
CO-4	design combinational circuits with logic gates.	6	Cr
CO-5	apply classical techniques for the logical design of combinational and sequential circuits	6	Ap
CO-6	define sequential logic circuits.	6	Re
CO-7	understand the basic operation of flip-flops.	2	Re
CO-8	understand the various registers-transfer methods .	2	Re

SEMESTER- II			
Allied II	**Digital Principles**		
Code: 18UCSA21	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 3**

Unit I

Binary Systems : Digital Computers and Digital Systems – Binary numbers – Number base conversion – Octal and Hexadecimal numbers – Complements – Binary Codes –Basic theorems and properties of boolean algebra– Boolean functions – Canonical and Standard forms – Digital Logic Gates .

Unit II

Simplification of Boolean Functions : The Map method – Two and Three variable Maps – Four Variable Map – Five and Six Variable Maps – Product of Sums Simplification – NAND and NOR Implementation – Other two-level Implementations – Don't care conditions – The Tabulation method – Determination of Prime – Implicants – Selection of Prime – Implicants

Unit III

Combinational Logic : Introduction – Design Procedure – Adders – Subtractors – Code Conversion– Multilevel NAND Circuits – Multilevel NOR Circuits – Exclusive-OR and Equivalence Functions.

Unit IV

Combinational Logic with MSI and LSI : Introduction – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers

Unit V

Registers and Counters: Sequential logic -Introduction – Flip-Flops -Basic Flip-Flop Circuit-Clocked RS Flip-Flop-D-Flip-Flop-JK Flip-Flop- T-Flip-Flop- Registers – Shift Registers

Text Book :

1. M. Morris Mano, Digital Logic and Computer Design, , Fourth Edition Prentice Private Limited

Chapters : 1.2-1.6, 2.3-2.5,2.7,3.1-3.11,4.1-4.5,4.7-4.9,5.1-5.6,6.1,6.2,7.1-7.3

Books for Reference:

1.Charles H.Roth, Jr. “Fundamentals of Logic Design”, 7th Edition, Jaico Publishing House, 1996.

2.Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2007.

3.Donald P.Leach and Albert Paul Malvino, Digital Principles andApplications, Seventh ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

SEMESTER- II			
Allied-Practical I	**Office Automation Lab**		
Code: 18UCSAR2	**Hrs / week :3**	**Hrs / Semester: 45**	**Credits :2**

List of Practicals :

1. Type a paragraph and use various formatting.
2. Usage of Numbering, Bullets, Indents and Headers in a Word Document
3. Prepare a Calendar in a Word Document
4. Design a wedding invitation in Word Document
5. Usage of Spell Check, Find and Replace
6. Picture Insertion and Alignment
7. Use mail merge in word.
8. Prepare class time table.
9. Prepare a semester wise mark statement for a computer class of 20 students using any spreadsheet' worksheet. Total, average and rank the student marks. Give proper headings. Make the column headings bold and italic.
10. Consider the sample employee worksheet and calculate their salary. Plot it using chart.
11. Use any spreadsheet to use mathematical, statistical and logical functions
12. Use any spreadsheet to plot a chart for marks obtained by the students.

SEMESTER- I			
Core – I	**C Programming**		
Code: 18UCSC11	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 4**

Vision:

Understand the basic concepts of Structured programming language

Mission:

Able to design, code, test and debug an application

Course outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	draw the flow chart for the given problem and algorithm	1	Un
CO-2	describe the various operators and library functions and to define I/O functions	3	Un
CO-3	compare and contrast loops	4	An
CO-4	implement recursion	8	Ap
CO-5	understand the concept of storage classes	9	Un
CO-6	implement different operations on arrays	3	Ap
CO-7	develop an application using pointer.	5	Cr
CO-8	develop application using structure and pointers	10	Cr

SEMESTER- I			
Core – I	**C Programming**		
Code: 18UCSC11	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 4**

Unit I:

Algorithms - Flow charts: Developing algorithms and flowcharts for solving simple problems.

C Fundamentals: The C Character Set - Identifiers and Keywords - Data Types –Constants– Variables and Arrays - Declarations - Expressions - Statements - Symbolic Constants.

Unit II:

Operators and Expressions: Arithmetic Operators - Unary Operators - Relational and Logical Operators - Assignment Operators - The Conditional Operator - Library Functions.

Data Input and Output: Single Character Input-The getchar Function-Single Character Output-The putchar Function-Entering Input Data-More about the scanf function-Writing output data – The printf function- The scanf Function-More about the printf function -The gets and puts Functions.

Unit III:

Control Statements: Branching: The if-else Statement-Looping: The While Statement-More Looping: The do-while Statement-Still More Looping: The for Statement-Nested Control Structures-The switch Statement-The break Statement-The continue Statement-The comma Operator-The go to Statement.

Functions: Defining a Function-Accessing a Function-Function Prototypes- Passing Arguments to a Function- Recursion.

Unit IV:

Program Structure: Storage Classes- Automatic Variables- External (Global) Variables- Static Variables

Arrays: Defining an Array-Processing an Array - Passing Arrays to Functions- Multidimensional

Arrays - Arrays and Strings.

Unit V:

Pointers: Fundamentals-Pointer Declarations- Passing Pointers to Functions- Pointers and One-Dimensional Arrays-Dynamic Memory Allocation- Operations on Pointers-

Pointers and Multidimensional Arrays -Arrays of pointers.

Structures and Unions: Defining a Structure - Processing a Structure - User Defined Data types (typedef) - Structures and Pointers - Passing Structures to Functions - Unions.

Text Book:

1. Byron Gottfried ,Programming with C ,, McGraw Hill Education (India) Private Limited, 3rd Edition .**Chapters: 2,3,4,6,7,8,9,10,11 and 12.**

Books for Reference:

1. Ashok N. Kamthane, Programming with ANSI and Turbo C, Pearsoneducation, 2006.
2. Gary.J.Bronson, A first Book of ANSI C 3rd Edition, Thomson learning 2001.
3. Kumar Agrawal, Programming in ANSI C., Tata McGraw Hill, 2006.
4. VenugopalPrasad, Programming with C, Tata McGraw Hill, 2006.
5. E. Balagurusamy, Programming in ANSI C Sixth Edition,, McGraw Hill Education (India) Private Limited, 2012.
6. S. Jaiswal, "Information Technology Today", Galgotia Publications,First Edition, 1999.

SEMESTER- II			
Core II	**C++ Programming**		
Code: 18UCSC21	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 4**

Vision:

Understand the basic concepts of object orient programming language

Mission:

Able to design,code,test and debug an application

Course outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know about object oriented features.	8	Un
CO-2	understand the various operators and i/o functions	3	Re
CO-3	write program using inline and friend function and to implement overloading constructor	3	Cr, AP
CO-4	understand array of objects and to demonstrate operator overloading	8,9	Un, AP
CO-5	compare different inheritance methods	3	An
CO-6	develop linked list	5	Cr
CO-7	understand virtual function	8	Un
CO-8	create an application using file operations	10	Cr

SEMESTER- II			
Core II	**C++ Programming**		
Code: 18UCSC21	**Hrs / week : 4**	**Hrs / Semester: 60**	**Credits : 4**

Unit I

The Big Picture: Why Do Need Object Oriented Programming- Characteristics of Object Oriented Languages - C++ and C-Laying the Groundwork.

C++ Programming Basics:Basic Program Construction - Output Using cout - Preprocessor Directives – Comments - Integer Variables- Character Variables - Input with cin- Type float- Manipulators-Variable type Summary-Type conversion-Arithmetic Operators-Library Functions.

Unit II

Function: Simple Functions - Passing Arguments to Functions -Returning Values from Functions - Reference Arguments - Overloaded Functions - Inline Functions - Default Arguments- Variables and Storage Classes - Returning by Reference.

Objects and Classes: A Simple Class - C++ Objects as Physical Objects - C++ Objects as Data Types-Constructors - Objects as Function Arguments -Returning Objects from unction-A Card Game Example-Structures and Classes-Classes, Object, and Memory-Static Class Data-What Does It All Mean?

Unit III

Arrays: Array Fundamentals - Array as Class Member Data - Array of Objects - String.

Operator Overloading: Overloading Unary Operators - Overloading Binary Operators-Data Conversion- Pitfalls of Operator Overloading and Conversion.

Unit IV

Inheritance Derived Class and Base Class - Derived Class Constructors - Overriding Member Functions-Inheritance in the English Distance Class - Class Hierarchies-Public and Private Inheritance-Levels of Inheritance-Multiple Inheritance-Ambiguity in Multiple Inheritance - Containership: Classes with Classes - inheritance and Program Development.

Pointers: Addresses and Pointers - Pointer Variables - Pointers and Array - Pointers and Functions - Pointers and Strings - Memory Management: new and delete - Pointers to Objects - A Linked List Example - Pointers to Pointers - Debugging Pointers.

Unit V:

Virtual Functions: Virtual Functions - Friend Functions - Static Functions - assignment and Copy Initialization -The *this* Pointer.

Files And Streams: Streams -String I/O -Character I/O - Object I/O -I/O with Multiple Objects -File Pointers - Disk I/O with Member Functions - Error Handling - Redirection - Command Line Arguments - Printer Output - Overloading the Extraction And Insertion Operators.

Text Book:

1. Robert Lafore, Object-Oriented Programming in C++, 4th Edition,Pearson and Dorling Kindersley Publications.

Books for Reference:

1. E.Balagurusamy, Object Oriented Programming C++ 5thEdition., Tata McGraw-Hill, 2011.
2. D.Ravichandran, Programming with C++ 2ndEdition., Tata McGraw-Hill, 2010.
3. Y.Venugopal RajkumarRavishankar, Mastering C++, Tata McGraw –Hill, 2011.
4. Debasish Jana, C++ and object oriented programming paradigm 2nd Edition, PHI publications, 2005.
5. Deiteland Deitel , C++ How to Program , Fourth Edition, Prentice Hall,2004

SEMESTER- III			
Core – III	**Java Programming**		
Code: 18UCSC31	**Hrs / week :5**	**Hrs / Semester: 75**	**Credits :4**

Unit I:

The History and Evolution of Java:

Creation of java - Operators – Control statements – Class , Methods , Inheritance

Packages and Interfaces:

Packages-Access Protection – Importing Packages- Interfaces.

Unit II:

Exception Handling:

Exception-Handling Fundamentals-Exception Types-Uncaught Exceptions-Using try and catch-Multiple catch clauses-Nested try Statements-throw-throws-finally-Java‘s Built-in Exceptions.

Multithreaded Programming:

Java Thread Model-Main Thread-Creating a Thread-Creating Multiple Threads- Using is Alive() and join ()-Thread Priorities-Synchronization - Interthread Communication-Suspending, Resuming, and Stopping Threads-Using Multithreading.

Unit III:

The Applet Class: Applet Basics -Applet Architecture - Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - HTML APPLET tag - Passing Parameters toApplet.

Event Handling:

Event Handling Mechanisms - Delegation Event Model - Event Classes(The Action Event, Item Event, Key Event , Mouse Event) - Sources of Events - Event Listener Interfaces(Action Listener ,Item Listener, Key Listener, Mouse Listener) - Adapter Classes

Introducing the AWT:

AWT Classes-Window fundamentals -working with Frame Windows -Working with Graphics.

Unit IV:

Using AWT Controls:

Controls Fundamentals-Labels-Using Buttons-Applying Check Boxes-Check Box Group-Choice Controls-Using a Text Field-Using a Text Area-Understanding Layout Managers-[Flow Layout Only]-Menu Bars and Menus.

RMI:

Remote Method Invocation – Text Formatting

Unit V:

JDBC Package:

JDBC – JDBC versus ODBC – Types of JDBC drivers – Connection – Statement – PreparedStatement.

ResultSet:

Fields of ResultSet – Methods of ResultSet – Executing a query - ResultSetMetaData – DatabaseMetaData.

Database in JDBC:

Basicdatatypes in JDBC – Advanced datatypes in JDBC – fields of Statement – methods of Statement

Text Books:

1. Herbert Schildt, The Complete Reference Java™ ,8th Edition,TATAMcGRAW- HILL EDITION, 2011. Chapters: 1, 9, 10, 11,21,22,23,24,29,30,31 (Unit I,II,III,IV)
2. S.Horstmenn and Gary Cornell, Core Java2 Volume II Advanced Features, The Sun Microsystems press Java Series,2002. Chapter: 4.(Unit V)

Books for Reference:

1. Steven Holzner, Java 2 Programming Black Book, Dream Tech Press,2005.
2. Joseph O'Neil, JavaBeans Programming from the GroundUp, TMGH, New Delhi,1998
3. KathyWalrath, The J2EE Tutorial, Pearson Education Asia, 2003.

SEMESTER- I			
Core Practical I	**C Programming Lab**		
Code: 18CSCR1	**Hrs / week :5**	**Hrs / Semester:75**	**Credits :3**

List of Practicals :

1. Solve Quadratic Equation- control statements

2. Sum of Digits & reverse the number.

3. Prime number Checking

4. Sine Series evaluation

5. Binary search

6. Sorting an Array of numbers

7. Linear Searching using function

8. Sorting an array of names

9. Counting no. of vowels, consonants, words and white spaces in a line of text.

10.EB Bill using Structure

11.Exchanging values using pointers

12.Matrix multiplication using pointers

SEMESTER- II			
Core Practical II	C++ Programming Lab		
Code: 18UCSCR2	Hrs / week : 5	Hrs / Semester: 75	Credits : 4

List of Practicals :

1.Write a program in C++ to perform Area calculation using Function overloading (Minimum three functions).

2. Write a program to implement constructor overloading

3.Write a program to swap two values between two class objects using friend function.

4.Write a program in C++ to display the details of employees using array of objects.

5.Write a C++ program to overload Binary + operator which adds two complex numbers.

6.Write a C++ program to overload Relational operator = = to compare two strings.

7.Write a C++ program using class and objects to find row and column total of a matrix.

8.Using class and objects, find the sum of two matrices using pointers.

9.Write a program using multiple inheritances to process students mark list.

10.Write a program using multi level inheritance to process telephone billing.

11.Write a program in C++ using virtual function.

12.Write a program in C++ to process mark listing using binary file.

13.Write a program to open a file in output and input mode. Accept data and write to the file. Display the contents of the file.

SEMESTER- III			
Core – Practical III	**Java Programming Lab**		
Code: 18UCSCR3	**Hrs / week : 6**	**Hrs / Semester: 90**	**Credits : 4**

List of Practicals :

1. Implement Overloading Constructor and Overloading Method
2. Writing a Program to apply method Overriding concept.
3. Development of Java Packages
4. To create and implement an interface.
5. To create a thread i. Using Thread class ii. Using runnable interface
6. To design a calculator arithmetic operations.
7. To create an applet with four Checkboxes with labels and a Text area object.
8. To create a window with a checkbox group with boxes for the colors, Violet, Indigo, Yellow, Orange, Red, Blue and Green. When the button is selected the background color must change accordingly.
9. To demonstrate the use of choice box.
10. To throw the following exception, i. Negative Array Size ii. Array Index out of bounds
11. To illustrate mouse event handling.
12. To create a File menu with options new, save, and close, edit menu with options cut, copy and paste.
13. To prepare the mark sheet using JDBC.

SEMESTER- IV			
Core – Practical IV	**Python Programming Lab**		
Code: 18UCSCR4	**Hrs / week :6**	**Hrs / Semester: 90**	**Credits :4**

List of Practicals :

1. Write a Python program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a Python Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
    a. Grade A: Percentage >=80
    b. Grade B: Percentage>=70 and <80
    c. Grade C: Percentage>=60 and <70
    d. Grade D: Percentage>=40 and <60
    e. Grade E: Percentage<40
3. Write a Python Program using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. Write a Python Program to display the first n terms of Fibonacci series.
5. Write a Python Program to find factorial of the given number.
6. Write a Python Program to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - - n/n!
7. Write a Python programs using String functions.
8. Write a Python program to count the number of strings where the string length is 2 or more and the first and last character are same from a given list of strings.
9. Write a Python program to get the largest number from a list.
10. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples.
11. Write a Python program to remove duplicates from a list.
12. Write a Python program to create a CSV File based on user input.
13. Write a Python program to read a CSV File already created and display the contents

SEMESTER- III	
Self Study 1 Computer Architecture	
Course Code:21UCSSS1 (Compulsory)	**Credits : 2**

Objectives:

- To study basic computer organization.
- To understand the basic Arithmetic operations algorithms.
- To understand the memory organization.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss the organization of basic computer	1	Un
CO-2	explain various types of instructions.	1	Un
CO-3	explain general register organization and stack organization	1	Un
CO-4	explain algorithms for arithmetic operations of various integer number systems	1	Un
CO-5	explain algorithms for arithmetic operations of floating number systems	1,4	Un
CO-6	discuss memory hierarchy with different types of memories.	1,2	Un

SEMESTER- III	
Self Study 1	**Computer Architecture**
Course Code:21UCSSS1(Compulsory)	**Credits : 2**

Unit I:

Basic computer organization and design :

Instruction codes –computer registers –computer instructions –timing and control –instruction cycle-memory reference instructions

Unit II:

Central processing Unit:

General register organization –stack organization-instruction formats –addressing modes- data transfer and manipulation-program control-Reduced Instruction Set Computer.

Unit III:

Computer Arithmetic:

Addition and subtraction – multiplication algorithms-division algorithms

Unit IV:

Computer Arithmetic:

floating point arithmetic operations- Decimal Arithmetic unit- Decimal Arithmetic operations

Unit V:

Memory organization:

Memory hierarchy –main memory –auxiliary memory-associative memory – cache memory – virtual memory

Text Book :

1. M. Morris Mano .*Computer System Architecture.* New Delhi: Pearson Education. Third Edition 2017 .

Books for Reference:

1. P.V.S. Rao .*Computer system Architecture* .New Delhi: PHI Learnings.Second Printing. 2011
2. John P.Hayes .*Computer Organization and Architecture.* India: Tata McGraw Hill. Third Edition 2002
3. John D. Carpinelli*Computer Systems Organization & Architecture.* India: Tata McGraw Hill. First edition 2002.

Semester - III			
Part III Allied - Statistics I			
Code :15UMAA31	**Hrs/week :6**	**Hrs/Sem :90**	**Credits : 5**

Objectives

To help the students to understand the uses of statistics in various competitive fields.

Unit I

Moments - Skewness and kurtosis - Curve fitting - Method of least squares - fitting lines - parabolic, exponential & logarithmic curves (Text book 1 Chapter 4,5)

Unit II

Correlation &regression - scatter diagram - Karl Pearson's coefficient of correlation - properties - lines of regression coefficient & properties - rank correlation (Text book 1 Chapter 6 §sections 6.1,6.2 6.3))

Unit III

Random variables, distribution function, two dimensional random variables, moment generating function, cumulants and characteristic function (Text book 2 chapter5&7 §sections 5.2 to 5.5 and 7.1 to 7.3)

Unit IV

Discrete probability distribution - geometric, binomial & Poisson distribution & their moment generating functions, characteristic function, properties & simple application.(Text book 2§Chapter8§Section8.4,8.5,8.7 (Omitting Negative Binomials))

Unit V

Continuous probability distributions - Beta1 , Beta2 &Gamma distributions, normal distributions - their properties - simple problems - importance of normal distribution (Text book 2§ Chapter 9 §sec 9.2, 9.5,9.6 and 9.7)

Text Books

1. S.Arumugam and A.Issac, **Statistics**, New Gamma publishing House. Palayamkottai
2. Gupta S.C., Kapoor V.K., **Fundamentals of mathematical Statistics** Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi

Reference books

1 H.C.Saxena, **Elementary Statistics,** S.Chand & Company Ltd., New Delhi

2. J.N.Kapurand Saxena, **Mathematical Statistics,**S.Chand & Company Ltd., New Delhi

Semester – IV			
Part III Allied - Statistics II			
Code :15UMAA41	**Hrs/week :6**	**Hrs/Sem :90**	**Credits :5**

Objectives

1. To cater needs of statistics in professional and academic courses
2. To understand the application of statistics in various fields

Unit I

Characteristics of index numbers, Laspeyers and Paasche's – Bowley's - Marshall and Erdgeworth's index numbers - Tests - Unit test - Commodity reversal test, Time reversal test, Circular test. §Text book 2 chapter 9

Unit II

Statistical Quality Control - Definition, Advantages, Process control - Control chart, Mean chart, Range chart, P - chart, -. §Text book1 volume2 chapter 7 (page 1052 - 1074)

Unit III

Testing of hypothesis - Null and Alternate Hypothesis. Type I and Type II errors - Critical region, level of significance - Test of significance for large samples - Testing a single proportion - Difference of proportions - testing a single mean - Difference of means. §Text book1 volume2 chapter 3 (page 881 -908)

Unit IV

Tests based on t - distribution - Single mean - Difference of means - Tests based on F distribution - Variance ratio test - Test based on chi square distribution - Independence - Goodness of fit. §Text book1 volume2 chapters 3&4 (page 910 -920, 939-990, 1006-1009)

Unit V

Analysis of Variance - One way and two way classified data - Basis of experimental design - simple problems. §Text book2 chapter17

Text Books

- Gupta S.P., **Statistical Method** , forty fourth editionSultan chand & sons publishers-New Delhi.
- ArumugamS. and IssacA., **Statistics**, New Gamma publishing House. Palayamkottai.

Reference Book

1. Gupta S.C., Kapoor V.K., **Fundamentals of mathematical Statistics** , Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi

Semester – IV			
Part IV Skill Based Practical - Office Automation			
Code :15UMAS31	**Hrs/week :2**	**Hrs/Sem :60**	**Credits :2**

List of Practical for Office Automation

MSWORD 2000

- Letter Writing (Formal) – Application for a job
- Tables – Creating Time Table
- Inserting Pictures(Clip Art, Smart Art, Word Art)
- Inserting Shapes (Flow Charts)
- Formatting a Page- colors, watermark etc .
- Inserting Mathematical symbols and Formula
- Inserting Charts

EXCEL 2000

- Mark sheet Preparation
- Payroll Preparation
- Mathematical, Statistical
- Logical Functions and Financial Functions
- Graphs and Charts

MS POWERPOINT

- Presentation I – National/ International Leader
- Presentation II – Story/ incident
- Presentation III- Subject (Maths)

Books for Reference

1. A. Leon, Introduction to computers

2. Stephen L.Nelson,Office 2000The complete reference, Tata McGraw Hill Publishing Company Limited

Semester - III			
Part IV Skill Based Subject - Mathematics for Competitive Exam			
Code :15UMAS41	**Hrs/week :2**	**Hrs/Sem :60**	**Credits :2**

Objectives

To train the students appearing for the competitive examinations

Unit I

Numbers – Square roots & cube roots(Chapter 1& 5)

Unit II

Time & Distance – Polygons(Chapter 17 & 25)

Unit III

Problems on Numbers – Problems on Ages(Chapter 7 & 8)

Unit IV

True Discount – Banker's Discount – Calendar (Chapter 26, 27 & 29)

Unit V

Series Test (Determination of wrong or missing term in the series) - BODMAS Rule.(Chapter 4)

Text Book

1. Agarwal R.S., **Arithmetic Subjective and Objective for Competitive Examinations (Revised Edition 2011)**, S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55

2.Agarwal R.S., **Quantative Aptitude** , S.Chand and Company Ltd. , Ram Nagar,

New Delhi - 55

Semester –V			
Part III Core X	**Operations Research**		
Code :18UMAC54	**Hrs/week : 4**	**Hrs/Semester :60**	**Credits : 4**

Vision

To solve problems using appropriate techniques, interpret the results obtained and translate solutions into directives for action.

Mission

To familiarize the students with the basic concepts, models and statements of the operations research theory.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identify optimum solution.	1	Un
CO-2	interpret the mathematical tools that are needed to solve optimization problems.	2	Ap
CO-3	make decision and improve its quality.	3	Ev
CO-4	comprehend the concept of a Transportation Model and develop the initial solution for the same	4	Un
CO-5	apply the Hungarian method for solving assignment problems	5	Ap
CO-6	examine the significant impact of job sequencing system on total elapsed time management	8	An
CO-7	use CPM and PERT techniques, to plan, schedule, and control project activities.	4	Ap
CO-8	apply Mathematical theories to Commerce and Business and Management	3	Ap

Semester – V			
Part III	**Core X**	**Operations Research**	
Code :18UMAC54	**Hrs/week : 4**	**Hrs/Semester :60**	**Credits : 4**

Unit I

Transportation problem - Mathematical formulation - North West Corner Rule - Vogel's approximation method (Unit penalty method) - The method of matrix minima - optimality test - Maximization - u - v method.

(Chapter 10, Sec 10.1 10.2 10.8 – 10.13, pages 247, 248, 252 273)

Unit II

Assignment problem - Mathematical formulation - Method of solution - Maximization of the effective matrix

(Chapter 11, Sec 11.1, 1.2, 11.3 &11.4, pages 295 – 315)

Unit III

Sequencing problem - n - jobs and two machines - n - jobs and three machines, two jobs and m – machines

(Chapter 12, Sections 12.1, 12.2, 12.3 12.4 12.5 &12.6, pages 327 – 342)

Unit IV

Network Scheduling – Introduction - Basic Components – Logical Sequencing – Rules of Network Construction – Critical Path Analysis

(Chapter 25, Sec 25.1, 25.2, 25.3, 25.4 25.5,25.6 &12.6, pages 763 – 780)

Unit V

Probability Considerations in PERT - Probability of Meeting the Schedule Time.

(Chapter 25, Sec 25.7, pages 781 – 790)

Text Book

1.GuptaP.K., Kantiswarup and Manmohan, Operations Research, Sultan Chand & Sons, Educational Publishers, New Delhi -2, Reprint 2011.

Books for Reference

1.Prem Kumar Gupta and Hira D.S., Operations Research, Sultan Chand & Sons, Educational Publishers, New Delhi -2 .

2.Billy E Gillet, Introduction to Operations Research, Tata McGraw Hill publishing Company, New Delhi.

Semester VI			
Part III Core XIII Mechanics			
Code :18UMAC63	**Hrs/week :6**	**Hrs/Semester :90**	**Credits :4**

Vision

Getting knowledge to apply mechanical theory

Mission

Using the mechanical knowledge in their day-to -day life

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the equilibrium of forces	1	Un
CO-2	know the conditions for equilibrium	3	Ev
CO-3	distinguish between parallel and non parallel forces	8	Cr, Ap
CO-4	know the types of friction laws	1	Cr
CO-5	apply friction laws in problems	5	Un, Ap
CO-6	understand the two types of impact	1	Ap
CO-7	understand the simple harmonic motion	3, 7	Ap
CO-8	determine the simple harmonic motion	4	Ap

Semester VI			
Part III	**Core XIII**	**Mechanics**	
Code :18UMAC63	**Hrs/week :6**	**Hrs/Semester :90**	**Credits :4**

Unit I

Lami's theorem, Parallel forces and moments - Resultant of Two like and unlike parallel forces, moment of a force - t Varignon's theorem - moment of force about an axis couples.

(Text Book 1: Chapter 3,4, pages 52-96)

Unit II

Equilibrium of three forces acting on rigid body subjected to any three forces - three coplanar forces theorem, Two Trigonometrical theorems, problems.

(Text Book 1: Chapter5, pages 98-142)

Unit III

Frictions - Laws of friction - angle of friction - cone of friction - Equilibrium of particle on a rough inclined plane under a Force.

(Text Book 1: Chapter7, pages 206-262)

Unit IV

Fundamental laws of impact - impact of a smooth sphere on a fixed smooth plane - direct impact of smooth elastic spheres**.**

(Text Book2: Chapter 8, pages 215-261)

Unit V

Definition - Geometrical representation of S.H.M.'s –Composition of S.H.M.'s of the same period and in the same line - Composition of S.H.M.'s of the same period and in two perpendicular directions.

(Text Book2: Chapter 10, pages 309-355)

Text Books

1. Venkatraman, M.K.Statics, Agasthiar Book House, Tiruchirapalli, Aug 2011
2. Venkatraman M.K, Dynamics, Agasthiar Book house, Tiruchirapalli, 16th Edition, Jan 2014

Books for Reference

1**.** Duraipandian P., Mechanics, S.Chand and Company Ltd
2. Bali N.P., Dynamics, Laxmi Publication, Delhi

Semester – V			
Part III Core Integral II Statistical Inference			
Code :18UMAI52	**Hrs/week :4**	**Hrs/Semester :60**	**Credits :4**

Vision

It gives the knowledge of statistical quality control techniques and their applications

Mission

To apply the statistical techniques in their work stations

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the uses of statistical quality control.	1	Un
CO-2	compute the upper and lower control limits for different chart	3	Ev
CO-3	analyse the usage of different charts.	8	Cr, Ap
CO-4	know type I and type II error	1	Cr
CO-5	classify the different test static	5	Un, Ap
CO-6	check the difference between small and large samples.	1	Ap
CO-7	evaluate t-test, F-test etc	3, 7	Ap
CO-8	apply the correct test static	4	Ap

Semester – V			
Part III Core Integral II Statistical Inference			
Code :18UMAI52	**Hrs/week :4**	**Hrs/Sem :60**	**Credits :4**

Unit I

Statistical Quality Control - Definition, Advantages, Process control - Control chart, Mean chart, Range chart

(Text Book1: Vol.2, Chapter 7, Pages1051-1074)

Unit II

Control chart for standard Deviation, Control chart for C, Control chart for P ,np- chart

(Text Book1: Vol.2, Chapter 7, Pages 1082-1091)

Unit III

Testing of hypothesis - Null and Alternate Hypothesis. Type I and Type II errors - Critical region, level of significance - Test of significance for large samples - Testing a single proportion - Difference of proportions - testing a single mean - Difference of means.

(Text Book1: Vol.2, Chapter 3, Pages 882 – 908)

Unit IV

Tests based on t - distribution - Single mean - Difference of means - Tests based on F distribution - Variance ratio test - Test based on chi square distribution - Independence - Goodness of fit. (excluding the test for correlation)

(Text Book1: Chapter 3- 4, Pages 910 – 920, 954 – 970, 1006-1009)

Unit V

Analysis of Variance - One way and two way classified data - Basis of experimental design - simple problems.

(**Text Book2: chapter 17 pages 481 – 506)**

Text Books

1.Gupta S.P., Statistical Method , 44-th edition Sultan Chand & Sons Publishers-New Delhi.

2.Arumugam S. and Issac A., Statistics, New Gamma publishing House. Palayamkottai, 2016.

Books for Reference

1. Gupta S.C., Kapoor V.K., Fundamentals of mathematical Statistics , Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi

2. Sancheti D.C, Kapoor V.K., Statistics, Sultan Chand & Sons, Educational Publishers, New Delhi

Semester – III			
Part III NME I- Mathematics for Competitive Examinations I			
Code : 21UMAN31	**Hrs/week : 2**	**Hrs/Semester : 30**	**Credits : 2**

Objectives

- To train the students appearing for the competitive examinations
- To inculcate the skills in Arithmetic ability

Course Outcomes

Co No	Upon completion of this course, students will be able to	PSO s addressed	CL
Co-1	solve mathematical problems using shortcut methods.	3	Cr
Co-2	develop their calculating and computing skills.	5	Ap
Co-3	solve the questions with accuracy and within the given time limit.	3	Cr
Co-4	build confidence to face the competitive examinations.	3	Cr
Co-5	enhances logical reasoning skills, arithmetic skills, aptitude skills.	6	Ap
Co-6	simplify and evaluate algebraic expressions.	3	Ev

Semester – III			
Part III NME I- Mathematics for Competitive Examinations I			
Code : 21UMAN31	**Hrs/week : 2**	**Hrs/Semester : 30**	**Credits : 2**

Unit I

H.C.F and L.C.M of Numbers

(Chapter 2, Pages 22-36)

Unit II

Simplification

(Chapters 4, Pages 58-75)

Unit III

Average

(Chapter 7, Pages 124-138)

Unit IV

Time & Work

(Chapters 11, Pages 206-222)

Unit V

Time & Distance

(Chapter 13, Pages 231-243)

Text Book

Aggarwal R.S., **Objective Arithmetic** (Edition 2004), S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55

Books for Reference

1. Aggarwal R.S., **Arithmetic Subjective and Objective for Competitive Examinations** (Revised Edition 2011), S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55
2. Abhijit Guha, **Quantitative Aptitude for Competitive Examinations**, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Semester – IV			
Part III NME II- Mathematics for Competitive Examinations II			
Code : 21UMAN41	**Hrs/week : 2**	**Hrs/Semester : 30**	**Credits : 2**

Objectives:

- To train the students appearing for the competitive examinations
- To inculcate the skills in Arithmetic ability

Course Outcomes

CO. No	Upon completion of this course, students will be able to	PSO s addressed	CL
CO-1	solve mathematical problems using shortcut methods.	3	Cr
CO-2	develop their calculating and computing skills.	5	Ap
CO-3	solve the questions with accuracy and within the given time limit.	3	Cr
CO-4	build confidence to face the competitive examinations.	3	Cr
CO-5	enhances logical reasoning skills, arithmetic skills, aptitude skills.	6	Ap
CO-6	use mathematical concepts in real world situations.	4	Ap

Semester – IV			
Part III NME II-Mathematics for Competitive Examinations II			
Code : 21UMAN41	**Hrs/week : 2**	**Hrs/Semester: 30**	**Credits : 2**

Unit I

Square Root and Cube Root

(Chapter 5, Pages 76-95)

Unit II

Problems on Numbers

(Chapter 16, Pages 267-278)

Unit III

Problems on Ages

(Chapters 17, Pages 279-285)

Unit IV

Simple Interest

(Chapter 18, Pages 286-298)

Unit V

Compound Interest

(Chapter 19, Pages 299-312)

Text Book

Aggarwal R.S., **Objective Arithmetic** (Edition 2004), S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55.

Books for Reference

1. Aggarwal R.S., **Arithmetic Subjective and Objective for Competitive Examinations** (Revised Edition 2011), S.Chand and Company Ltd. , Ram Nagar, New Delhi - 55.
2.Abhijit Guha, **Quantitative Aptitude for Competitive Examinations**, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

SEMESTER-I			
Skill Enhancement Course - I Professional English for Mathematics - I			
Course Code:21UMAPE1	**Hrs/Week: 2**	**Hrs/Sem: 30**	**Credits: 2**

Objectives:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciencesstudents

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PO addressed	CL
CO-1	Recognise their own ability to improve their own competence in using the language	3	Un
CO-2	Use language for speaking with confidence in an intelligible and acceptablemanner	3	An
CO-3	Understand the importance of reading forlife	8	Cr
CO-4	Read independently any unfamiliar texts withcomprehension	3	Un
CO-5	Understand the importance of writing in academiclife	3	An
CO-6	Write simple sentences without committing error of spelling or grammar.	4	Un
CO-7	Develop critical thinking skills and get culturally aware of the targetsituation	3	Cr

SEMESTER-I			
Skill Enhancement Course - I Professional English for Mathematics - I			
CourseCode :21UMAPE1	**Hrs/Week: 2**	**Hrs/Sem: 30**	**Credits: 2**

UNIT 1: COMMUNICATION

Listening and Speaking:

Listening to audio text and answering questions

Listening toInstructions

Pair work and small group work.

Reading and writing:

Comprehension passages –Differentiate between facts and opinion

Developing a story with pictures**.**

Word Power/Vocabulary:

Register specific - Incorporated into the LSRW tasks

Grammar in Context:

Adverbs, Prepositions.

UNIT 2: DESCRIPTION

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition- Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

UNIT 3: NEGOTIATION STRATEGIES

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming.(Mind mapping). Small group discussions (Subject-Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

UNIT 4: PRESENTATION SKILLS

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations

Interpreting Visuals inputs

Vocabulary: Register specific -Incorporated into the LSRW tasks

UNIT 5: CRITICAL THINKING SKILLS

Listening: Listening comprehension- Listening for information.
Speaking: Making presentations (with PPT- practice).
Reading: Comprehension passages –Note making.
Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)
Writing: Problem and Solution essay– Creative writing –Summary writing
Vocabulary: Register specific - Incorporated into the LSRW tasks

Links for Reference

1. Britannica, T. E. (Ed.). (2020, April 16). Marie Curie. Retrieved June 18, 2020, from Encyclopedia
2. Britannica. Wikipedia, T. E. (Ed.). (16, June 2020). Marie Curie. Retrieved June 18, 2020, from
Wikipedia.
3. https://www.myindiamyglory.com/2018/07/12/raman-effect-how-indian-scientist-cv-raman-discovered-why-sea-is-blue/
4. https://opensource.com/resources/internet-of-things
5. http://warofcurrents.newtfire.org/
6. https://www.youtube.com/watch?v=ubpsosv7mHM
7. https://www.englishclub.com/reading/health/cell-phone.htm
8. https://www.britannica.com/biography/Isaac-Asimov
9. https://www.softschools.com/
10. https://www.space.com/17056-kalpana-chawla-biography.html
11. https://labour.gov.in/childlabour/census-data-child-labour
12.https://www.bu.edu/csp/Conferences/Space_Exploration/Day1/Presentations/Kalam_Space%2 0Exploration%20and%20Human%20Life.pdf
13. https://www.youtube.com/watch?v=WEKzNH09Vqs
14. https://www.bbc.com/news/world-europe-48616174
15. https://semiengineering.com/how-5g-differs-from-previous-network-technologies/
16. https://www.thehindubusinessline.com/info-tech/scientists-caution-government-to-go-slow-on-5g-roll-out/article28737197.ece
17. https://www.downtoearth.org.in/interviews/science-and-technology/-5g-is-unlikely-to-cause-health-concerns--63698

SEMESTER-II			
Skill Enhancement Course - II Professional English for Mathematics - II			
Course Code :21UMAPE2	**Hrs/Week: 2**	**Hrs/Sem: 30**	**Credits: 2**

Objectives:

- To Increase the proficiency of students from all levels and abilities by refining their speaking, writing, reading, and listening skills.
- To provide a comprehensive and intensive course that assists students in achieving their professional, personal and educational objectives.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PO addressed	CL
CO-1	understand the basic objective of the course and obtain strong professional vocabulary for its application at different platforms	3	Un
CO-2	Apply the knowledge for writing purposes such as Presentation, drafting and project report etc.	2	Ap
CO-3	Evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication and presentation.	8	Ev
CO-4	Apply techniques for developing inter-personal communication and to respond questions at a formal interview	8	Ap
CO-5	Apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics	6	Ap
CO-6	Use critical thinking skills to face everyday life situations.	5	Cr
CO-7	Develop strategic competence that will help in efficient communication	6	Ap
CO-8	Apply the acquired knowledge and ideas in giving opinions during the meeting and making concluding remarks.	8	An

SEMESTER-II			
Skill Enhancement Course –II Professional English for Mathematics - II			
Course Code :21UMAPE2	**Hrs/Week: 2**	**Hrs/Sem: 30**	**Credits: 2**

UNIT 1: COMMUNICATIVE COMPETENCE

Listening and Speaking:

Listening and responding to complaints (formal situation)

Listening to problems and offering solutions (informal)

Reading and writing:

Reading aloud (brief motivational anecdotes)

Writing a paragraph on a proverbial expression/motivational idea.

Word Power/Vocabulary:

Synonyms & Antonyms

Grammar in Context:

Adverbs, Prepositions.

UNIT 2: PERSUASIVE COMMUNICATION

Listening and Speaking:

Listening to famous speeches and poems

Making short speeches- Formal: welcome speech and vote of thanks.

Informal occasions- Farewell party, graduation speech

Reading and Writing:

Writing opinion pieces (could be on travel, food, film / book reviews or on any contemporary topic)

Reading poetry

Reading aloud: (Intonation and Voice Modulation)

Identifying and using figures of speech - simile, metaphor, personification etc.

Word Power/Vocabulary:

Idioms & Phrases

Grammar in Context

Conjunctions and Interjections.

UNIT 3: DIGITAL COMPETENCE

Listening and Speaking:

Listening to Ted talks

Making short presentations – Formal presentation with PPT, analytical presentation of graphs and reports of multiple kinds

Interactions during and after the presentations

Reading and writing:

Writing emails of complaint

Reading aloud famous speeches

Word Power/Vocabulary:

One Word Substitution

Grammar in Context:

Sentence Patterns

UNIT 4: CREATIVITY AND IMAGINATION

Listening and Speaking

Participating in a meeting: face to face and online

Listening with courtesy and adding ideas and giving opinions during the meeting and making concluding remarks.

Reading and Writing

Reading visual texts – advertisements

Writing a Brochure

Word Power/Vocabulary:

Denotation and Connotation

Grammar in Context:

Sentence Types.

UNIT 5: WORKPLACE COMMUNICATION & BASICS OF ACADEMIC WRITING

Listening and Speaking:

Informal interview for feature writing

Listening and responding to questions at a formal interview

Reading and Writing

Writing letters of application

Readers' Theatre (Script Reading)

Dramatizing everyday situations/social issues through skits. (Writing scripts and performing)

Word Power/Vocabulary:

Collocation

Grammar in Context:

Working With Clauses.

Links for Reference

1. https://www.collinsdictionary.com/
2. https://youtu.be/moJjKqkn_Xs
3. https://www.collinsdictionary.com/
4. https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3
5.https://owl.purdue.edu/owl/general_writing/academic_writing/essay_writing/argumentative_essays
6. https://youtu.be/5ctbvkAMQO4
7. https://www.wareable.com/fitness-trackers/how-your-fitness-tracker-works-1449
8. https://www.hfe.co.uk/blog/a-study-of-fitness-trackers-and-wearables/
9. https://youtu.be/o_f7mp_tTqw
10.https://www.youtube.com/watch?v=IOluK9i1yiw&feature=youtu.be
11.https://www.sciencehistory.org/historical-profile/antoine-laurent-lavoisier
12.https://youtu.be/AE0kuHKoitE
13. https://science.howstuffworks.com/math-concepts/fibonacci-nature.html
14.https://youtu.be/nt2OlMAJj6o
15.https://www.everythingrf.com/community/what-is-electronic-warfare
16. https://w0ww.youtube.com/watch?v=Rsa1zsOx5Mw
17. http://www.bhopal.com/
18. https://www.youtube.com/watch?v=4WZTzKu3CsY
19. https://www.youtube.com/watch?v=khc2wUBsFU4
20.http://www.bhopal.com/
21.https://www.youtube.com/watch?v=32vJxDUr-nE
22. https://www.youtube.com/watch?v=BLhwNhtYU5E
23. https://www.bbc.com/news/science-environment-55365434
24.https://www.ted.com/talks/ray_kurzweil_get_ready_for_hybrid_thinking?referrer=playlist-talks_on_artificial_intelligen%23t-146994
25.https://celebratepicturebooks.com/tag/writing-resources-for-kids/
26.http://www.englishclub.com/writing/punctuation.htm
27.http://guidetogrammar.org/grammar/marks/marks.htm
28.http://www.grammarbook.com/english_rules.asp

Semester IV	
Self Study Course –Industrial Mathematics	
Code: 21UMASS2	**Credits: 2**

Objectives:

- To understand and develop the linkage between mathematics and business.
- To apply mathematics to engineering, science, society and industry and to emphasis on mathematical modeling, computational techniques and statistical reasoning.

Course Outcomes

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	evaluate range, quartile, mean deviation and standard deviation.	1	Ev
CO-2	apply basic operation to calculate frequencies.	3	Ap
CO-3	make connections of mathematical ideas to other ideas both inside of and outside of mathematics.	4	Ap
CO-4	demonstrate mathematical skills in the area of conditionally probability.	6	Un
CO-5	evaluate the consistency of data from a sample.	7	Ev
CO-6	demonstrate the knowledge of probability and the standard statistical distributions.	7	Un
CO-7	relate mean deviation and standard deviation.	3	Un
CO-8	measure the association between two binary variables with yule's coefficient.	5	Ev

Semester IV	
Self Study Course – Industrial Mathematics	
Code: 21UMASS2	**Credits: 2**

Unit: I

Measures of dispersions: Measures of dispersions - Range - Quartile - Mean deviation - Standard deviation.

(Chapter: 3, Sec: 3.1, Pages: 60-80)

Unit: II

Theory of Attributes: Theory of Attributes – Positive class frequencies – negative class frequencies - Contrary frequencies.

(Chapter: 8, Sec: 8.1, Pages: 196 - 212)

Unit: III

Consistency of data: Consistency of data- Consistent- Inconsistent - Independence and association of data: Two attributes are independence.

(Chapter: 8, Sec: 8.2, 8.3, Pages: 212-228)

Unit: IV

Probability: Probability – random experiment – relative frequency – probability set function

(Chapter: 11, Sec: 11.1, Pages: 274-281& Exercise)

Unit: V

Probability: Conditional probability.

(Chapter: 11, Sec: 11.2, Pages: 281 - 303)

Text Book

1. Dr. S. Arumugam and Mr. A. Thangapandi Issac., Statistics, 2013, New Gamma Publishing House, Palayamkottai.

Semester - III			
Part III Allied	**Statistics I**		
Course Code :21UMMA31	**Hrs/week : 6**	**Hrs/Sem : 90**	**Credits : 4**

Objectives:

- To help the students to understand the uses of statistics in various competitive fields.
- To apply the statistical tools in their day to day problems.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the difference between the central moments and general moments	1	Un
CO-2	compute the central moments and general moments	3	Ev
CO-3	apply concepts and theorems in solving problems	8	Cr, Ap
CO-4	find correlation between two variables	3	Ap
CO-5	evaluate particular regression lines	3 and 7	Ap
CO-6	understand the difference between the discrete random variables and the continuous random variables and solve the problems	8	Un, Ap
CO-7	fit Binomial, Poisson and Normal distribution.	8	Ap
CO-8	compare moment generating function and cumulant generating function	2 and 7	Ev

Semester - III			
Part III Allied	**Statistics I**		
Course Code : 21UMMA31	**Hrs/week :6**	**Hrs/Sem: 90**	**Credits : 4**

Unit I

Moments - Skewness and kurtosis - Curve fitting - Method of least squares - fitting lines - parabolic, exponential & logarithmic curves **(Text book 1 Chapter 4,5)**

Unit II

Correlation &regression - scatter diagram - Karl Pearson's coefficient of correlation - properties - lines of regression coefficient & properties - rank correlation

(Text book 1 Chapter 6 §sections 6.1,6.2 6.3)

Unit III

Random variables, distribution function, two dimensional random variables, moment generating function, cumulants and characteristic function

(Text book 2 chapter5&7 §sections 5.2 to 5.5 and 7.1 to 7.3)

Unit IV

Discrete probability distribution - Geometric, Binomial & Poisson distribution & their moment generating functions, characteristic function, properties & simple application. **(Text book 2§Chapter8§Section8.4,8.5,8.7 (Omitting Negative Binomials)**

Unit V

Continuous probability distributions - Gamma distributions, Normal distributions - their properties - simple problems - importance of normal distribution

(Text book 2§ Chapter 9 §sec 9.2, 9.5,9.6 and 9.7)

Text Books

1. S.Arumugam and A.Issac, *Statistics*, New Gamma publishing House. Palayamkottai

2. Gupta S.C., Kapoor V.K., *Fundamentals of mathematical Statistics* Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi.

Reference books

1 H.C.Saxena, *Elementary Statistics*, S.Chand& Company Ltd., New Delhi

2. J.N.Kapurand Saxena, *Mathematical Statistics*,S.Chand& Company Ltd., New Delhi.

Semester – IV			
Part III Allied	**Statistics II**		
Course Code : 21UMMA41	**Hrs/week : 6**	**Hrs/Sem : 90**	**Credits : 4**

Objectives:

- To cater needs of statistics in professional and academic courses
- To understand the application of statistics in various fields.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	understand the difference between the weighted index numbers and unweighted	1 and 2	Un
CO-2	compute the upper and lower control limits for different chart	3	Ev
CO-3	find approximate solutions to problems	4 and 8	Cr & Un
CO-4	apply concepts and theorems in solving problems.	4	Ap
CO-5	demonstrate problem solving skills	3	An
CO-6	know type I and type II error	1	Cr
CO-7	classify the different test static	5	Un & Ap
CO-8	apply the correct test static	4	Ap

Semester – IV			
Part III Allied	**Statistics II**		
Course Code : 21UMMA41	**Hrs/week :6**	**Hrs/Sem :90**	**Credits :4**

Unit I

Characteristics of index numbers, Laspeyers and Paasche's – Bowley's - Marshall and Erdgeworth's index numbers - Tests - Unit test - Commodity reversal test, Time reversal test, Circular test.**§Text book 2 chapter 9**

Unit II

Statistical Quality Control - Definition, Advantages, Process control - Control chart, Mean chart, Range chart, p - chart, np – chart.

§Text book1 volume2 chapter 7 (page 1052 - 1074)

Unit III

Testing of hypothesis - Null and Alternate Hypothesis. Type I and Type II errors - Critical region, level of significance - Test of significance for large samples - Testing a single proportion - Difference of proportions - testing a single mean - Difference of means. **§Text book1 volume2 chapter 3 (page 881 -908)**

Unit IV

Tests based on t - distribution - Single mean - Difference of means - Tests based on F distribution - Variance ratio test - Test based on chi square distribution - Independence - Goodness of fit.

§Text book1 volume2 chapters 3&4 (page 910 -920, 939-990, 1006-1009)

Unit V

Analysis of Variance - One way and two way classified data - Basis of experimental design - simple problems. **§Text book2 chapter17**

Text Books

1. Gupta S.P., *Statistical Method*, forty fourth edition Sultanch and & sons publishers-New Delhi.
2. Arumugam S. and Issac A., *Statistics*, New Gamma publishing House. Palayamkottai.

Reference Book

1. Gupta S.C., Kapoor V.K., *Fundamentals of Mathematical Statistics* , Eleventh edition, Sultan Chand & Sons, Educational Publishers, New Delhi.

SEMESTER- V			
CORE VII - AGRICULTURAL MICROBIOLOGY			
Code : 15UMIC51	**HRS/WEEK: 6**	**HRS/SEM: 90**	**CREDITS: 5**

OBJECTIVES:

1. To enhance knowledge of various microbial activities and its impact on the environment.
2. To study about various beneficial aspects of soil microbes.

UNIT-I

Soil- physical and chemical properties of soil- Microbial flora of soil (Bacteria, fungi, algae and nematodes) - Role of microbes in biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

UNIT-II

Microbial interactions-Mutualism, commensalisms, competition, amensalism, parasitism and predation. Interactions between microbes and plants-rhizosphere, phyllosphere.

UNIT-III

Nitrogen fixation and its mechanism - Symbiotic *(Rhizobium* sp) - Asymbiotic (*Azotobacter* sp) – Associative (*Azospirillum* sp). Phosphate solubilising bacteria. Bacterial biofertilizers- Definition, isolation, mass production and commercial applications of *Rhizobium*, *Azotobacter*, *Azospirillum*, *Phosphobacteria*, *Cyanobacteria* (*Anabaena*, *Nostoc*)- Mycorrhizae – VAM.

UNIT-IV

Plant diseases - symptoms, etiology, life cycle and control measures - Bacterial (Soft rot of vegetables, Blight of paddy, Citrus canker), fungal (Red rot of sugarcane, Stem rust of wheat, Tikka leaf spot of groundnut, Late blight of potato) and viral (TMV, CMV, Banana bunchy top virus).

UNIT-V

Biopesticides - Bacterial (*Bacillus thuringiensis*)- Fungal (*Trichoderma viridae*)- Viral (NPV,CPV & GV)- mode of action and applications- Biopesticide developments.

REFERENCE BOOKS:

1. Shiva Aithal, C. (2010). Mordern approaches in Soil,Agricultural and Environmental Microbiology. Himalaya Publishers, New Delhi.
2. Atlas,R.M., and Bartha.M. (2003). Microbial Ecology –Fundamentals and applications. Benjamin – Cummings, Mento Park, California.
3. Martin Alexander (1983).Introduction to Soil Microbiology, Wiley eastern Ltd., NewDelhi.
4. Subba Rao,N.S.(1997). Biofertilizers in Agriculture and Forestry III Ed,Oxford and IBH Publishing Co, Pvt. Ltd, NewDelhi.
5. Subba Rao,N.S.(1995). Soil Microorganisms and Plant growth. Ed,Oxford and IBH Publishing Co, Pvt. Ltd, NewDelhi
6. Wheeler, B.E. (1976). An introduction to Plant disease. ELBS and John Wiley and sons, Ltd.
7. Rangaswamy.g., and Bagyaraj.D.J. (1996). Agricultural Microbiology. Prentice-Hall of India Pvt Ltd., New Delhi.
8. Dirk, J. Elasas, V., Trevors,.T., and Wellington, E.M.H. (1997). Modern Soil Mirobiology. Marcel Dekker INC, New York, HongKong.
9. Dubey R.C. (2001).A Text Book of Biotechnology. S Chand & Co. New Delhi.
10. Gupta,S.K.(2014).Approaches and trends in plant disease management. Scientific publishers.Jodhpur,India.

SEMESTER – IV			
SKILL BASED ELECTIVE – COMPUTERS & BIOSTATISTICS			
Sub code:15UMIS41	**HRS/WEEK- 2**	**HRS/SEM - 30**	**CREDITS:2**

OBJECTIVES

To impart advance level information in the subject of computer &biostastics

Unit I

Introduction to computer- computer generation- classification of computers – computer memory and its types.

Unit II

Introduction to computer software- operating system-Compiler&interpreter – Internet networking.

Unit III

Software, MS windows, MS excel, MS power point.

Unit IV

Introduction to biostatistics- Basic concepts of biostatistics population (data, sample, variable)- Collection of data-(Primary& Secondary)- Sampling-Processing of data.

Unit V

Diagrammatic presentation of data- Graphic presentation of data(Bar diagram, Pie diagram, Line graph, Pictogram, Histogram, Frequency polygon, Frequency curve, Ogive).

Reference Books:

1.Introduction to Information Technology, Pearson Eduction, New Delhi.
2. Norton, peter,Introduction to Computers,Tata McGraw Hill, New Delhi.
3. Douglas,Comer E., Computer Networks and Internet, Pearsons Education, New Delhi.
4. Rajaraman, V., Fundamentals of Computers, Prentice Hallof India, New Delhi.
5. Office 2000: No Experince Required, BPB Publications, New Delhi

6. Spiegel M. R., Schiller J.J., Srinivasan R. A. , A. Srinivasan Schaum's Outline of Probability

and Statistics. McGraw-Hill Trade.

7.Arora PN & Malhon PK (1996). Biostatistics Imalaya Publishing House, Mumbai.

8.Sokal & Rohif (1973). Introduction to Biostatistics, Toppan Co. Japan.

9.Stanton A & Clantz, Primer of Biostatistics (2005). The McGraw Hill Inc., New York.

SEMESTER- V			
Common Core VII	**Psychology and Microbiology for Health care**		
Code: 18UBCS51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit: 4**

Vision:

To familiarize the concepts of psychological aspects in health.

Mission:

To understand the complex interactions of biological, psychological, social factors of human health and disease.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the nature of psychology and microbiology	1	Re
CO-2	understand the importance of human system	1	Re
CO-3	gain knowledge about the acute stressors.	2	Un
CO-4	analyze the various problems in menstrual cycle	5	An
CO-5	develop a proper lifestyle	3	Cr
CO-6	understand about sleep related disorders	6	Un
CO-7	create a depth knowledge about the warning and health risk	2	Un
CO-8	evaluate the concept of health care.	4	Ev

SEMESTER- V			
Common Core VII	**Psychology and Microbiology for Health care**		
Code: 18UBCS51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit: 4**

Unit – I:

Introduction to Microbiology - The History and Contributions of Microbiology (Antony Van Leeuwenhoek, Joseph Lister, Pasteur, Robert Koch) Classification of microorganisms (Bacteria, fungi, virus), Applied fields of Microbiology.

Psychology as a science - Schools of psychology, Various fields in psychology, Nature and scope of psychology .

Unit – II:

Introduction and historical overview of Immune system, Basic Immunology- Specific immune mechanisms and functions – Immuno mediators: [Immune-specific (e.g., cytokines); Non-immune-specific (e.g., aging, sleep)], Neuro immunology- Lymphocyte neuro hormonal receptors. Human stressor - Laboratory acute stressor effects on immunity.

Unit – III:

Personality disposition. CHD, Asthmatics, Allergy, Eczema, Hiding, Rheumatoid Arthritis, Peptic Ulcer, Diabetes and menstrual disorders.

Unit – IV:

Keeping the motor running -Neurobiological process that govern exercise, related psychological effects, Nutrition, Eating-related process, Overweight and obesity -making changes – Healthy foods-public health-Sleep, Sleep disorders, accidents at work and at home.

Unit – V:

Recognizing illness symptoms and what needs to be done-recognizing warning and health risks -illness perceptions and beliefs – Relation between patients and the health provider-obtaining health care.

Text books:

1. Cacioppo, J.T., Tassinary, L.G., & Berntson, G.G 2007. *Handbook of Psycho physiology*. 3rdedition. Cambridge, UK: Cambridge University Press.
2. Marks, D. F., Murray, M., Evans, B., & Estacio, E.V. 2006. *Health Psychology* India; Sage Publication.
3. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne. 2007. *Kuby Immunology*. 6th edition. W. H. Freeman and Company, New York.
4. Wiley, Sherwood, Woolverton. 2014. *Prescott's Microbiology*. Ninth Edition. McGraw Hill International Edition.

Books for Reference:

1. Sarafino, E.P. 1999. *Health Psychology*. John Wiley & Sons Inc.
2. Hymie Anisman ,2016. *Health Psychology*. Sage publication Ltd.
3. Taylor,S.E.2014. *Health psychology*. Mc Graw-Hill Education.
4. VamanRao. C. 2007. *Immunology*. 2nd Edition. Narosa Publishing House, New Delhi.

SEMESTER- VI			
Core X - Food Microbiology			
Code :18UMIC61	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Vision:

To highlight the basic concepts and principles about the techniques in food microbiology and advanced level information about food microbiology.

Mission:

To enhance the students with the basic knowledge on various techniques involved in food production and preservation.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain food microbiology	1	Un
CO-2	classify food.	1	Un
CO-3	explain food as a substrate for microorganisms.	3	Ev
CO-4	determines microbial contamination of food	3	Ev
CO-5	explain food preservation- physical and chemical methods.	1	Ev
CO-6	evaluate the causes of food spoilage-fruits, vegetables, dairy products, meat and fish.	3	An
CO-7	determine food borne disease and food spoilage.	4	Ev
CO-8	importance of food laws and regulations.	3, 4 ,5	Ev

SEMESTER- VI			
Core X - Food Microbiology			
Code :18UMIC61	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Unit - I

Food as a substrate for microorganisms- Microorganisms important in food microbiology- Bacteria, Molds and Yeasts- Brief account of each group – General characteristics and importance –Microbiological examination of food - Microscopic techniques. Direct microscopic examination, total colony counts and differential enumeration.

Unit- II

Microbial contamination of foods - spoilage of food by microbes in cereals and cereal products- Eggs and poultry – meat – fruits, vegetables and its dried products- pickles- bread – canned foods.

Unit- III

Methods of food preservation: Aseptic handling, removal of microorganisms, anaerobic conditions, heat processing, refrigeration and freezing, drying, osmotic pressure- Chemical preservatives - Radiation- UV light, irradiation - Canning- Food Hygiene and sanitation.

Unit- IV

Food poisoning- Food borne diseases- Food intoxication and Food infection- Bacterial toxins (*Staphylococcus*, *Clostridium*, *Escherichia* and *Salmonella*) – Fungal (Mycotoxins) – Viral (Hepatitis) – Protozoan (*Entamoeba*).

Unit-V

Quality and safety assurance in food industry- - Microbial standards in food –*fssai* – Hazard Analysis Critical Control point (HACCP) - Food laws and Regulations- FAO,FDA,WHO,AGMARK, ISI, ISO. - BIS Laboratory Services, BIS product certification and licensing quality systems.

Text Book:

1. Frazier, W.C. and Westhoff, D.C. 2008. *Food Microbiology*. 4th Edition. Tata McGraw Hill publishing Co Ltd., New Delhi.

Books for Reference:

1. Adams, M.R. and Moss, M.O. 1995. *Food Microbiology*. 4th edition McGraw Hill, New York.
2. Jay, J.M. 2006. *Modern Food Microbiology*. CBS Publishers and Distributors, New Delhi.
3. Hobbs, B.C. and Roberts, D. 1993. *Food Poisoining and Food Hygiene*, Edward Aarnold (A division of Hodder and Sloughton), London.

SEMESTER –VI			
Core Practical – VI - Laboratory in Food Microbiology, Industrial Microbiology and Microbial Biotechnology			
Code : 18UMICR6	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 2**

Vision:
To highlight the techniques involved in food and industrial microbiology

Mission:
To expose the students to different processes used in industries, food production and preservation and get information about the spoilage microorganisms.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the importance of food and industrial microbiology	1	Un
CO-2	understand different food microbes and their role.	1	Un
CO-3	explain food as a substrate for microorganisms.	3	Ev
CO-4	exploit microbes in the production of food	3	Ev
CO-5	explain food preservation- physical and chemical methods.	1	Ev
CO-6	evaluate the causes of food spoilage-fruits, vegetables, dairy products, meat and fish.	3	An
CO-7	recall the techniques involved in industries.	1	Re
CO-8	explain the quality and safety assurance in food industry.	2, 4 ,5	Un

SEMESTER –VI			
Core Practical – VI - Laboratory in Food Microbiology, Industrial Microbiology and Microbial Biotechnology			
Code : 18UMICR6	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 2**

1. Evaluation of Milk quality- Methylene blue reduction test.
2. Milk testing by Resazurin method.
3. Microbiological analysis of food product- Curd.
4. Microbial Examination of fruits and vegetables - Surface washing and internal tissues- TVC.
5. Microbial examination of Meat- Surface washing and internal tissues- TVC.
6. Testing of soft drinks.
7. Immobilization of bacterial cells (*Escherichia coli* and *Bacillus*).
8. Preparation of Single cell Protein (*Spirulina*) - Demonstration
9. Mushroom cultivation.
10. Wine production using yeast .
11. Antibiotic production by Bacteria or Actinomycetes- (Demonstration).

Books for Reference:

1. Cappuccino J.G and Sherman N. 1996 *Microbiology – A lab manual* Benjamin Cummins, New York.
1. Kannan, N., *Laboratory Manual in General Microbiology*.Palani Paramount Publication, Palani.
2. David greenwood, Richard. B., Slack & John. F., Peutherer, 2002. *Medical microbiology* 16th edition.
3. Murray P.R; Baron E.J; Jorgerson J.H; Pfaller M.A. and Yolker R.H 2003. *Manual of Clinical microbiology,* 8th edition. Vol. 1 & 2 ASM Poem Washington D.C.
5. Gunasekaran, P.1996. *Laboratory Manual in Microbiology.* New Age International Ltd., Publishers, New Delhi.
6. Jayaraman, J.,1985. *Laboratory Manual in Biochemistry*. Wiley EasternLtd., New Delhi.
7. Plummer, D.T.,. *An Introduction to Practical Biochemistry*. Tata McGraw-Hill. New Delhi.
8. Dubey, R.C.and Maheswari,D.K. 2002. *Practical Microbiology*, 1st edition Chand and Company Ltd., India.

SEMESTER –V			
Core Integral - I – Microbial Nanotechnology			
Code: 18UMII51	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 4**

Vision:

To create the ability to be multi-skilled in the field of nanotechnology with good technical and instrumentation knowledge on various concepts and providing standard education and enabling the students to become entrepreneurs and socially responsible.

Mission:

To aware the basic knowledge about the basic nanotechnology and developing young students with active and creative minds in the field of nanotechnology.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	acquire basic knowledge on nanotechnology	4	Un
CO -2	explain the basics of microbial applications of nanotechnology.	4	Un
CO -3	appreciate the structural and functional principles of nanomatreials.	4	An
CO- 4	grasp the fundamental knowledge about synthesis of nanomaterials.	4	Un
CO- 5	acquire basic knowledge about biosensors and types.	2	Ap
CO- 6	get knowledge about analysis of biomolecular nanostructures.	4,2	Un
CO -7	acquire knowledge on cancer diagnosis and treatment.	2,4	Ap
CO- 8	get knowledge about drug designing and delivery	2,4	Ap

SEMESTER –V			
Core Integral - I – Microbial Nanotechnology			
Code: 18UMII51	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 4**

Unit I

Introduction to nanotechnology - Structural and functional principles of nanotechnology - Applications of nanotechnology. Bionanoparticles – Carbon nanotubes, Carbon nanocones.

Unit II

Nanotechnology : Nanoparticle synthesis by plants, bacteria and yeast. Methods of Nanobiotechnology - Analysis of bimolecular Nanostructures by Atomic Force Microscopy, Scanning Probe Electron Microcopy and XRD.

Unit III

Biosensors – optical nanosensors, multi-functional biochip (MFB) and Detection of the *Mycobacterium by MFB.*

Unit IV

Application of Nanobiotechnology in medicine – Cancer diagnosis and treatment, Drug designing and delivery.

Unit V

Nanotechnology and Food safety – Food Packaging and Processing. Nanotechnology in Agriculture – crop improvement and Pest management. Bio security

Text Books:

1. David. S. Goodsell. Jhonwiley 2006.*Bionanotechnology*: Lessons from Nature.
2. R. K. Rathi, 2009, *Nanotechnology* 1st Edition. S. Chand & Company Ltd, New Dehli.

Books for Reference:

1. Bernd Rehm, 2006.*Microbial Bionanotechnology*: *Biological Self-assembly Systems and Biopolymer-based Nanostructures*, Horizon Scientific Press.
2. Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen and Jack E.Lemons. *Biomaterials Sciences: An Introduction to Materials in Medicine* 2nd Edition.
3. Christof M. Niemayer, Chad A. Mirkin, 2004. *Nanobiotechnology:* Concepts, Applications and perspectives, Wiley VCH publishers.
4. Fulekar M.H., 2010, *Nanotechnology: Importance and Applications*, I. K. International Pvt Ltd, New Delhi
5. JainK.K., Tailor L.,*Nanobiotechnology: Molecular Diagnosis*. Francis Group.

SEMESTER-VI			
Core Integral–III- Cosmetic Microbiology			
Code :18UMII61	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credit:4**

Vision:

To impart basic level information in the novel subject of Cosmetic microbiology.

Mission:

To enhance the knowledge on the applications of Cosmetic microbiology in various fields.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	recall the history of cosmetic microbiology.	1	Re
CO- 2	explain about sanitary manufacturing in cosmetic manufacturing	2,5	Un
CO -3	infer practical knowledge about the microbiological targets of preservation	1,2,4	Un
CO- 4	explain the recent techniques on good manufacturing techniques in cosmetic microbiology	3,4,6	Un
CO- 5	demonstrate the quality and safety assurance in cosmetic industry and the hazard analysis and critical control point.	2,4,5,6	Un
CO- 6	apply the techniques in preservation of cosmetics	2,4,5,6	Ap
CO-7	have knowledge on cosmetic production	2,4	Cr
CO-8	get knowledge about analysis of cosmetic production	2,4	Cr

SEMESTER-VI			
Core Integral–III- Cosmetic Microbiology			
Code :18UMII61	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credit:4**

Unit I

Introduction to cosmetic microbiology-History of cosmetic microbiology – Biology of microbes-Bacteria, growth, diversity, molds and yeast.

Unit II

Sanitary manufacturing in cosmetic manufacturing – Cleaning (Detergent ingredients & properties,Types of surfactants) – Sanitization(Physical &chemical sanitizers)-Cleaning & sanitizing equipments-Cleaning and sanitization procedures.

Unit III

Hazard Analysis and Critical Control Point (HACCP) protocols in cosmetic microbiology-Apply HACCP to cosmetics-Waste water removal and CIP system-Selecting Critical Control Points – Parameters of an effective HACCP program.

Unit IV

Cosmetic microbiology test methods preservative efficacy methods-CFTA methods-ASTM methods-Test for factors affecting preservative efficacy-Neutralizer evaluation-Rapid methods used in preservative testing-Microbial content testing.

Unit V

Validation methods – Model for validation-Validation of equipment cleaning & sanitization-Validation in microbiology laboratory- Preservation strategies-Scope and microbiological targets of preservation.

Textbook:

1. Daniel. K. Brannan. 1997. *Cosmetic Microbiology. A Practical Handbook*. CRC press.

Books for Reference :

1. Brannan , D.K.,DilleJ.C., and Kaufman, D.J.1987. Correlation of invitro challenge testing with consumer-use testing for cosmetic products, *Appl.Environ.Microbiol.,53.*
2. Halleck F.E.,1978. Thermal solution sterilization,*Pharm.Technol.,*June.
3. Pflug I.J.,and G.M.Smith. 1977. "the Use of Biological Indicators for Monitoring Wet-Heat Sterilization Processes.". In *Sterlization of Medical products.*(EDS. E.R.L. Gaughran and K.Kereluk), New Brunswick, N.J.,Johnson and Johnson.
4. Gardner J.F., and M.M.Peel.1991.*Introduction to Sterilization, Disinfection, and Infection Control.* Second Edition. Churchill Livingstone, Melbourne

SEMESTER-IV			
NME II - Clinical Microbiology			
Code:18UMIN41	**Hrs/Week: 2**	**Hrs/Sem:30**	**Credit: 2**

Vision:

Highlighting the students about diverse microbial pathogens and its effects on human health.

Mission:

To be aware of the diagnosis, treatment and prevention of pathogens and good medical practice.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO- 1	provide knowledge on the importance of clinical microbiology	1,4	Un, An
CO -2	acquire knowledge on normal flora on human body.	1	Un
CO- 3	acquire knowledge on various types of diseases.	6	Co
CO- 4	provide information about the mechanisms of infectious disease transmission	1,6	Un
CO- 5	acquire knowledge on causative agent, treatment , prevention and control measures.	1,6	Un
CO- 6	provide interpretation of laboratory tests in the diagnosis of infectious diseases.	2	Co
CO- 7	understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.	6	Co
CO- 8	develop basic skills necessary to work in the microbiology laboratory.	1,2	Un

SEMESTER-IV			
NME II - Clinical Microbiology			
Code:18UMIN41	**Hrs/Week: 2**	**Hrs/Sem:30**	**Credit: 2**

Unit - I

Sources of infection - Routes of transmission - control measures - Testing by Koch's postulates - Antibiotic sensitivity testing

Unit - II

Bacterial pathogens - *Streptococcal, Staphylococci, E.coli, Vibrio, Salmonella, Shigella* and *Mycobacterium*

Unit – III

Fungal pathogens - *Candida, Aspergillus - Dermatophytes*

Unit - IV

Viral pathogens - Pox virus, Mumps virus, Rabies virus and HIV

Unit - V

Protozoan pathogens - Malarial, Amoebic , Giardiasis and Yellow fever

Text Books:

1. Ananthanaryanan R and Panikar J , 2000. *Text book of Microbiology*, Orient Longmans.
2. Rajan.S. 2007 . *Medical Microbiology*, MJP Publisher, Chennai

Books for Reference:

1. Kanika L Mukherjee, *Medical Laboratory Technology,* Mc Graw Hill Publishing Co., Ltd., New Delhi Vol I-III
2. Salle, A.J.,1996. *Fundamental Principles of Bacteriology*. (7th edition), Tata McGraw-Hill Publishing Company Ltd., New Delhi.
3. Pelczar Jr.,M.J., Chan E.C.S. and Kreig, N.R. 1993. *Microbiology.* McGraw Hill Inc., New York.

SEMESTER –V	
Self Study – Sea Food Processing	
Code: 18UMISS3	**Credits:2**

Vision:

To understand the different food sources from the sea environment.

Mission:

To gain knowledge in the concept of sea food processing.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	build an idea about the sea environmental science.	3,4	Ap
CO -2	elaborate the nutritional benefits of marine resources	3	Cr
CO -3	importance of food processing.	3	Ev
CO- 4	explain the preservation methods- canning, smoking, drying, chilling and freezing.	1	Un
CO -5	demonstrate to handle and store the fish products	3	Un
CO -6	design the fish products	4	Cr
CO- 7	explain packaging and labelling techniques.	3	Un
CO -8	evaluate the methods to extend shelf life.	4	Ev

SEMESTER –V	
Self Study – Sea Food Processing	
Code: 18UMISS3	**Credits:2**

Unit– I

Sea environmental science: Marine eco system - Nutritional benefits of marine resources – fish, fish oil, seaweeds.

Unit- II

Scope and importance of food processing - principles and methods of food preservation - Sun drying, Smoking, Salt curing, Chilling, Pickling,

Unit- III

Preservation methods: Canning and Frying, irradiation process, value addition**.**

Unit– IV

Microbiology of fish products - storage and handling, preservation – freezing techniques and, preparation of fish products (Fermented fish, Fish products, Fish soups, Fish powder, Prawn powder and Cutlets)

Unit– V

Introduction to packaging and labelling - packaging principles and operation - packaging materials - deteriorative changes in foodstuff and packaging methods for prevention - shelf life of packaged foodstuffs - methods to extend shelf life, requisites of good packages.

Text book:

1. Bonnell A. D. 1993 - *Quality Assurance in Sea Food Processing:* A practical guide – Chapman and Hall, Inc.

Books for Reference:

1. Linda AnkenmanGranata, George J. Flick, Jr, Roy E. Martin.2012. *The sea food industry – Spices, products, processing and safety* – 2nd edition – Wiley Blackwell Publication.
2. Hall G. M. 1997 -*Fish Processing Technology* – 2nd Edition – Blackie academic and Professional publication.
3. Ioannis S. Boziaris. 2013. *Sea food processing – Technology, Quality and safety* – Wiley Blackwell publication.

SEMESTER – II			
Allied-II Biochemistry			
Course Code -21UMIA21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Objectives:

To extend the fundamental knowledge of biochemistry and to provide the highest quality of translational biomedical research, education and service.

To enhance the students with knowledge on various biochemical aspects of the bio- molecules.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	develop fundamental knowledge about various bio-molecules.	2	Un
CO -2	learn the element present in biomolecules	2	Un
CO-3	differentiate between monomers and polymers	2	Un
CO-4	compare and contrast the structure and function of the carbohydrates, protein, and lipid.	2	Ap
CO-5	summarize the functions of carbohydrates, proteins, lipids, enzymes and vitamins	2	Sy
CO-6	compare and contrast saturated, mono-saturated and poly-saturated fatty acids.	2	Un
CO-7	recognize the importance of the three dimensional shape of a protein on its function and its role.	2	An
CO-8	know the working principle of spectrophotometer and able to handle.	2 ,3	Kn

SEMESTER – II			
Allied-II Biochemistry			
Course Code -21UMIA21	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 3**

Unit I Basis of Biomolecules

Structure of atom – chemical bonds – principles of bioenergetics - Laws of thermodynamics – Structure and functions of energy rich phosphate ATP, PEP and creatine phosphate – Role of pH and buffers in biological systems.

Unit II Carbohydrates

Monosaccharides, Disaccharides, oligosaccharides and Polysaccharides - Structure, classification
and functions.

Unit III Proteins

Amino Acids – Peptides – Types, Structure, classification and functions. Nucleic acids – structure and forms and types of DNA and RNA- Functions of nucleic acids.

Unit IV Lipids

Classification – Structure and functions. Enzymes: Classification – Functions of enzymes - Active site – Allosterism – Determination of Michaelis Menten constant – Factors affecting Km Value – Mode of Enzyme action (Lock and Key model and Induced fit model)- coenzymes – Cofactors – Isozymes and Inhibitors.

Unit V Vitamins

Introduction – Fat soluble vitamins (A,D,E & K) – Water Soluble vitamins (B- complex and Vitamin C) – sources, functions ,deficiency and syndromes.

Text book:

1. Santhyanarayana. U. Essentials of Biochemistry. (1st Edition) Books and Allied Ltd., Kolkata , 2002.

Books for Reference :

1. Stryer,L. *Biochemistry.* Newyork: Ed.W.H.Freeman and company, 1995.
2. J.L.Jain, , *Fundamental of Biochemistry*, New Delhi : S.Chand& company Ltd, , 1999.
3. A.C.Deb . *Concepts of Biochemistry.* Kolkata: (7st Education), Books and Allied (P) Ltd., 1999.
4. Hubert,Styer,. *Biochemistry*. Newyork: Freeman and Company,. 1995
5. Lehninger, *Principle of Biochemistry*. 3rd editions by Nelson and Cox (Worth**),** 2009.

SEMESTER–III			
Allied–III–Genetic Engineering			
Course Code:21UMIA31	**Hrs/Week:4**	**Hrs/Sem:60**	**Credit:3**

Objectives:

1. To understand the steps of gene cloning
2. To understand significance of GMOs
3. To know ethical values related to genetic modification
4. To screen out various techniques involved in molecular cloning

Course Outcome:

CONO	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	Infer basic knowledge about cloning	2	Un
CO-2	Identify the applications of genetic engineering in Various fields	4	Ap
CO-3	Explain cloning vectors	2	Un
CO-4	Interpret the techniques used in genetic engineering	2	Un
CO-5	Compare different types of vectors	4	An
CO-6	Explain Genetically modified food	2	Un
CO-7	Demonstrate the hazardous and potential risk in Releasing transgenic into environment	6	Un
CO-8	Make use of DNA Libraries	4	Ap

SEMESTER–III			
Allied–III–Genetic Engineering			
Course code:21UMIA31	**Hrs/Week: 4**	**Hrs/Sem:60**	**Credit:3**

Unit–I: Methods of gene cloning

Genetic engineering–History–Tools of Genetic Engineering-Gene cloning-Steps in cloning- Gene transfer methods-Screening of chimeric DNA. Cloning using linkers and adapters

Unit–II: Gene cloning vectors

Cloning vectors for rDNA (Plasmids, Phages, Cosmids, Transposons)-Binary and Shuttle vectors. Strategies for selecting and designing cloning vectors

Unit–III: Gene libraries and blotting methods

Techniques in Genetic Engineering - Southern, Western, Northern blotting - PCR and its modification-DNA finger printing-DNA libraries .BAC library – YAC library

Unit–IV: Advantages of gene cloning

Applications of genetic engineering- Transgenic plants – Development of crops for disease resistance (Bt cotton) - herbicide tolerance- Medicine (Insulin) – Environment - role of superbug in bio degradation. Markers and Reporter genes and their applications

Unit-V: Role of Genetically modified organisms and regulations

Genetically modified organisms–Advantages and disadvantages-Ecological impact of transgenic plant–Release of GMO in to environment. Indian and international agencies involved in patenting, patenting biological materials

Textbooks:

1. Dr.Verma P.S and Dr.Agarwal.V.K. *Genetic Engineering*. NewDelhi: Chand and Company Ltd. 2009.
2. DubeyR.C. *A Text Book of Biotechnology*. NewDelhi: Fifth revised Edition. S Chand &Co. 2014.
3. Dr.Prakash.S Lohar. *Text Book of Biotechnology.* Chennai: MJP Publishers, 2005

Books for Reference:

1. Glick.B.R.and Pasternak,J.J. *Molecular Biotechnology–Principles and Applications of Recombinant DNA.* Washington D.C: ASM Press, 2017.
2. Brown,T.A. *Gene Cloning.* USA: Third Edition. -Chapman and Hall Publications, 2016.
3. Satyanarayana.U. *Biotechnology*. Kolkata: Books and Allied(P) Ltd. 2013.
4. Rastogi S.C. *Biotechnology Principles and applications.* New Delhi: Narosa Publishing HousePvt.Ltd . 2007.
5. Mohan P. Arora.*Biotechnology.* Mumbai :Himalaya Publishing House Pvt Ltd, 2005
6. Jogdh and.S.N.*Gene Biotechnology* Mumbai: Himalaya Publishing House Pvt. Ltd. 2009

SEMESTER-III			
Allied practical III–Laboratory in Genetic Engineering			
Course Code:21UMIAR3	**Hrs/Week:2**	**Hrs/Sem:30**	**Credit:1**

Objectives:

1. To illustrate creative use of modern tolls and techniques in genetic engineering
2. To familiarize with molecular research-based enzymes
3. To develop different ends of restricted fragmented used in gene cloning
4. To understand the concept of gene multiplication

Course Outcome:

CONO	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Illustrate the principle behind any genetic engineering practical	2	Un
CO-2	Develop basic handling skill in genetic engineering practical	2	Ap
CO-3	Experiment with isolation of Nucleic acids from Different sources	4	Ap
CO-4	Interpret Transformation	1	Un
CO-5	Test for the quantification of nucleic acids	2	An
CO-6	Distinguish the quantification of DNA and RNA	2	An
CO-7	Distinguish the isolation of DNA and RNA	4	An
CO-8	Compare the theory with the protocol of PCR	2	An

SEMESTER-III			
Allied practical III–Laboratory in Genetic Engineering			
Course code:21UMIAR3	**Hrs/Week:2**	**Hrs/Sem:30**	**Credit:1**

1. Isolation of genomic DNA from bacteria.
2. Isolation of genomic DNA from plant source.
3. Isolation of DNA from animal source.
4. Isolation of RNA from bacteria.
5. Isolation of RNA from plant source.
6. Isolation of RNA from animal source.
7. Polymerase Chain Reaction (Demonstration).
8. Quantification of DNA.
9. Quantification of RNA.
10. Restriction – Digestion of E.CoR1 enzyme

11 Ligation of Restricted fragment using Ligase enzyme

12. Determination of unknown fragment using marker DNA – Demonstration

Books for Reference:

1. Janarthanan. S. and Vincent.S. *Practical Biotechnology*: *Methods and Protocols.* Hyderabad : Universities Press (India) private limited. 2007.
2. Jyoti Saxena, Mamta aunthiyal, InduRavi. *Laboratory manual for Microbiology, Bio-chemistry and Molecular Biology*. India : Scientific Publishers, 2012.
3. Sambrook and Russell. *Molecular Cloning laboratory manual.* New York: Vol 1,2,3.Third edition. ColdSpring Harbor Laboratory Press, Cold Spring Harbor. 2016.

SEMESTER - I			
Core – I - Introduction to Microbiology			
Course Code: 21UMIC11	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Objectives:

To highlight the basic concepts and principles about the different aspects of microbiology including recent developments in the area.

To inculcate about the techniques involved in culturing microorganisms.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	get an idea about the historical events in microbiology.	1	Un
CO -2	understand the diversity in microbiology.	1	Un
CO-3	know the scope of microbiology	4	An
CO-4	know parts of microscope, type and its principle	1, 2	An
CO-5	get the theoretical concepts of related stain	2	Un
CO-6	distinguish different methods of staining techniques	2	Ev
CO-7	analyse nutritional requirements of microbes.	2	An
CO-8	understand the techniques involved in culturing microorganisms.	2	Un

SEMESTER - I			
Core – I Introduction to Microbiology			
Course Code: 21UMIC11	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Unit –I: The scope of Microbiology

The History and contributions of Antony Van Leewenhoek, Joseph Lister, Louis Pasteur, Robert Koch, Edward Jenner, Winogradsky and Beijerinck and development of microbiology
Applied fields of Microbiology.

Unit II: Microscopy

Resolving power, Numerical aperture – Limit of resolution - Magnification Types of Microscopy – Dark field microscopy – Bright field microscopy – Phase contrast microscopy – Electron microscopy.

Unit III: Microbiological staining

Types – Simple, Differential staining, Gram's staining, Endospore staining, Capsule, Flagella, Cytoplasmic inclusion staining, Giemsa staining and their applications.

Unit IV: Structure of bacterial cells

Structure and functions of capsule, flagella, Fimbrae or pili: The cell wall- chemical composition , characteristics and functions of cell wall, Plasma membrane (Fluid mosaic model), mesosomes, cytoplasm: Subunits and chemical compositon, Nucleoids: Cytoplasmic inclusions, Spores and cysts.

Unit V: Sterilization

Principles – Dry heat, Moist heat, Filtration, Pasteurization, Radiation, Disinfectant – Development of Pure culture techniques – Basic component of growth media – Types of growth media, purpose – General, selective&, differential-Nutrient and Mac Conkey agar, enrichment-blood agar, transport and preservation media. Isolation and purification of pure culture.

Text Books:

1. Rajan S., Selvi Christy R. *Essentials of Microbiology*. Chennai: CBS Publishers and Distributers. 2015
2. Rao A.S. *Introduction to Microbiology*. New Delhi: PHI Learning PVT Ltd. 1997

Books for Reference:

1. Prescott L.M., Harley J.P., and Klein D.A., *Microbiology* New York: McGraw-Hill Inc, 7th edition, 2008.
2. Tortora, Funke Case Addison, *Microbiology – An Introduction* Wesley Longman Inc. 7th edition, 2001.
3. Dubey R.C., and Maheswari, S. A *Text Book of Microbiology*, New Delhi: S.Chand & Co. 2003.
4. Pelczar Jr., M.J. Chan E.C.S., and Kreig N.R. *Microbiology*- , New York: McGraw- Hill Inc 1993.
5. Jogn L. Ingraham & Catherine A, *Introduction to Microbiology,* Newyork : Ingraham, Brooks / Cole,. 2nd Edition 2000
6. Jeffrey C. Pommerville., Alcamo's *Fundamentals of Microbiology.* Ninth edition. Jones & Bartlett learning. 2010.

SEMESTER - II			
Core – II Microbial Diversity			
Course Code : 21UMIC21	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Objectives:

To illustrate the evolutionary approaches and diversified nature of microorganisms

To demonstrate the students to be aware of ubiquitous nature of micro organisms and their detailed account on taxonomic approaches and survey of prokaryotic phylogeny and phylogenetic groups of eukaryotes.

Course Outcome:

CO .No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	list out the general classification of microbes.	1,5	Kn
CO -2	distinguish the taxonomic ranks of micro organisms	2	An
CO-3	illustrate the Bergey's manual classification about bacteria	2,4	Co
CO-4	know the Alexopoulous classification of fungi and their general features	1	Kn
CO-5	interpret the general morphological characteristics and the algal diversity	1,2	Co
CO-6	demonstrates the morphology and genetic material of viruses	2	Co
CO-7	know about diversification of microbes	2	Kn
CO-8	analyse the classification, replication, cytocidal effects of plant and animal viruses	2,5	An

SEMESTER - II			
Core – II Microbial Diversity			
Course Code : 21UMIC21	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 6**

Unit-I – Introduction to Taxonomy and classification

General principles of classification. Evolution methods in classification – International codes of nomenclature – Taxonomic approaches and phylogeny.

Unit-II – Bacteria and its classification

General introduction – type study: gram positive bacteria (*Bacillus*), Gram negative bacteria (*E.coli*) – Archaebacteria, Methanogens, Appendage bacteria. Determinative classification of Bergey's manual, cyanobacteria.

Unit-III – Fungi and its classification

– General introduction, morphology, Alexopoulous classification and their general features – Life cycle – filamentous fungi (*Actinomycetes*), molds (*Aspergillus*), macroscopic fungi (*mushroom-Agaricus bisporus*) – unicellular fungi (*Yeast-Saccharomyces cerevisiae*)

Unit- IV – Algae, Protozoa - classification

General characteristics – algal diversity - morphology –classification- General features and Life cycle –blue green algae (*Nostoc*) – Red algae (*Gracilaria*) Protozoa - General introduction –morphology –classification – General features and Life cycle - Sarcodina (*Entamoeba histolytica*) – Mastigophora (*Euglena gracilis*)

Unit- V – Viruses and its classification

Introduction –structure –classification based on morphology and genetic material. Plant virus (TMV) –Animal virus (*Adeno virus*) –Bacteriophage (*T4 phage*).

Text Book:

1. Rajan S., Selvi Christy R., *Essentials of Microbiology*. CBS Publishers and Distributors. 2015

Books for Reference:

1. Stanier, Y. Roger, John L. Ingrahm, Mark L. Wheelis and Page R. Painter. *General Microbiology.* New Jersey: V Ed. MacMillan Press Ltd. 2003.
2. R.C. Dubey. *Text Book of Microbiology* S. Chand and Company Ltd., 2004
3. Pelczar*, Microbiology*, Tata McGraw-Hill Education. 1998.
4. Lansing M. Prescott, John P. Harly and Donald A. Klein. *Microbiology,*. WCB/ McGraw Hill Company. 5th edition, 1999.

SEMESTER-III	
Self-Study (Optional) - Food Packaging Technology	
Course Code: 21UMISS1	**Credits: +2**

Objectives:

To provide the learners with the best learning experience in packing by self-study education andenabling the students to become entrepreneurs and socially responsible.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	To provide understanding on the consequence of Food microbiology	1,4	Un, An
CO -2	Acquire a brief knowledge on food packing	1	Un
CO-3	Acquire knowledge on various types of food packing	6	Co
CO-4	Provide information about the principle of Packing	1,6	Un
CO-5	Acquire knowledge on special packing techniques	1,6	Un
CO-6	Acquire knowledge on packing techniques and their types	1	Un
CO-7	To provide understanding on the consequence of Labelling and packing rules	1	Un
CO-8	Acquire knowledge on bar coding	1	Un

SEMESTER-III	
Self-Study (Compulsory) - Food Packaging Technology	
Course Code: 21UMISS1	**Credits: +2**

Unit I: Introduction

Introduction – packaging strategies for various environments – functions of package

Unit II: Packaging materials

Packaging materials – cushioning materials – bio degradable packaging materials – shrink and stretch packaging materials.

Unit III: Special Packaging Techniques

Special Packaging Techniques- Vacuum and gas packaging – aseptic packaging

Unit IV: Types of Packaging

Retort pouching –edible film packaging – tetra packaging – antimicrobial packaging – shrinks and stretches packaging.

Unit V: Packaging Rules

Packaging Rules- Labeling- Packaging Techniques - Bar coding.

Text Books:

1. Robertson, G.L. *Food Packaging: Principles and Practice*. 2nd Edition. Taylor and Francis, 2006.
2. Han, Jung H. *Innovations in Food Packaging*. Elsevier, 2005.
3. Ahvenainen, Raija. *Novel Food Packaging Techniques*. Wood Head Publishing, 2003.
4. Mathlouthi, M. *Food packaging and Preservation*. Aspen Publications, 1999.

Books for Reference:

1. Mahadevia, M., Gowramma, R.V. *Food Packaging Materials*. Tata McGraw Hill 2007.
2. Robertson, G. L. *Food Packaging and Shelf life*: A Practical Guide. Narendra Publishing House. 2001.
3. 3. John, P.J. *A Handbook on Food Packaging* Narendra Publishing House 2008.

SEMESTER- IV	
Self-Study (Optional) -Probiotics	
Course Code: 21UMISS2	**Credits: +2**

Objectives:

To provide the learners with the best learning experience in Probiotics by self-study education and enabling the students to become entrepreneurs and socially responsible.

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall the basic knowledge on probiotics	3	Re
CO -2	acquaint with characteristics of probiotics	1,2	Kn
CO-3	analyse the aware the probiotics organisms.	2	Ev
CO-4	interpret the knowledge on the roles of probiotics.	1,2	Ap
CO-5	differentiate the probiotics and prebiotics	1,2	Co
CO-6	explain the concept of mechanisms of probiotics	2	Un, Ap
CO-7	grasp the knowledge about prebiotics.	2,3	An
CO-8	know the wealth of the probiotics and prebioticsm	2	Kn

SEMESTER-IV	
Self-Study (Optional) -Probiotics	
Course Code: 21UMISS2	**Credits: +2**

Unit I: Probiotics

Probiotics: Introduction and history of Probiotics, Probiotic microorganisms.

Unit II: Characteristics of Probiotics

Characteristics of Probiotics for selection: Tolerance to additives, stability during storage, stability maintenance of probiotic microorganisms.

Unit III: Role of Probiotics

Role of Probiotics in health and disease: prevention and treatment of gastero-intestinal bacterial infection treatment of chronic urinary tract infection, antitumor and cholesterol level

Unit IV: Mechanism of probiotics

Mechanism of probiotics: production of antimicrobial substances, modulation of immune system, alteration of intestinal bacterial metabolite action

Unit V: Prebiotics concepts

. Prebiotics: concept, definition, criteria, types and sources of prebiotics, prebiotics and gut microflora - Prebiotics and health benefits: mineral absorption, immune response, cancer prevention, elderly health and infant health, prebiotics in foods.

Books for References:

1. Salminen. S and Wright , A. V. *Lactic Acid Bacteria*, Marcel Dekker.1998.
2. Glenn R. G. Marcel R. *Handbook of Prebiotics* CRC press. 2008.
3. LeeY K, Salminen S . *Handbook of Probiotics and Prebiotics* . AJohn Willeyand Sons Inc. Publication 2009.
4. SandholmT. M. Saarela M. *Functional Dairy Products* CRC Wood-head Publishing Limited 2003.

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SEMESTER- III			
CORE – V– ELECTRONICS AND COMMUNICATION			
Code: 15UPHC31	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :4**

Objectives:

To study the basic theorems

To study the working of diodes and transistors

To analyse different types of amplifier

To know about the concepts of feedback and its applications in an amplifier and an oscillator

To study the uses of various instruments applied for measurements

Unit I: Linear Circuit Analysis

Linear and non-linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h - parameters.

Unit II: Semiconductor Devices

Diodes: Semiconductors – P and N type semiconductors – P-N junction diode under forward bias, reverse bias – Silicon and Germanium diodes – Energy band diagram of p-n diode – V – I characteristics of a p-n diode – Experimental determination of knee voltage, ac .forward resistance and reverse saturation current of a p-n diode -Diode rectifier – Half wave rectifier-Expression for I_{dc}, I_{rms} , efficiency and ripple factor – Bridge rectifier – Zener diode - V-I characteristics – Voltage regulator.

Transistor: Junction transistor – Three modes of transistor connection – Relation between alpha and beta of transistor – Transistor parameter calculation for CE mode – Single stage transistor amplifier.

Unit III: Oscillators

Feedback – Negative voltage feedback amplifier – Principle – Gain – Advantages – Feedback circuit. Negative current feedback – Principle – Current gain – Effects – Emitter follower – D.C. analysis – Voltage gain – input impedance – Output impedance – Applications – Sinusoidal oscillator –Types –Oscillatory circuit. Positive feedback amplifier – Barkhausen criterion. Colpitt's oscillator, Hartley oscillator.

Unit IV: Operational Amplifier

Operational amplifier basic ideas – inverting amplifier – summing amplifier – differential amplifier – integrator & differentiator using Op amp – Instrumentation amplifier using Op amp-Differential Instrumentation amplifier using transducer bridge-application to measurement of temperature and as analog weight scale – Multivibrator (Astable, Monostable and Bistable using Op amp).

Unit V: Modulation and Demodulation

Radio Amplitude modulation – Modulated power output – Single side band transmission: A.M – Frequency Modulation – FM transmitter – Demodulation – Transmission of radio waves – Reception of radio waves – Superhetrodyne Receiver – Characteristics of a receiver.

Text Books:

1. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand & Co. Ltd. 2006.

2. G. Jose Robin and A. Ubald Raj, Electronics (I Edition), Indira Publication, Marthandam,2000.

UNIT	BOOK	CHAPTER	PAGE NO. / SECTION NO.
I	2	1	1.01 – 1.30, 1.35 – 1.40
II	2	2,3	2.01 – 2.38, 3.01 – 3.13
III	1	15,16	15.1 – 15.14,16.1 – 16.3 ,16.5,16.7,16.10,16.11
IV	2	8A, 12	8.01 – 8.23, 12.03 – 12.12
V	2	7	7.01 – 7.33

Books for Reference:

1. R. S. Sedha, A text book of applied electronics, S. Chand & Co. Ltd. 2006

2. B. L. Theraja, Basic electronics (solid state), S. Chand & Co. Ltd. 2003.

3. N. N. Bargava, D. C. Kulshreshtha, S. C. Gupta, Basic Electronics and linear circuits, Tata McGraw Hill Publishing company Ltd, reprint 2012.

SEMESTER- V			
CORE – VII – DIGITAL ELECTRONICS			
Code: 15UPHC51	**Hours / week :5**	**Hrs / Semester: 75**	**Credits :5**

Objectives:

To gain knowledge about the binary numbers, Boolean Algebra and Flip Flops.
To study the construction and working of Registers, Counters , A/D and D/A Converters.

Unit I : Number System and Logic Gates

Decimal, binary, hexadecimal, binary-coded decimal numbers-conversion of one two another –addition subtraction of binary numbers by 2's complement method. Digital circuits-logic gates-positive logic and negative logic systems-Basic logic gates-AND, OR, NOT gates-characteristics of logic gates-NOR, NAND gates-Exclusive OR gate-Boolean equation of logic circuits-Boolean equation and logic circuits from truth table-standard forms of expressing logic functions-Boolean algebra-De Morgan's law-NAND,NOR as universal building block-Binary adder-Half adder-Full adder-Half subtractor-Full subtractor.

Unit II: Karnaugh Map

Karnaugh map –Two variable map-Three variable map-four variable map-method of addressing a cell in map-preparation of truth table from Karnaugh map-Don't care conditions-simplification of product-of-sums (karnaugh map using Max terms).

Unit III: Binary Adders and converters

Parallel binary adder- Parallel subtractor using 2's complement system – BCD Adder-Excess 3-code-Excess-3 Adder- Parity Generator and Parity Checker, variable resistor networks, binary ladders, D/A converters, D/A Accuracy and Resolution, A/D converter-simultaneous Conversion, continuous A/D conversion.

Unit IV: Flip –Flops and 555 Timer

IC 555 Timer-as Monostable and Astable Multivibrator-RS Flip flop-clocked RS flip flop-JK Flip flop-JK Master Slave Flip flop-Divide by 2 counters with D Flip flop-T Flip flop.

Unit V: Counters and Registers

Binary counter-Decade counter-Up down counter –Synchronous and asynchronous counters –Shift Register-Registers with parallel load-serial transfer in Register.

Text Books:

1. G. Jose Robin, A.Ubald Raj, Integrated Electronics.
2. Albert Paul Malvino and Donald P. Leach, Digital principles and applications, 7^{th} edition 2013.

UNIT	BOOK	CHAPTER	PAGE NO.
I	1	2A, 2B, 2C	2.01 – 2.13, 2.21 – 2.77
II	1	2D	2.78 – 2.98
III	1 & 2	3 & 12	3.01 – 3.14 & 438 - 463
IV	2 & 1	7 & 3	253 – 258 & 3.18 – 3.35
V	1	4	4.01 – 4.20

Books for reference:-

1. Millman and Taub, Integrated Electronics, International student edition, (TMH)
2. R. P. Jain, Modern digital Electronics, Tata Mc Graw Hill Pvt. Ltd, 4^{th} reprint 1988.

SEMESTER-IV			
SBE– BIO MEDICAL INSTRUMENTATION			
Code: 15UPHS41	**Hours / week :2**	**Hrs / Semester: 30**	**Credits :2**

Objectives:

To have the functional elements of measuring instruments
To acquire the knowledge on the application of Physics in the field of medicine.

Unit I : Human Physiological Systems

Introduction - Cells and their structures - Nature of Cancer cells - Transport of ions through the cell membrane - Resting and action potentials - Nerve tissues and organs - Different systems of human body.

Unit II: Biosignal Acquisition

Introduction - Physiological signal amplifiers - Isolation amplifiers - Medical preamplifier design -Bridge amplifiers.

Unit III: Biopotential Recorders & Assist Devices

Introduction - Characteristics of the recording system - Electrocardiography(ECG) - Electroencephalography(EEG) - Introduction - Pacemakers - Pacemaker batteries - Artificial heart valves.

Unit IV: Specialised Medical Equipment

Introduction - Blood cell counter - Electron microscope - Radiation detectors - GM Counter, Bubble Chamber – Photometer - Filter photometer, Spectrophotometer – Chromatography - Audiometers.

Unit V: Advances in Biomedical Instrumentation

Introduction - Computers in medicine - Lasers in medicine – Endoscopes - Cryogenic surgery -Computer tomography.

Text Book:

1. Dr.N.Arumugam, Bio-medical Instrumentation, Anuradha Publications, reprint 2014.

UNIT	CHAPTER	SECTION NO.
I	1	1.1 - 1.8
II	3	3.1 - 3.5
III	4 & 5	4.1-4.5, 5.1 -5.4
IV	7	7.1–7.3, 7.4(a), 7.4(c), 7.5, 7.5.1,7.5.2,7.5.5,7.7
V	10	10.1-10.5,10.7

SEMESTER- V			
SBE – PHYSICS FOR COMPETITIVE EXAMINATIONS			
Code: 15UPHS51	**Hours / week :4**	**Hrs / Semester: 60**	**Credits :3**

Objective:

To prepare the students for competitive exams and make them competent in facing the challenges with confidence.

Unit I: Fundamentals of Physics

Units-Trignometric-numerical constants-Derivative and Integrals- unit conversion factors-some fundamental physical constants- units and dimensions.

Refer:S.L.Kakani&Hemarajam - vol 2. Pg XV-XIX

Unit II: Properties of matter

Gravitation, Escape velocity & artificial satellite (Refer : chapter7) Surface Tension & viscocity (Refer : chapter8)

Refer: S. L. Kakani

Unit III: Heat & Optics

Thermometry – Calorimetry - Thermal expansion - Law of thermodynamics.

Refer: Objective Physics, Satya Prakash (chapter A (17, 18, 20) – pg. A433 – A471, A499 – A529)

Unit IV: Electromagnetism

Magnetic effect of current – Meters – Magnetism – Electromagnetic induction – Electromagnetic waves.

Refer: Objective Physics, Satya Prakash (chapter C (5, 6, 7, 8, 10) pg. C179 – C309, C342 – C352)

Unit V: Modern Physics

Quantum nature of light – Atomic models and spectra – X-Rays – radioactivity- Properties of nucleus- Nuclear energy – Matter waves and relativity.

Refer: Objective Physics, Satya Prakash (chapter D(1, 2, 3, 4, 5) pg. D3-D121)

Text Books:

1. Satya Prakash, Er.Vibhav Saluja, Objective Physics, A.S.Prakashan publications, Meerut 27th revised edition 2010.
2. Dr.S.L.Kakani, Objective Physics, Sultan chand and sons Ltd. 10th revised edition (2001).

SEMESTER V			
Common Core Core VII – Solid state and Material Science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/Sem :90**	**Credits : 4**

Vision: To understand the usage of the appropriate materials while designing electronic system

Mission: To enrich the students with the knowledge of theory and properties of different materials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	understand the basic symmetry elements and operations of crystals	1, 2	Un
CO– 2	distinguish the types of crystals and enumerate the various crystal imperfections	3,4	An
CO–3	get a clear knowledge about metallic glasses, ceramics and biomaterials.	1, 3, 5,7, 8	Re
CO –4	justify the wave nature of matter and its experimental study	1,3	Ev
CO –5	apply Bragg's law for x –ray study	2	Ap
CO –6	distinguish magnetic materials based on susceptibility	1,2	An
CO –7	use magnetic materials in various field	1,2	Ap
CO –8	discuss the synthesis methods of nano materials	2,3	Un

SEMESTER V			
Common Core Core VII – Solid state and Material Science			
Code : 18UPCC51	**Hrs/Week : 6**	**Hrs/Sem :90**	**Credits : 4**

Unit I: Crystal Structure and Crystal imperfections

Crystal lattice – Primitive and unit cell – Basic symmetry elements and operations – Plane of Symmetry, centre of symmetry & axis of symmetry – Types of Crystals – Bravais lattices – Simple cubic, body centered, FCC structures with an example – Miller indices, Inter planar spacing – Crystal imperfections – Point defects – Schotty and Frenkel defects – Line Defects –Edge & screw dislocations – Surface defects – Volume defects(imperfection).

Unit II: New Materials

New materials – Metallic glasses – Fibre reinforced plastics – Fibre reinforced metals – Bio materials – Ceramics – Cements – High temperature materials – Intermetallic compounds – Alloys – Smart materials.

Unit III: Wave Nature of Matter and X-ray Diffraction

Wave nature – Introduction – De Broglie Hypothesis – Experimental study of matter waves – Davision –Germer's experiment – Heisenberg's Uncertainity Principle.

Bragg's law – Derivation of Bragg's equation – Experimental methods of X –ray study – Laue rotating crystal and powder methods.

Unit IV: Magnetic and Dielectric materials

Classification of magnetic materials – Langvein theory of diamagnetism – Theory of Paramagnetism – Domain theory of Ferromagnetism – Antiferro magnetic materials – Application of Different magnetic materials.

Dielectric materials – Types of dielectric materials – Different types of electric polarization – Internal field – Clausius –Mossotti equation – Frequency and temperature dependence of dielectric constant.

Unit V: Nanomaterials

Nanomaterials – Synthesis – Plasma Arcing – Chemical vapour Deposition – Sol gels – Electro deposition – Ball milling – Properties of nano particles and applications. Carbon nanotubes fabrication – Arc method – Pulsed laser deposition – Chemical vapour deposition – Structure –properties – applications.

Text books:

1. M.Arumugam Material Science, Anuradha Publications, 2008.
2. C M Sri Vasta & C Srinivasan, Science of Engineering materials, New Age International (P) Ltd, Second Edition, 1999.
3. P. K. Palanisamy, Solid state Physics Copyright (2003), Scitech Publication (India) Pvt Ltd, Chennai, 3rd reprint, 2008.

4. R.Murughesan, Modern Physics, Kiruthiga Sivaprasath, S.Chand & Co Ltd, 17th Edition2013.
5. Dr. P. Mani, A Text book of Engineering Physics, Dhanam Publications Chennai, RevisedEdition, 2008.

Book for Reference:

1. Charles Kittel, Introduction to solid State Physics, John Willey and sons, 2010.
2. P. K. Palanisamy, Material Science, Scitech Publication (India) Pvt Ltd .,Chennai, 2005.
M.H Fulekar, Nano Technology: Importance and Application, I K International PublishingHouse Pvt Ltd, 2010.

SEMESTER V			
Core VIII	**Digital Electronics**		
Code : 18UPHC52	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To enlighten our students on the concepts of digital electronics

Mission: To make our students understand number systems, logic gates and semiconductor devices and memories

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	define binary numbers	2	Re
CO –2	explain number system	2	Un
CO –3	construct logic gates	2, 4,6	Cr
CO –4	recall the fundamental concepts and techniques used in digital electronics	2	Re
CO –5	analyze the construction of shift register	2,5	An
CO –6	design registers, interpret logic functions, circuits and truth tables.	2, 4	Cr
CO –7	design counters, understand the concepts of decimal number system.	2,5	Cr
CO –8	differentiate A/D and D/A conversions	2, 4	An

SEMESTER V			
Core VIII	**Digital Electronics**		
Code : 18UPHC52	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Arithmetic Circuits

Binary to decimal system – Decimal system to binary system – Octal system – Hexadecimal System – Excess 3 Code – Gray Code – Binary addition – Subtraction – Unsigned Binary numbers 2's complement – Half adder – Full adder –Half subtractor – Full subtractor.

Unit II: Logic circuits

Boolean algebra – OR, AND and NOT operation – Boolean equation – Logic circuits – Boolean theorems and Basic laws – De Morgan's theorem – Duality theorem – Sum of products – Product of sums – Karnaugh map – Pairs, Quads and Octets – Karnaugh map simplification.

Unit III: Data processing circuits

Flip –Flops: R –S flip flop – Clocked RS flip flop – JK flip flop – JK master slaveflip flop – Schmitt trigger.

Multiplexer – Demultiplexer – 1-16 decoder – BCD to decimal decoders – Sevensegment decoder – Encoder – Parity checker and generator.

Unit IV: Shift registers and counters

Serial in register – Serial out register – Serial in–parallel out register – Parallel in-serialout register – Parallel in–parallel out register.

Ring counter – Binary counter – Decade counter UP/DOWN counter – Mod 3 counter –Mod 5 counter.

Unit V: Semiconductor memories:

ROM– RAMS – SRAMS – Dynamic RAMS.

A/D and D/A conversion:Variable resistor network – Binary ladder – A/D conversion –D/A conversion – Simultaneous conversion – Continuous AD conversion.

Text Books:

1. G. Jose Robin, A. Ubald Raj, Integrated Electronics, Indira Publications,Marthandam, second edition, 2002.
2. Albert Paul Malvino and Donald P. Leach, Digital principles and applications,7th edition 2013.

Books for Reference:

1. Millman and Taub, Integrated Electronics, International student edition, (TMH)

R. P. Jain, Modern digital Electronics, Tata Mc Graw Hill Pvt. Ltd., 4th Reprint1988.

SEMESTER V			
Core IX	**Computational Physics**		
Code : 18UPHC53	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To achieve programming logic by using all C++ features and to become a good programmer in C++

Mission: To apply the knowledge of computing fundamentals and mathematics to write programs in C++

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	utilize their knowledge of C++ programming language and write programs for solving various problems in physics	6,8	Ap
CO –2	design a program for operator overloading	6	Cr
CO –3	distinguish between one dimensional and two dimensional arrays	6	An
CO –4	define various types of constructors	6	Re
CO –5	design a simple C++ program for function	6	Cr
CO –6	define a class	6	Re
CO –7	differentiate constructors and destructors	6	An
CO –8	solve the problem in Bisection method	6, 8	An

SEMESTER V			
Core IX	**Computational Physics**		
Code : 18UPHC53	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Tokens and Expressions

Tokens– Keywords – Identifiers and Constants – Basic data types – User defined data types – Derived data types – Symbolic constants – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ – Scope resolution operator – Member dereferencing operators – Memory management operators – Manipulators – Expressions and their types – Control structures.

Unit II: Functions, Classes and Objects

Functions in C++ – The main function – Function prototyping – Call by reference – Return by reference – Inline functions – Default arguments.

Specifying class – A simple class example – Creating objects – Accessing class members – Defining member functions – Nesting of member functions – Private member functions – Arrays within a class – Arrays of objects – Objects as function arguments – Returning object.

Unit III: Constructors and Operator Overloading

Constructors – Parameterized constructors – Multiple constructors in a class Dynamic constructor – Copy constructors – Destructors.

Defining operator over loading – Overloading unary operators – Overloading binary operators – Manipulation of strings using operators – Rules for overloading operators.

Unit IV: Inheritance and Managing Console I/O Operations

Defining derived class – Single inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance.

C++ streams – C++ stream classes – Unformatted I/O operations – Formatted console I/O operations – Managing output with manipulators – Designing our own manipulators.

Unit V: Numerical Methods (No derivations)

Iterative methods: Bisection method, Newton – Raphson method – Solution of linear simultaneous equations: Gauss elimination method – Method of least squares: Straight line – Interpolation: Newton's forward and Lagrange's interpolation – Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule – Solution of differential equation: Taylor's series method.

Text Book:

1. E. Balagurusamy, Object oriented programming with C++, Tata McGraw – Hill publishing company Ltd. New Delhi, 4th Reprint 2015.

2. J.N.Sharma, Numerical Methods for Engineers and Scientists, Narosa PublishingHouse, New Delhi, Reprint 2008.

Book for Reference:

1. D. Ravichandran, Programming in C++, Tata Mc. Graw Hill Publishing companyLtd. New Delhi.

T.Veerarajan, T. Ramachandran, Numerical Methods with Programs in C, TataMcGraw Hill publishing company Ltd. New Delhi, Fifth reprint 2010.

SEMESTER VI			
Core X	**Modern Physics**		
Code :18UPHC61	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To enlighten our students on the Atomic, molecular, optical and quantum physics

Mission: To understand the theory and applications of emission, absorption and scattering of electromagnetic radiation.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe Michelson –Morley experiment	2	Un
CO –2	list the Postulates of special theory of relativity	2	Re
CO –3	apply Pauli's exclusion principle to periodic table	2	Ap
CO –4	illustrate L –S coupling	2	Ap
CO –5	differentiate the Characteristic and continuous X – ray spectrum	2,5	An
CO –6	define Bragg's law	2,5	Re
CO –7	evaluate Davisson and Germer's experiment	2	Ev
CO –8	apply Bohr's quantization of angular momentum to the hydrogen atom	2	Ap

SEMESTER VI			
Core X	**Modern Physics**		
Code :18UPHC61	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Relativity

General theory – Michelson – Morley experiment – Postulates of special theory of relativity – Lorentz transformation – Length contraction – Time dilation – Relativistic condition of velocities – Simultaneity – Relativistic mass – Relativistic momentum – Mass and energy equivalence – Relation between total energy and rest mass, rest mass energy and momentum.

Unit II: Atomic Structure and Spectra

The vector atom model – Quantum numbers associated with vector atom model – coupling schemes – L-S coupling – j-j coupling – Pauli's exclusion principle – Application to periodic table – Magnetic dipole moment due to orbital and spin motion of the electron – Stern and Gerlach experiment – Zeeman effect – Experimental study of Zeeman effect – Larmor's theorem – quantum mechanical explanation of normal Zeeman effect.

Unit III: X – Rays

Production of X – rays – Coolidge tube – Properties of X –rays – Bragg's law – Bragg spectrometer – X-ray spectra – Characteristic and continuous X- ray spectrum – Moseley's law and its significance – Compton Effect – Compton Effect and its experimental verification.

Unit IV: Wave Properties of Matter

Wave velocity and group velocity – Relation connecting them – Basic postulates of quantum mechanics – Derivation of time dependent and time independent Schrodinger's equation – Physical interpretation of the wave function – Properties of wave function – Operators in quantum mechanics – Eigen functions, Eigen values and Eigen value equations – Expectation values – Transition probability.

Unit V: Development of Quantum Mechanics

Introduction – Black body radiation – Theoretical laws of black body radiation – Plank's quantum theory – Photo-electric effect – Einstein explanation of photo electric effect – The Ritz combination principle in spectra – Stability of an atom, Bohr's quantization of angular momentum and its application to the hydrogen atom – Particle in one dimension and three dimensional box.

Text Books:

1. R. Murugeshan, Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co. Ltd. 12threvised edition 2006.
2. Kamal Singh, S.P. Singh, Quantum Mechanics, S. Chand & Co Ltd., 1998.

Books for Reference:

1. Brijlal and Subramanyam, Modern Physics, 8th edition, 2007
2. J.B. Rajam, Atomic Physics, 8th edition, S. Chand & Co.1981.

SEMESTER VI			
Core XI	**Nuclear and Particle Physics**		
Code :18UPHC62	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To enrich our students with the knowledge of nuclear and particle physics

Mission: To study the properties of α, β, γ rays, process of radioactivity and its applicationsand various detectors

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the structure of nuclei	2	Re
CO –2	understand simple nuclear models	2	Un
CO –3	explain properties of α, β, γrays and their decay	2	Un
CO –4	analyze the key features of nuclear fission and its applications	2	An
CO –5	analyze the key features of nuclear fusion and its applications	2	An
CO –6	understand the principle and working of particle accelerators	2	Un
CO –7	understand the principle and working of particle detectors	2	Un
CO –8	describe the constituent particles in the electron, proton and neutron	2	Un

SEMESTER VI			
Core XI	**Nuclear and Particle Physics**		
Code :18UPHC62	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Introduction to nucleus

Introduction – Classification of nuclei – General properties of nucleus: Nuclear density, Nuclear charge, Spin angular momentum, Resultant angular momentum, Nuclear magnetic dipole moment – Binding energy– Nuclear stability– Theories of nuclear composition– Non -existence of electron within the nucleus – Nuclear forces

– Meson theory of nuclear forces – Liquid drop model – The shell model – Neutrons: The discovery of the Neutron – Basic properties of the Neutron – Classification of Neutrons – Neutron Sources – Neutron Detectors.

Unit II: Radioactivity

Discovery of radioactivity – Natural radioactivity – Alpha, Beta and Gamma Rays – Properties of α, β, γ rays – Determination of e/m of α particles – Determination of charge of alpha particles –Range of alpha particles,Geiger Law, Geiger –Nuttal Law(definition only) –Theory of α decay – The nature of Beta Particles – Origin of γ rays – Soddy Fajan's Displacement law – Law of Radioactive disintegration – The mean life – Unit of Radioactivity – Law of successive disintegration – Biological Effects of Nuclear Radiations.

Unit III: Nuclear Reactions

The discovery of artificial transmutation –Bohr's theory of nuclear disintegration – The Q –value equation for a nuclear reaction – Nuclear reactions – Energy Balance in Nuclear Reactions and the Q – Value – Threshold energy of an Endoergic Reaction – Nuclear Transmutation.

Nuclear Fission and Fusion: Discovery – Nuclear Fission – Energy Released in Fission– Chain Reaction – Nuclear reactor – Uses of nuclear reactor – Nuclear fusion

– Sources of stellar energy – Thermonuclear reactions.

Unit IV: Particle Accelerators and Detectors

Linear Accelerator – Cyclotron –Synchro-cyclotron– Betatron– Ionization chamber – Geiger Mullar counter– Scintillation counter – Wilson cloud chamber.

Unit V :Elementary Particles

Introduction– Particles and Anti-particles – Antimatter – The fundamental interactions – Elementary – Particle quantum numbers – Conservation laws and symmetry – The Quark model.

Text Book:

1. R.Murughesan, Kiruthiga Sivaprasath, Modern Physics, S.Chand & Co Ltd. 12th revisededition, 2006.

Book for Reference:

1. A. Gupta, Modern Physics, 1st edition, Book and Allied Pvt. Ltd , 2006.
2. D.C Tayal, Atomic and Nuclear Physics, 3rd revised edition, Himalaya Publishing House,1998.

SEMESTER VI			
Core XII	**Opto Electronics & Fibre Optic Communication**		
Code :18UPHC63	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To make our students at ease with optoelectronics and communication physics

Mission: To make our students knowledgeable in the field of optoelectronics and fibre optic communication

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall the basic principles of semiconductors	2	Re
CO –2	understand the formation of energy bands of semiconductors	2	Un
CO –3	list out the optical characteristics of semiconductors	2	Re
CO –4	explain the principle and working of optical sources	2	Un
CO –5	categorise the optical detectors and their principles	2	An
CO –6	analyze and classify the structure of optical fibres, its types and various optical losses	2	An
CO –7	understand the basics of signal propagation through optical fibres	2	Un
CO –8	understand the types and various optical losses	2	Un

SEMESTER VI			
Core XII Opto Electronics & Fibre Optic Communication			
Code :18UPHC63	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Optical Characteristics of Semiconductors

Introduction – Light units – Formation of energy bands in semiconductors – Energy band diagram – Direct band gap and indirect band gap semiconductors – Mobility, current density and electrical conductivity – Optical absorption – Optical absorption coefficient – luminescence – Photoluminescence – Electroluminescence – Excess carrier recombination and minority carrier life time – Photoconductivity – photoconductive decay – Experiment to study photoconductive decay – Haynes and Shockley experiment for determination of minority carrier mobility

Unit II: Optical Sources for Optical Fibres

LED – Laser – Fundamentals – Types: Ruby Laser – He-Ne Laser – Heterojunction Laser – CO_2 Laser – Opto electronic couplers – Parameters of opto electronic coupler.

Unit III: Optical detectors

The need for optical detectors – Photo diode – Performance parameters of photodiode –Silicon p–i–n photodiode – Heterojunction Photodiode – Phototransistor – Photo multiplier –Photo thyristor - Photothermistor.

Unit IV: Fibre Optics

Introduction – Different types of fibres – Light propagation through step index fibre: Acceptance angle – Numerical aperture – Numerical aperture of Graded index fibre – Losses in Fibre: Absorption Losses –Scattering Losses: Rayleigh scattering loss and Mie scattering loss –Dispersion in fibres: Types of dispersion – Theory of material dispersion.

Unit V: Fibre optic communication

Analog optical communication system– Digital optical communication – Different generation in optical fibre communication – Advantages – Modulation: Different types of modulation methods –Modulation formats – External modulators: Electro optic modulators (Pockels Effect) – Acousto optic modulators – Demodulation Scheme: Homodyne and Heterodyne detection schemes.

Text Books:

1. Dr. M. Arumugam, Semiconductor physics & optoelectronics, Anuradha Publications,First edition, Reprint 2009.
2. A. Ubald Raj, G. Jose Robin, Optoelectronics, Indira Publication, Reprint 2012.

Book for Reference:

1. Pallab Battacharya, Semiconductor optoelectronic devices, Pearson Education, NewDelhi, Second edition, 2000.
2. Ajoy Ghatak, Optics, McGraw Hill Education(India) Private Limited, Fourth reprint2014.
3. Ajoy Ghatak and K.Thyagarajan, Introduction to Fibre optics, Cambridge UniversityPress India Pvt. Ltd., Reprint 2011

Subir Kumar Sarkar, Optical fibre and fibre optic communication system, S.Chand & company, First edition, Reprint 2008

SEMESTER V			
Core Integral I	**Renewable Energy Sources**		
Code :18UPHI51	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To enhance the students to understand about renewable energy sources and their utilisations

Mission: To create awareness among the students about sustainable utilisation and conservation of natural resources

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	construct solar ponds for water desalination, solar cookers and solar green houses	7, 5	Cr
CO –2	assess the working of windmills used for power generation	7	Ev
CO –3	list the renewable energy sources available in surplus	7	Re
CO –4	explain different types of solar water heaters	7,5	Un
CO –5	sketch out the classifications of WEC system	7	Ap
CO –6	recall Green house effect	7	Re
CO –7	discuss Energy audit	7	Un
CO –8	design KVIC plants for bio gas generation	7	Cr

SEMESTER V			
Core Integral I	**Renewable Energy Sources**		
Code :18UPHI51	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Solar Energy

Introduction – Solar Constant – Solar Radiation at the Earth's Surface : Beam and Diffuse Solar Radiation, Attenuation of Beam Radiation – Solar Radiation Measurements: Pyrheliometers, Pyranometers, Sunshine Recorder – Solar Radiation Data – Solar Energy Collectors: Introduction – Conversion of Solar Radiation into Heat
– Green House Effect – Flat –Plate Collectors: Introduction – Typical Liquid Collector – Advantages of Flat Plate Collectors.

Unit II: Solar Energy Storage and applications

Introduction – Solar Energy Storage Systems: Thermal Storage – Chemical Storage – Solar Pond: Introduction – Principle of Operation and Description of Non-convective Solar Pond –Extraction of Thermal Energy –Applications of Solar Ponds – Applications of Solar energy: Agriculture and Industrial Process heat – Solar Distillation – Solar Cooking: Box type Solar Cooker – Green House effect – Solar Green Houses (Introduction, Types, advantages, parameters for plant growth and Green house environment and control) – Global Warming.

Unit III: Wind Energy

Introduction – Basic Principles of Wind Energy Conversion: The nature of the wind – The power in the wind (only theory) – Wind energy conversion – Wind data and energy estimation – Site selection considerations – Basic components of a WECS (Wind Energy Conversion System) – Classification of WEC systems – Advantages and disadvantages of WECS – Applications of wind energy – Safety systems – Environmental aspects.

Unit IV: Energy Conservation

An Economic Concept of Energy – Principles of Energy Conservation and Energy Audit
– Types of Energy Audit – Energy Conservation Approach: Energy saving devices eligible for higher depreciation – Renewable energy devices eligible for higher depreciation – Co-Generation – Waste Heat Utilization – Heat Recuperators (Definition and Uses) – Heat Regenerators– Instrumentation and control.

Unit V: Other Conventional Energy Sources

Biomass energy – Classification – Biomass conversion Technologies: Wet and Dry Processes – Photosynthesis – Biogas generation – Advantages of Anaerobic Digestion – Factors Affecting Biodigestion – Types of biogas plant (KVIC Digester) – Geothermal energy (Introduction, Applications and advantages) – Ocean Thermal Electric Conversion (OTEC – Basics

principle) – Method and Working Principle of Closed OTEC.

Text Book:

1. G. D. Rai, Non conventional Energy Sources, Khanna Publishers, Reprint 2014.

SEMESTER VI			
Core Integral II	**Advanced Physics**		
Code :18UPHI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision: To make our students experts in areas of advanced Physics

Mission: To train our students in the areas of laser, microprossor, nanotechnology and nuclear spaced materials

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall laser and its applications in medicine industry	3	Re
CO –2	list out the applications of Holography	3	Re
CO –3	solve arithmetic operations using 8085	5,6	An
CO –4	draw 8085 MPU	5,6	An
CO –5	formulate a program to write two hexadecimal numbers using 8085	5,6	Cr
CO –6	discuss BCS theory	2	Un
CO –7	assess the usage of Superconductors	3	Ev
CO –8	list the materials and its properties for nuclear and space applications	2	Re

SEMESTER VI			
Core Integral II	**Advanced Physics**		
Code :18UPHI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I: Applications of Laser

Application of laser in material processing – Laser drilling – laser cutting – Laser welding – Experimental welding – Air pollution monitoring – Water pollution monitoring – Propagation of laser radiation through atmosphere – Laser remote sensing – LIDAR – Raman LIDAR – Sensing wind velocity using laser – Holography

– Applications.

Unit II: Microprocessor architecture

Microprocessor – Microprocessor instruction set and computer language – Microprocessor architect and its operations – Input and output devices – Microcomputer system – Logic devices for interfacing – 8085 MPU.

Unit III: Programming the 8085

8085 programming model – Instruction classification – Instruction and data format

– How to write, assemble and execute simple programs – Instruction set – Data transfer operations – Addressing modes – Arithmetic operations – Logical operations – Branching operations.

Unit IV: Superconductors

Superconductivity – Effect of magnetic field– The Meissner effect – Effect of current

– Type I and Type II superconductors – Thermal properties – Isotope effect – London equations – BCS theory– flux quantisation – Josephson's effect – Application of superconductors – High Tc superconductor – Application of superconductor.

Unit V: Materials For Nuclear and Space Applications

Nuclear fuels – Fuel cladding – Moderators, control materials – Coolants – Shielding materials – Space programme – Structural material and their properties – System requirements – Extreme high temperature materials for thermal protection – Pressure vessels – Lubrication.

Text Books:

1. R. Murugeshan, Optics and spectroscopy, S. Chand & Co. (1995).
2. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International Publishing (India) Private Limited, Fifth edition, (2011).
3. P.K. Palanisamy, Solid state Physics, Scitech publication (India) Pvt

Ltd., Chennai. 3rd Reprint (2008).

4. CM Sri Vastava, C & C. Srinivasan, Science of Engineering materials and Carbon Nanotubes, New Age International Publishers, Third Edition.

Books for Reference:

1. Physics education, volume 19, No.1, April – June 2002
2. Dr. Arumugham, Bio medical instrumentation, Anuradha Agencies, Reprint 2014.
3. M.H Fulekar, Nano Technology: Importance and Application, I K International Publishing House Pvt Ltd, 2010.

SEMESTER VI			
Core Integral III Microprocessor 8086 and Microcontroller			
Code :18UPHI62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision: To develop background knowledge and core expertise in 8086 microprocessor and 8051 microcontroller

Mission: To expose the students to the architecture and instruction set of 8086microprocessor and 8051 microcontroller

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	explain the architecture of 8086 Microprocessor	5,6	Un
CO –2	categorise addressing modes of the 8086 Microprocessor	5,6	An
CO –3	understand instruction set of the 8086 Microprocessor	5,6	Un
CO –4	recall the basic introduction to 8051microcontroller	5,6	Re
CO –5	understand instruction Set and Programming of the 8051 microcontroller	5,6	Un
CO –6	design the assembly level programs using instruction set	5,6	Cr
CO –7	sketch the architecture of 8051 microcontroller	5,6	Ap
CO –8	compare timers and counters	5,6	An

SEMESTER VI			
Core Integral III Microprocessor 8086 and Microcontroller			
Code :18UPHI62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I: Architecture of 8086 Microprocessor

Introduction – Architecture of 8086 – Bus Interface Unit - Execution Unit – Fetch and Execute – Process of Fetching and Decoding of instructions – Registers – Data registers –Segment Registers –Pointer and Index Registers – Flag Register.

Unit II: Addressing modes of the 8086 Microprocessor

Logical and physical address – Address bus, Data bus, Control Bus – Memory Segmentation – 8086 memory addressing-8-bit data from Even – Address bank-8-bit data from odd Address bank – 16-bit data starting from Even Address bank – 16-bitdata starting from odd Address bank.

Unit III: Instruction set of the 8086 Microprocessor

Pin description of 8086 – memory read and write bus cycle of 8086 – 8086 instruction set.

Unit IV: Introduction to microcontroller

Introduction – Architecture of 8051 microcontroller – Memory organization – Pin diagram of 8051 microcontroller – Timers/ Counters – Serial communication

Unit V: Instruction Set and Programming of the 8051 microcontroller

Introduction – Addressing modes- 8051 instruction set – logical instructions – Data- transfer instruction - Boolean variable manipulation – Simple examples in assembly – Language programs of 8051 microcontroller – Assembly – Language programs.

Text Book:

1. Microprocessors and Microcontrollers, Soumitra Kumar mandal, Tata McGraw HillEducation Private Limited, New Delhi.

SEMESTER V	
Self Study	**Bio Physics**
Code :18UPHSS3 (Compulsory)	**Credits : 2**

Vision: To enhance the students to apply the principles and techniques of Physics to Biology

Mission: To make the students to know about the physiology of respiration and resolving power of eye which uses the principle of Physics

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	define Poiseueille ‘s formula	1,2	Re
CO –2	recall polarization	1,2	Re
CO –3	compare transverse and longitudinal waves	1,2	An
CO –4	use of Doppler effect	1,2	Ap
CO –5	diagrammatically show retina and photo receptor	2	An
CO –6	understand the Physiological characteristics of sound	1,2	Un
CO –7	define the terms thermodynamics	1,2	Re
CO –8	identify the non –linearity of human ear response	2	Un

SEMESTER V	
Self Study	**Bio Physics**
Code :18UPHSS3 (Compulsory)	**Credits : 2**

Unit I: Bio Mechanics

Bio Statics: Forces and Torques – Bio Physics of Muscle – Strength of Bones – Bio Dynamics: Newton's Laws – Frictional Forces and Stoke's Law.

Unit II: Biophysics and Fluid Flow

Steady Laminar Flow: Coefficient of viscosity – Poiseuille's Formula: Velocity Profile – Continuity Equation – Flow network and equivalent resistance – Energetics of Fluid Flow – Turbulence – Reynolds Number – Hemodynamics.

Unit III: Biophysics and Gas Transport

The Ideal Gas – Dalton's Law of Partial Pressure – Vapour Pressure – Convective Transport of Gases – Transport of O_2 in Blood – Transport of CO_2 in Blood – Diffusion of Gases: Fick's Law – Gas exchange in lungs – Physiology of Respiration (Definitions associated with the operation of lungs)

Unit IV: Biophysics and Audition

Transverse and Longitudinal Waves – Wave Velocity – Intensity of a Wave – Physiological Characteristics of Sound – Human ear: Phase sensitivity and determination of direction – Non-linearity of ear response.

Unit V: Physics of Vision

Wave Nature of Light – Polarization – Particle Nature of Light – Geometrical Optics – Refraction – Gradient Index Lens –Spherical Aberration – Refractive Power –Refractive Power of Eye – Retina and photoreceptors – Resolving power of eye – Polarization and vision.

Text Book:

1. K Srivastava, Elementary Biophysics , Narosha Publishing House Pvt. Ltd., Reprint2006

SEMESTER I / III			
Allied Physics – Paper I - I B.Sc., Mathematics / II B.Sc., Chemistry			
Course Code : 21UPHA11	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Objective:

1. To understand the principle behind various physical phenomena and apply them in appropriate situations.
2. To learn the concept involved in elasticity, bending of beams
3. To understand the basic principles of heat, light and ultrasonic through the systematic study of theory and experiments.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define fundamentals of elasticity and discuss concepts of stress and strain and the relationship between both, use the stress-strain equations to solve the problems of elastic modes	1	**R, U**
CO-2	solve problems related to uniform and non-uniform bending of beams	1	**An**
CO-3	tell about the terms viscosity and surface tension	1	**R**
CO-4	describe the properties of fluids such as viscosity, surface tension and evaluate the value of coefficient of viscosity	1,2,6	**U,E**
CO-5	estimate the thermal conductivity of a bad conductor	1,2,6	**E**
CO-6	calculate the specific heat capacity of a liquid	1,2,6	**An**
CO-7	calculate the thickness of a thin wire by forming interference fringes	1,2,6	**An**
CO-8	evaluate the dispersive power and resolving power of a grating	1,2,6	**E**

SEMESTER I / III			
Allied Physics – Paper I - I B.Sc., Mathematics / II B.Sc., Chemistry			
Course Code: 21UPHA11/ 21UPHA31	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Unit I: Elasticity

Stress, strain, Hooke's law – elastic moduli – work done in shearing strain – Poisson's ratio – relation between elastic constants – twisting couple on a cylindrical wire – expression for couple per unit twist – torsion pendulum – experiment to determine the rigidity modulus of a wire using torsion pendulum.

Unit II: Bending moment

Bending of beams – expression for bending moment – theory of uniform bending – expression for elevation in uniform bending – experiment to find young's modulus using microscope – non-uniform bending – expression for depression – experiment to find young's modulus using scale and telescope.

Unit III: Thermal Physics

Mean free path – expression for mean free path – transport phenomena – expression for viscosity, thermal conductivity and diffusion – thermal conductivity – Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – determination of specific heat capacity of a liquid.

Unit IV: Interference and diffraction

Young's double slit experiment – condition for interference –additional phase difference due to dissimilar reflections – colour of thin film – air wedge –thickness of a wire – Fresnel and Fraunhofer diffraction – plane transmission grating – experiment to find wavelength by normal incidence method – distinction between interference and diffraction bands.

Unit V: Ultrasonics

Properties of ultrasonic–ultrasonic production – Piezoelectric and magnetostriction methods – detection –thermal and Piezoelectric methods –determination of velocity of ultrasonic waves in liquid using acoustic grating – applicationsand uses – SONAR – measurement of velocity of blood flow and movement of heart

Text Book:

1. Ubald Raj A. and Jose Robin G. *Allied Physics I*. Marthandam: Indira publication. 2016.
2. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication. 2006 and 2012.
3. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication. 2004.
4. Dr. Natarajan G. *Engineering Physics – I*. Chennai: Sri Krishna publications. 2004.

Books for Reference:

1. Mathur D. S. *Properties of matter*. Shyamalal charitable trust Ram Nagar. 1992.

2. Murugeshan R. *Properties of matter*. S. Chand & Co. Ltd. 2008.

3. David Halliday, Robert Resnick and Jearl Walker. *Fundamentals of Physics*. John Wiley & Sons Inc.

4. Brijlal and Subramania. *A text book of Optics*. S. Chand & Co.

SEMESTER II			
Allied Physics – Paper II (I B.Sc., Mathematics/ II B.Sc., Chemistry)			
Course Code : 21UPHA21	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits: 3**

Course Objectives:

- To understand the importance of Physics in the development of latest technology and apply them in appropriate situations.
- To learn the physical phenomena such as electrostatics, electromagnetism, relativity, electronics and energy physics through the systematic study of theory and experiments

Unit I: Electrostatics

Coulomb's law – electric field and field intensity – electric field due to point charge – electric dipole – electric flux – gauss law – applications – electric field due to a charged conducting sphere (point inside and point outside) – uniformly charged cylinder (line charge) – electric potential – potential difference – relation connecting electric field and electric potential at a point – equipotential surface.

Unit II: Electromagnetism

Faraday's laws of induction – induced current and charge – self induction – self inductance of torroidal solenoid – determination of self inductance using Rayleigh method – mutual inductance – coefficient of coupling – determination of mutual inductance using B.G.

Unit III: Nuclear Physics

Classification of nucleus – nuclear constituents – properties of nucleus – expression for magnetic moment of nucleus– packing fraction – mass defect and binding energy – binding energy curve – nuclear fission – energy released in nuclear fission – chain reaction – nuclear fusion – nuclear forces – natural radioactivity – laws of radioactive disintegration – the half life period – mean life period .

Unit IV: Relativity and Wave mechanics

Frame of reference – Galilean transformation – postulates – Lorentz transformation – de Broglie's theory of matter waves – de Broglie wavelength – wave function –postulates of quantum mechanics – Schrodinger wave equation – time dependent form.

Unit V: Digital electronics

Binary numbers – conversion of decimal number into binary number – binary to decimal – binary addition – multiplication –subtraction by 2's complement – basic logic gates - OR , AND, NOT, NOR, NAND gates – De Morgan's laws – boolean equations and logic circuit from truth table – NOR and NAND gates as universal building blocks –binary adder – half adder.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Allied Physics*. Marthandam: Indira publication 2012.
2. Murugeshan R. *Modern Physics*. S. Chand & Co. 2011.

Books for Reference:

1. Rai G. D. *Solar energy Utilization*. Khanna Publishers. Seventh reprint, Fifth edition 2008.
2. Brijlal N. And Subramanian. *Electricity & Magnetism*. Ratan Prakashan Mandir. 14th revised Edition. 1985.
3. Tewari K. K. *Electricity and magnetism*. Sultan Chand & Co. Reprint, 2nd edition 1994.
4. Milman and Taub. *Integrated Electronics*. International student edition. (TMH).

Method of Evaluation:

Continuous Internal Assessment	End Semester Examination	Total
25	**75**	**100**

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	CL
CO-1	Define coulomb's law Gauss law, Faraday's law, packing fraction, frame of reference and binary numbers, which gives an idea about the electrostatic force between point charges and nuclear force of attraction.	**K1**
CO-2	Discuss electric field. Toroidal solenoid, binding energy, de-Broglie wavelength and addition, subtraction of binary numbers.	**K2**
CO-3	Apply the knowledge gained in electricity, magnetism, nuclear force , frame of reference, binary numbers, to demonstrate about the electric potential, self inductance of a coil and basic logic gates.	**K3**
CO-4	Analyse the estimated values of an electric field due to a charged sphere, mutual inductance of a coil, energy released in nuclear reactions theoretically. Prove that NOR and NAND gates are universal building blocks.	**K4**
CO-5	Evaluate the significance and applications of electricity, magnetism and nuclear force in various fields, examine the structure of various number system and its applications in digital design.	**K5**

Mapping with program outcomes and programme specific outcomes:

Map course outcomes **(CO)** for each course with program outcomes **(PO)** and Programme Specific Outcomes **(PSO)** in the 3-point scale of HIGH (**3, ≥ 70%**), MEDIUM (**2, ≥ 40%** and **< 70%**) and LOW (**1, <40%**).

Course Outcomes	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**
CO-1	3	1	1	1	1	2	1	1	1	1
CO-2	3	2	2	1	2	3	2	1	2	1
CO-3	2	3	3	2	2	2	3	2	3	3
CO-4	1	3	3	3	2	2	3	3	2	3
CO-5	1	2	3	3	3	2	3	3	3	3
Ave.	2	2.2	2.4	2	2	2.2	2.4	2	2	2.2

SEMESTER III			
ALLIED PHYSICS – PAPER I - II B.Sc., Chemistry			
Code : 21UPHA31	**Hrs/Week: 4**	**Hrs/ Semester: 60**	**Credits : 4**

Vision: To enable students to understand and appreciate the principle behind various physical phenomena and apply them in appropriate situations.

Mission: To provide knowledge in the physical phenomena such as elasticity, bending of beams, heat, light and ultrasonic through the systematic study of theory and experiments.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	define fundamentals of elasticity and discuss concepts of stress and strain and the relationship between both, use the stress-strain equations to solve the problems of elastic modes	1	**R, U**
CO-2	solve problems related to uniform and non-uniform bending of beams	1	**An**
CO-3	tell about the terms viscosity and surface tension	1	**R**
CO-4	describe the properties of fluids such as viscosity, surface tension and evaluate the value of coefficient of viscosity	1,2,6	**U,E**
CO-5	estimate the thermal conductivity of a bad conductor	1,2,6	**E**
CO-6	calculate the specific heat capacity of a liquid	1,2,6	**An**
CO-7	calculate the thickness of a thin wire by forming interference fringes	1,2,6	**An**
CO-8	evaluate the dispersive power and resolving power of a grating	1,2,6	**E**

Unit I: Elasticity

Stress, strain, Hooke's law – elastic moduli – work done in shearing strain – Poisson's ratio – relation between elastic constants – twisting couple on a cylindrical wire – expression for couple per unit twist – torsion pendulum – experiment to determine the rigidity modulus of a wire using torsion pendulum.

Unit II: Bending moment

Bending of beams – expression for bending moment – theory of uniform bending – expression for elevation in uniform bending – experiment to find young's modulus using microscope – non-uniform bending – expression for depression – experiment to find young's modulus using scale and telescope.

Unit III: Thermal Physics

Mean free path – expression for mean free path – transport phenomena – expression for viscosity, thermal conductivity and diffusion – thermal conductivity – Lee's disc experiment to determine the thermal conductivity of a bad conductor – Newton's law of cooling – determination of specific heat capacity of a liquid.

Unit IV: Interference and diffraction

Young's double slit experiment – condition for interference – additional phase difference due to dissimilar reflections – colour of thin film – air wedge –thickness of a wire – Fresnel and Fraunhofer diffraction – plane transmission grating – experiment to find wavelength by normal incidence method – distinction between interference and diffraction bands.

Unit V: Ultrasonics

Properties of ultrasonic – ultrasonic production – Piezoelectric and magnetostriction methods – detection –thermal and Piezoelectric methods –determination of velocity of ultrasonic waves in liquid using acoustic grating – applications and uses – SONAR – measurement of velocity of blood flow and movement of heart

Text Book:

1. A. Ubald Raj & G. Jose Robin, Allied Physics I, Indra Publications, Marthandam (July 2016).
2. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications, Marthandam (2006, 2012).
3. A. Ubald Raj & G. Jose Robin, Allied Physics, Indra Publications, Marthandam (April 2004).
4. Dr. G. Natarajan, Engineering Physics – I, Sri Krishna publications, Chennai- 37(July 2004)

Books for Reference:

1. D. S. Mathur, Properties of matter, Shyamalal charitable trust, Ram Nagar, 1992.
2. R. Murugeshan, Properties of matter, S. Chand & Co. Ltd., 2008.
3. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, John Wiley & Sons Inc.
4. Brijlal & Subramanian, A text book of Optics, S. Chand & Co.

UNIT	BOOK	CHAPTER	PAGE NO.
I	T1 T 2	1 3	1 – 26 57 – 85
II	T 1	4	87 – 107
III	T 1	4	128 – 145,
IV	T 3	2	30 – 52
V	T4	1	1.28 – 1.45

SEMESTER II/IV

ALLIED PHYSICS PRACTICALS - I B.Sc., Mathematics / II B.Sc., Chemistry

Code : 21UPHAR1	Hrs/Week: 2	Hrs/ Semester: 30	Credits : 2

Any 12 experiments

1. Measurement of diameter using vernier caliper, screw gauge and travelling microscope.
2. Young's modulus – Uniform bending (pin and microscope)
3. Young's modulus – Non uniform bending (scale and telescope)
4. Coefficient of viscosity – Stoke's method
5. Spectrometer – Determination of μ
6. Air wedge – Thickness of a wire
7. Lee's Disc – Thermal Conductivity of a bad conductor
8. Basic logic gates – OR, AND and NOT
9. Rigidity modulus – Torsion pendulum
10. Newton's law of cooling - Specific heat capacity of liquid
11. Coefficient of viscosity- Burette method
12. Surface Tension – Drop weight method
13. Half Adder
14. De Morgan's law verification
15. Boolean expression verification
16. Spectrometer – Normal Incidence

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SEMESTER- I			
CORE I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objectives:

1. To learn about mechanics and properties of matter
2. To know their relevance in day to day applications.
3. To learn about conservation laws, collisions and gravitational force, elasticity, surface tension and viscous nature of matter.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss the principle of conservation of energy and linear momentum, derive an expression for two body problem, calculate the moment of inertia of diatomic molecule	1	**U**
CO-2	discuss impulse and linear momentum, calculate the change in momentum of an object for the net force acting on the object	1	**U**
CO-3	analyse the motion of the projectile	1	**An**
CO-4	describe about gravitation and calculate the acceleration due to gravity at a place.	2,4,6	**E**
CO-5	describe the fundamental concepts of stress and strain and their relationship through the stress-strain curve, Hooke's law and Poisson's ratio	1	**U**
CO-6	calculate the elastic constant values of materials which is necessary for beam construction.	1	**An**
CO-7	learn about the properties of fluids such as viscosity, surface tension and capillary rise.	1	**U**
CO-8	calculate the properties and utility of lubricants	1	**E**
CO-9	calculate the surface tension of a liquid	2,4,6	**E**

SEMESTER- I			
Core I	**Mechanics and Properties of Matter**		
Course Code : 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Conservation laws:

Newton's laws of Motion- inertial frames – gravitational mass – conservation of linear momentum, conservation of angular momentum –conservation of energy – work energy theorem – conservative force and potential energy – centre of mass of a system of particles – two body problem and reduced mass – moment of inertia of system of diatomic molecules.

Unit II: Collision and Projectiles:

Collision – impulse and linear momentum – elastic and inelastic collision – fundamental principles of impact – direct and indirect impact – velocities and kinetic energy in direct impact – loss of k. e in an indirect impact – transfer of energy in collision between two equal masses – projectile – expression for time of flight and horizontal range of a projectile – path of a projectile – range of a projectile on an inclined plane.

Unit III: Gravitation: Gravitation – Newton's law of gravitation – determination of gravitational constant – Boys' method – gravitational potential and field due to a spherical shell and solid sphere – acceleration due to gravity(g) by compound pendulum – variation of 'g' with altitude and latitude.

Unit IV: Elasticity and bending of beams:

Stress – strain – Hooke's law –relation connecting elastic moduli – Poisson's ratio – twisting couple on a cylindrical wire (torsion) – expression for couple per unit twist – work done in twisting – torsion pendulum – theory – determination of rigidity modulus by dynamic method

– bending of beams – expression for bending moment – uniform and non-uniform bending – theory and experiment – determination of young's modulus – work done in bending – cantilever – expression for depression at the loaded end of a cantilever.

Unit V: Viscosity and Surface Tension:

Streamlined motion – turbulent motion – coefficient of viscosity – rate of flow of liquid in a capillary tube by dimension method and Poiseuille's formula – analogy between liquid flow and current flow – experimental determination of viscosity of a liquid by Stoke's method.

Surface tension – work done in increasing area of the surface – work done in blowing a bubble – variation of surface tension with temperature – experimental determination of surface tension by Jaegar's method – excess of pressure inside a curved liquid surface – excess pressure inside a liquid drop – excess pressure inside a soap bubble.

Text Books:

1. Murugeshan R. *Properties of matter*. S. Chand & Company Ltd. Revised edition 2008.

2. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication

2003.

3. Ubald Raj A. and Jose Robin G. *Mechanics and relativity*. Marthandam: Indira Publications. 2008.

Books for Reference:

1. Mathur D. S. *Mechanics*. S. Chand & Co. Ltd. 1984.

2. Mathur D. S. *Properties of matter*. Ram Nagar: Shyamlal Charitable trust. 1992.

3. Brijlal and Subramanyam N. *Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.

4. Dr. Upadhyaya J.C. *Classical Mechanics*. Himalaya Publishing House. ISO 9001:2015 certified.

SEMESTER- II			
CORE II	**Thermal Physics And Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Objective:

1. To gain knowledge about the laws of thermodynamics
2. To understand the concept of transport phenomena and thermal conductivity
3. To provide a solid understanding of low temperature physics and optical phenomena
4. To know the spectacular nature of light by studying interference, diffraction and polarisation

COURSE OUTCOMES:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laws of thermodynamics understand the concepts of transport phenomenon	1 1	**U** **U**
CO-2	understand the transfer of energy through conduction, convection and radiation	1	**U**
CO-3	demonstrate the experiment regarding the measurement of thermal conductivity and specific capacity. Calculate the thermal conductivity of a bad conductor	1 2, 4, 6	**U** **E**
CO-4	understand the low temperature physics, concerned with the behaviour of matter in the temperature regime where quantum effects are dominated	1	**U**
CO-5	create an interest in field of research in low temperature physics	1	**C**
CO-6	learn about the dispersion through a prism. determine the refractive index and dispersive power of the material of the prism	1 2, 4, 6	**U** **E**
CO-7	define the different types of aberrations in lenses and discuss the methods to reduce them	1	**R, U**
CO-8	describe the phenomenon of interference and colours of thin films. calculate the thickness of a thin wire by forming interference fringes	1 2, 4, 6	**U** **E**
CO-9	evaluate the dispersive power and resolving power of a grating and demonstrate experiments with a grating and find the wavelengths of the light used	2, 4, 6	**E, An**

CO-10	acquire knowledge of the polarisation of light and its changes upon reflection and transmission	1	**U**

SEMESTER- II			
CORE II	**Thermal Physics And Optics**		
Course Code: 21UPHC11	**Hours/Week: 6**	**Hrs/ Semester: 90**	**Credits : 5**

Unit I: Laws of thermodynamics and Transport Phenomena

Zeroth law of thermodynamics – first law of thermodynamics – isothermal change – adiabatic change – heat engine – expression for the efficiency of a Carnot's engine – Carnot's cycle as refrigerator – reversible and irreversible process – second law of thermodynamics — entropy – change in entropy in reversible and irreversible process – temperature-entropy diagram – third law of thermodynamics – mean free path - transport phenomena - expression for the viscosity of a gas – expression for thermal conductivity of a gases – expression for the coefficient of diffusion

Unit II: Transfer of heat and low temperature physics

Conduction, convection and radiation – conduction of heat – Lee's Disc's method of determining K of a bad conductor – convection of heat – Newton's law of cooling by convection –experimental verification of Newton's law of cooling –the Joule Porous plug experiment – relation between inversion, Boyle and critical temperatures – adiabatic demagnetization – theory and experimental setup.

Unit III: Dispersion and Aberrations

Dispersion through a prism – angular dispersion – dispersive power – achromatism in prisms – deviation without dispersion – dispersion without deviation – direct vision spectroscope – constant deviation prism – constant deviation spectroscope – spherical aberration in lenses – methods of minimizing spherical aberration – condition for minimum spherical aberration of two thin lenses separated by a distance – aplanatic lens – chromatic aberration in lenses – condition for achromatism of two thin lenses in contact – coma.

Unit IV: Interference and Diffraction

Interference – conditions for sustained interference – interference by reflected systems – production of colours in thin films– air wedge – determination of diameter of a thin wire by air

wedge – test for optical flatness – Newton's rings – determination of wavelength of sodium light by Newton's rings – determination of refractive index of a liquid by Newton's rings.

Fresnel's diffraction – half period zones – zone plate – multiple foci in a zone plate – comparison of zone plate with a convex lens – Fraunhofer diffraction – plane transmission diffraction grating – grating at normal incidence –determination of wavelength of light by normal incidence method and minimum deviation method– dispersive power of grating – grating at oblique incidence – resolving power of optical instruments – Rayleigh's criterion for resolution – resolving power of a grating.

Unit V: Polarisation

polarisation of light – double refraction – Nicol prism – polarizer and analyzer – quarter wave plate and half wave plate – plane, elliptically and circularly polarized light:production and detection – optical activity – Fresnel's theory of optical activity – experimental verification of Fresnel's theory – specific rotation – Laurent's half shade polarimeter.

Text Books:

1. Ubald Raj A. and Jose Robin G. *Mechanics and Thermal Physics*. Marthandam: Indira publication.
2. Murugeshan R. *Thermal Physics and Geometrical Optics*.
3. Murugeshan Kiruthiga Sivaprasath R. *Optics and Spectroscopy*. S. Chand & Company Ltd. Revised edition 2014.

Books for Reference:

1. Gupta B. and Roy H.P. *Thermal Physics*. Books and Allied (P) Ltd., Second edition 2005.
2. Brijlal and Subramanyam N. *Heat and thermodynamics*, S. Chand & Co. Ltd. 2005.
3. Arunabhasen and Gupta A. B. *College Physics.* volume I. Books and Allied (P) Ltd. 2005.
4. Brijlal and Subramanyam N. *Optics*. S. Chand & Co. Revised by M.N. Avadhanulu. 23rd revised edition 2006.

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Objectives:

1. To deal with the basic concept of electricity
2. To discuss the laws of electromagnetic induction
3. To extend the fundamental concepts to AC bridges

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO–1	recall Current	1	Re
CO–2	apply Kirchoff's law to Wheatstone's network	1	Ap
CO–3	apply the principle of potentiometer to measure current and resistance	1	Ap
CO–4	compare self inductance and mutual inductance	1	Ev
CO–5	describe choke coil	1	Un
CO–6	construct LCR series and parallel resonance circuit	1	Cr
CO–7	study the uses of transformer	1	Ap
CO–8	construct De Sauty's bridge and Wein's bridge	1	Cr

SEMESTER III			
Core III	**Electricity and Electromagnetism**		
Course Code: 21UPHC31	**Hrs./Week : 4**	**Hrs./Sem : 60**	**Credits : 4**

Unit I: Steady Currents and Thermo-Electricity

Current and Current density – Expression for current density –Equation of Continuity – Ohm's law and Electrical Conductivity – Kirchoff's laws – Applications to Wheatstone's network – Carey Foster bridge – Determination of the Temperature coefficient of resistance – Potentiometer: Principle, Calibration of Ammeter, Voltmeter (Low & High range), Measurement of Resistance of a coil with a Potentiometer – Seebeck effect – Law of Thermo emf – Peltier effect – Thomson effect – Thermodynamics of Thermocouple.

Unit II: Magnetic Properties and Magnetostatics

Magnetic induction (B) – Magnetization (M) – Relation between B, H and M – Magnetic susceptibility – Magnetic permeability – Relation connecting them.

Moving coil Ballistic galvanometer: Principle, Construction, Theory – Correction for damping – Measurement of Charge sensitiveness – Absolute capacitance of a capacitor.

Unit III: Electromagnetic Induction

Faraday's laws of induction – Lenz law – Expression for induced current – Self induction – Self inductance of a long solenoid – Determination of self inductance by Rayleigh's method – Self inductance of a toroidal coil of rectangular and circular cross- section – Mutual induction – The Neumann formula for mutual inductance – Mutual inductance between two coaxial solenoids – Experimental determination of mutual inductance- Eddy currents.

Unit IV: Alternating Current

Emf induced in a coil rotating in a magnetic field – A.C circuit containing Resistance, Inductance and Capacitance only – A.C circuit containing L and R in series – A.C circuit containing C and R in series – A.C circuit containing LCR in series – Parallel resonance circuit

– Power in A.C circuit – Choke coil.

Unit V: Transformers and A.C Bridges

Coupled circuit – Transformers – Detailed theory of transformer – Transformer losses

–A.C bridges – A.C bridges for the measurement of inductances: Maxwell's bridge, Owen bridge, Anderson's bridge – A.C bridges for the measurement of capacitance: De Sauty's bridge, Wein's bridge, Schering bridge – Robinson's bridge for determining the frequency of an a.c source.

Text Books:

1. Murugeshan R. *Electricity and Magnetism*. New Delhi: S. Chand & company Ltd.Reprint, 2019.
2. Dr.Tewari K.K. *Electricity and Magnetism with Electronics.* New Delhi: S. Chand & company Ltd. Reprint, 2018.

Books for Reference:

1. Brijlal and Subramanium. *Electricity and Magnetism*. Ratan Prakash mandir. 7th edition 1994.
2. Tayal D.C. *Electricity and Magnetism*. Himalaya Publishing House. 3rd revised edition 1998.

David Halliday, Robert Resnick and Jearl Walker. *Fundamentals of Physics.* Wiley & Sons Inc. 6th edition 2006.

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

1. To develop competent technocrats who can strive continuously in pursuit of professional excellence in the field of Electronics and Communication
2. To establish a unique learning environment to enable the students to face the challenges in Electronics and Communication Engineering field
3. To facilitate an understanding of circuit analysis, transistors and op amp

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	recall semiconductors	2	Re
CO –2	construct a universal divider bias.	2, 4	Cr
CO –3	construct inverting and non inverting amplifier.	2, 4	Cr
CO –4	design a difference amplifier	2, 4	Cr
CO –5	list out the types of networks	2	Re
CO –6	prove thevenin's and norton's theorem	2, 4	An
CO –7	describe amplitude modulation	2	Un
CO –8	understand the principle of amplitude modulation reception	2	Ap

SEMESTER IV			
Core IV	**Electronics and Communication**		
Course Code: 21UPHC41	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I: Linear Circuit Analysis

Linear and non–linear circuit elements – Active and Passive elements – Ideal voltage source and current source – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – h-parameters.

Unit II: Transistors

Function Transistor – Transistor Action – Relation connecting Alpha and Beta of a transistor – Three modes of transistor connection – Relation between alpha, beta and gamma – Current components in a transistor and relation connecting I_c and I_b – Load line, Q point, biasing and stabilization – Methods of transistor biasing – Fixed bias or base bias circuit – Collector feedback bias – Universal divider bias.

Unit III: Operational Amplifiers

Operation of Differential amplifier – CMRR – Important Characteristics – Slew Rate – Inverting amplifier – Non inverting amplifier – Gain – Voltage follower – Multistage op-amp circuits – Summing amplifier – Difference amplifier – Integrator and Differentiator using op-amp.

Unit IV: Amplitude Modulation and Transmission

Introduction – Elements of a communication system – Noise – Signal to Noise ratio – Noise figure – Modulation – Need for modulation – Different kinds of modulation – Bandwidth required for transmission – Amplitude modulation – Wave forms, side bands and power – Transmission of Radio waves: AM Transmitter – Broadcast AM Transmitter – High level AM Transmitter – Low level AM Transmitter.

Unit V: Amplitude Modulation - Reception

Radio Amplitude modulation – Comparison of AM Systems – Quadrature Amplitude Modulation (QAM) – Generation of QAM signal – AM Receivers – Demodulation (AM Detection) : Envelope detector – Tuned Radio Frequency (TRF) Receiver (Straight Receiver) – Super heterodyne receiver – Characteristics of a receiver (Receiver parameters) – Choice of Intermediate frequency for heterodyne receiver – Communication receiver: Double frequency conversion A.M receiver.

Text Books:

1. Jose Robin G and Ubald Raj A. *Electronics*. Marthandam: Indira Publication, First Edition 2000.

Books for Reference:

1. Jose Robin G and Ubald Raj A. *Communication Electronics*. Marthandam: Indira Publications. First Edition 2002.
2. Bargava N. N, Kulshreshtha D. C. and Gupta S. C. *Basic Electronics and linear circuits*. New Delhi: Tata McGraw Hill Publishing company Ltd. Reprint, 2012.

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Objectives:

1. To prepare the students for competitive exams and make them competent in facing the challenges with confidence
2. To motivate students to face and pursue higher education through competitive Examinations
3. To equip students with the basic principles of physics and apply the same in solving problems

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	solve problems in gravitation and escape velocity	8, 9	An
CO –2	answer problems in surface tension and viscosity	8, 9	An
CO –4	explain problems in laws of thermodynamics	8, 9	An
CO –5	solve problems in diffraction and interference	8, 9	An
CO –6	explain problems related to kirchhoff's laws & steady current	8, 9	An
CO –7	explain problems in electromagnetic induction	8, 9	An
CO –8	solve problems in zener diode & transistor	8, 9	An

SEMESTER IV			
Skill Based Elective	**Physics for Competitive Examinations**		
Course Code : 21UPHS41	**Hrs./Week :2**	**Hrs./Sem : 30**	**Credits :2**

Unit I: Properties of matter

Gravitation, Escape velocity and artificial satellite – Surface Tension and Viscosity – Elasticity.

Unit II: Heat

Laws of thermodynamics - Conduction and radiation.

Unit III: Optics

Interference – Diffraction, Resolving power (Prism & Grating) and Polarisation.

Unit IV: Electricity and Electromagnetism

Kirchhoff's laws and Steady current – Electromagnetic Induction - Alternating Current.

Unit V: Semiconductors

PN junction diode – Zener diode – Transistor: Transistor as an amplifier, Transistor as an oscillator.

Text Books:

1. Dr. Kakani S.L. *Objective Physics*. Sultan Chand and sons Ltd. 10th revised edition 2001.

Book for Reference:

1. Satya Prakash and Er. Vibhav Saluja. *Objective Physics*. Meerut: Prakashan publications. 27th revised edition 2010.

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

(Compulsory)

Objectives:

1. To know the students how to apply the electronic components in physics laboratory
2. To make the students to measure the physical quantities using measuring instruments
3. To enhance the students to know about photography

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO –1	describe different types of capacitors	10	Un
CO –2	define the method of soldering	10	Re
CO –3	compare audio frequency range and radio frequency bands	10	An
CO –4	usage of transducers	10	Ap
CO –5	define aperture of camera	10	Re
CO –6	construct the parts of camera	10	Cr
CO –7	define the terms of film structure and film speed	10	Re
CO –8	identify the types of filters used in photography	10	Un

SEMESTER III	
Self Study Course	**Maintenance of Electronic Equipment and Photography**
Course Code : 21UPHSS3	**Credits :2**

Unit I: Electronic Components

Active and passive components – Resistances - Capacitors: Uses, Types of capacitors, Detecting faulty capacitors, Characteristics, Working Voltage – Soldering techniques – Groove board – Bread board – Printed circuit board.

Unit II: Measuring Instruments

Multimeter – Cathode Ray Oscilloscope – Liquid Crystal Display – Audio Frequency Oscillator.

Unit III: Transducers

Transducer: Classification, Basic requirements – Inductive transducer – Piezoelectric transducer – Capacitive transducer – Resistive transducer: Potentiomentric type, Wheatstone bridge type.

Unit IV: Photography I

Camera – Photographic camera – Parts and their functions – Camera lens: Types – Camera lens shutters: Types.

Unit V: Photography II

Film structure – Film speed – Exposure triangle – Flash photography - Camera lens filter – DSLR camera – Digital format in DSLR camera.

Text Book:

1. Jose Robin G and Ubald Raj A. *Maintenance of Electronic Equipment & Photography*. Marthandam: Indira Publications. First Edition 2017.

Semester V			
Core: VIII	Counselling Types and Skills		
Code: 17UPSC52	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Objectives

- To acquaint the students with the nature and process of counselling.
- To create an awareness about theories and techniques of counselling.
- To enable them to understand different fields of application of counselling.

UNIT – I

Introduction

Counselling: Definition, Purpose and goals of counselling, Ethics in Counselling

UNIT - II

Theories of Counseling

Person Centered Counseling, Cognitive Counselling, Behaviooural Counselling.

UNIT - III

Types of Counselling

Group Counselling, Counseling Families, Child Counseling, Counseling The Delinquent, Prematerial Counseling, Marriage Counseling, counselling Drug Addicts, Crisis Intervention Counseling, Career Counseling.

UNIT - IV

Counseling Process

Stages of the Counseling Process: Basic skills for Counseling, communication and relationship skills.

UNIT - V

Major theories of Counselling
Person Centered Counselling
Gestalt Counselling
Cognitive Counselling

References:

1. Antony, D.John (1995). Skills of Counselling Micro Skill Model, Dindigul, Anugraha publication.
2. Antony, D. John (2009). Principles of practices of Counselling, Dindigul, Anugraha publications.
3. Burnard. P (2004) Counselling Skills Training, New Delhi – Viva Books.

Semester V			
Core Practical V **Counselling Skills- Practicals**			
Code:17UPSCR5	Hrs/Week:4	Hrs/Sem: 60	Credits:4

Basic Skills – introduction of micro skills – 13 steps – code of conduct of a counsellor.

1. Welcoming the client and make the client comfortable with a small talk .
2. Observation of the body language of the client.
3. Attending the client Physically.
4. The client tells the story.
5. Reflecting the content of what the client said.
6. Reflect the a) feeling of the client b) Allow the client to speak sufficiently on the feeling c) Facilitate the client to release strong negative feelings.
7. Pin pointing the problem.
8. Personalising the client's deficiency.
9. Finding alternative frame of reference.
10. Employing problem solving techniques, behavioral strategies.
11. Insights
    a) Encouraging the client to change what can be changed.
    b) The client accepting gracefully what cannot be changed.
    c) Preparing the client for the worst.
    d) Preparing the client to be happy with whatever decision he/she has made.
12. Defining and operationalising the goal.
13. Making of contracts and evaluate.

Semester VI			
CorePractical VI	**MENTAL STATUS ASSESSMENT TOOLS**		
Code:17UPSCR6	Hrs/Week:5	Hrs/Sem: 75	Credits:5

Introduction to Mental Status Examination – Theoretical foundations and applications

Appearance. Attitude and Behaviour

Mood and Affect Speech

Thought Process and thought Content

Perceptions, Cognition, Insights and Judgments

Semester IV			
SBE	**Inner child Healing**		
Code:17UPSS41	Hrs/Week:2	Hrs/Sem: 30	Credits:2

Objectives

- To understand the various issues in the studentsinner child journey
- To overcome the issues related to the inner child

Unit_1
An introduction to inner child journey.

Unit-II
The impact of early childhood.

Unit -III
Inner child work

Unit -IV
Dumping the negative garbage.

Unit-V
Positive belief system.

Reference:

Healing the Inner Child, Compiled by Sundar Wilson OFM Cap.,
Anugraha Publication, Dindigul

Semester - III			
Self Study Course (Optional)	Colour Psychology		
Code : 17UPSSS1	**Hrs/week :**	**Hrs/Sem:**	**Credits : 2**

Objectives:

- To know about various colours and its meaning
- To understand about Psychological functions of colours

UNIT – I

Introduction to Colour Psychology .

UNIT – II

Understanding the meaning of various colours in colour psychology

UNIT – III

Non verbal communication of colours

UNIT – IV

Positive and Nagative traits of the colours

UNIT – V

Effect of the colours

Self Study Course (Compulsory)	Semester V **Stress Management**		
Code:17UPSSS3	Hrs/Week:	Hrs/Sem:	Credits:2

Objectives

- To understand how intelligence, aptitude and achievement are related
- To understand the psychological concepts relating to adjustment
- To understand the concept of stress and techniques to cope with stress

Unit 1. Introduction: Nature of stress; Different perspectives on stress - Stress as response, stress as stimulus, stress as transaction. Types of stress- frustration, conflict, change, pressure.

Unit 2. Responding to stress: Emotional response, physiological response, behavioural response. Factor influencing stress tolerance – social support, hardiness, optimism and conscientiousness.

Unit3. Potential effects of stress: Impaired task performance, disruption of cognitive functioning, burnout; psychological problems and disorders, physical illness.

Unit 4. Nature and characteristics of coping: Different views of coping – psychodynamic, transactional, internal and external resource perspective. Common coping strategies and patterns; giving up, striking out at others, indulging and blaming self, defensive coping; appraisal focused, problem focused, emotion focused coping.

Unit5.Managing stress: Methods - yoga, meditation, relaxation techniques, problem focused and emotion focused approaches

Recommended Books:

1. Weiten, W., Dunn, D. S., & Hammer, E. Y. (2012). Psychology applied to modern life: Adjustment in 21st century (10th ed.). Belmond, CA: Wadsworth, Cengage Learning.
2. Lazarus, R.S. (1980). Patterns of adjustment, New Delhi: McGraw-Hill.
3. Martin, L.G.; Osborne, G. (1989). Psychology: Adjustment and everyday living. N.J.: Prentice-Hall, Englewood Cliffs.
4. Lazarus, R. S. & Folkman, S. (1984). Stress, appraisal and coping. New York, NY: Springer Publishing.
5. Aldwin, C. M. & Werner, E. E. (2004). Stress, coping and development: An integrative perspective. New York: Guilford.
6.Parameshwaran,E.G. & Beena,C (2002). Invitation to Psychology. Neelkamal Publication Pvt Ltd.
7. Sarason & Sarason (1982). Frontiers of Behaviour. Harper & Row. New York.

SEMESTER- V			
Common Core VII Psychology and Micro Biology for Health Care			
Code: 18UBCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit: 4**

Vision:

To familiarize the concepts of psychological aspects in health.

Mission:

To understand the complex interactions of biological, psychological, social factors of human health and disease.

Course Outcome

CO. NO	**Upon completion of this course, students will be able to**	**PSO addressed**	CL
CO-1	learn the nature of psychology and microbiology	1	Re
CO-2	understand the importance of human system	1	Re
CO-3	to gain knowledge about the acute stressors.	2	Un
CO-4	analyze the various problems in menstrual cycle	5	An
CO-5	to develop a proper lifestyle	3	Cr
CO-6	understand about sleep related disorders	6	Un
CO-7	create an indepth knowledge about the health risk factors	2	Un
CO-8	evaluate the concept of health care.	4	Ev

SEMESTER- V			
Common Core VII Psychology and Micro Biology for Health Care			
Code: 18UBCC51	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credit: 4**

Unit I Introduction

Introduction to Microbiology - The History and Contributions of Microbiology (Antony Van Leeuwenhoek, Joseph Lister, Pasteur, Robert Koch,) Classification of microorganisms (Bacteria, fungi, virus), Applied fields of Microbiology.

Psychology as a science -Schools of Psychology, Various fields in psychology, Nature and Scope of Psychology.

Unit II Psychoneuroimmunology

Introduction and historical overview of Immune system, Basic Immunology- Specific immune mechanisms and functions – Immunomediators: [Immune-specific (e.g., cytokines); Non-immune-specific (e.g., aging, sleep)], Neuroimmunology- Lymphocyte neurohormonal receptors. Human stressor - Laboratory acute stressor effects on immunity.

Unit III Psycho physiological disorders

Personality disposition. CHD, Asthmatics, Allergy, Eczema, Hiding, Rheumatoid Arthritis, Peptic Ulcer, Diabetes and menstrual disorders.

Unit IV Life -style factors

Keeping the motor running -Neurobiological process that govern exercise, related psychological effects. Nutrition, eating -related process, overweight and obesity -making changes -Healthy foods-public health-Sleep, Sleep Disorders, accidents at work and at home.

Unit V Dealing with illness

Recognizing illness symptoms and what needs to be done- recognizing warning and health risks - illness perceptions and beliefs- Relation between patients and the health provider- obtaining health care.

Text books

1**.** Cacioppo, J.T., Tassinary, L.G., &Berntson, G.G (2007). *Handbook of Psychophysiology*(3rd edition). Cambridge, UK: Cambridge University Press.

2. 5Taylor,S.E.(2014).*Health Psychology*. McGraw-Hill Education.

Books for Reference

1. Marks, D. F., Murray, M., Evans, B., & Estacio, E.V. (2006). *Health Psychology India*; Sage Publication.

2. Sarafino, E.P. (1999). *Health Psychology*. John Wiley & Sons Inc.

3.HymieAnisman ,(2016) *Health Psychology*. Sage publication Ltd.

SEMESTER III			
Allied III - Psychological Statistics - I			
Code:18UPSA31	**Hrs/Week:4**	**Hrs/Sem: 60**	**Credit: 3**

Unit I: Introduction

Meaning and definition of statistics – origin, growth and characteristics – applications in psychology and limitations. Primary and Secondary Data: Differences and data collection methods

Unit II: Data Classification & Frequency Distribution

Classification and Tabulation: Objectives – types of classification – formation of continuous frequency distribution – uses of tabulation – parts of a table – types of tables – simple and complex tables – general purpose and special purpose tables; Diagrammatic and graphic Representation: General rules for construction– uses –Types - limitations of diagrams and graphs.

Unit III: Probability and Its Applications

Definition – Computation of probability – Set theory: Set, Subset, Equal sets, Proper subset, Empty set – Complement of set, Union, intersection, disjoint and universal set – Theorems of probability

Unit IV: Descriptive Statistics

Averages: Concepts– requisites of a good average –mean, median and mode –merits and demerits – numerical computations; Dispersion: Concepts – types of measures– merits and demerits – numerical computations.

Unit V: Sampling and Theoretical Distributions

Concept of population and sample – census – requisites of a sample - Random & Non Random sampling methods– sampling and non-sampling errors; Poisson and normal distributions – Skewness and kurtosis

Textbooks

1. Verma, J. P., &Ghufran, M. (2012). Statistics for Psychology: A comprehensive text. Tata McGraw Hill Education, New Delhi.
2. Garrett, H.E. (1979)Statistics in Psychology and Education, 9th Indian Reprint, Bombay, wakils, Feffer and Simons Pvt. Ltd.

Books for Reference

1. Gupta, S.P. (2006)Statistical Methods, New Delhi: Sultan Chand and Sons.
2. Howell, D.C. (2002) Statistical Methods for Psychology, 5th edition, Australia Duxbury Publishers.
3. Howell, D.C. (2002) Statistical Methods of Psychology. 5th edition. Australia, Duxbury Publishers.
4. Minium, E.W., King B.M. and Bear. G. Statistical Reasoning in Psychology and Education N.Y: john wiley& sons, end 2001.
5. Gravetter F.J. and Wallnay L.B. Essentials of statistics for the Bahavioural Sciences. N.Y. West Publishing com., 1995.

SEMESTER IV			
Allied IV - Psychological Statistics - II			
Subject Code:18UPSA41	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 4**

Unit I: Inferential Statistics: Parametric and Non Parametric Tests
Parametric and Non-parametric tests: Meaning – Rules of using – Chi-square and contingency coefficients: Meaning and assumptions – numerical computations - Correlation and Regression: Meaning– correlation and regression coefficients – numerical computations.

Unit II: Analysis of Variance
One-way analysis of variance, Two-way analysis of variance.

Unit III: Testing of Hypothesis
Testing of hypothesis – Meaning - Types, Type 1 & 2 errors, level of significance, one tailed and two tailed tests, t test, z test, test of significance

Unit IV: Inference Estimation
Introduction – Theory of estimation – point estimation, interval estimation – Confidence interval – Factors affecting confidence interval – Confidence intervals for mean, population mean and proportion

Unit: Research Design in Psychology
Types – Design – Principles of design – Methods of research – Experimental design

Textbooks

1. Verma, J. P., &Ghufran, M. (2012). Statistics for Psychology: A comprehensive text. Tata McGraw Hill Education, New Delhi.
2. Garrett, H.E. (1979)Statistics in Psychology and Education, 9th Indian Reprint, Bombay, wakils, Feffer and Simons Pvt. Ltd.

Books for Reference

1. Gupta, S.P. (2006) Statistical Methods, New Delhi: Sultan Chand and Sons.

Howell, D.C. (2002)Statistical Methods for Psychology, 5th edition, Australia Duxbury Publishers.

2. Howell, D.C. (2002) Statistical Methods of Psychology. 5th edition. Australia, Duxbury Publishers.
3. Minium, E.W., King B.M. and Bear. G. Statistical Reasoning in Psychology and Education, N.Y: john wiley& sons, end 2001.
4. Gravetter F.J. and Wallnay L.B. Essentials of Statistics for the Bahavional Sciences N.Y. West Publishing com., 1995.

SEMESTER V			
Core:IX	**Counselling Psychology**		
Code:18UPSC53	**Hrs/Week:5**	**Hrs/Sem: 60**	**Credit:4**

Vision:

To acquaint the students with the nature and process of counselling.

Mission:

To elaborate on the different fields and application of counselling.

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the process of counselling and the Ethics in counselling.	5	Un
CO-2	analyse the counselling process and its various stages.	5	An
CO-3	understand the concepts and theories in counselling.	5	Un
CO-4	know the meaning, person centered counselling and behavioural counselling.	5	Un
CO-5	use the theories of counselling in a practical way.	5	Ap
CO-6	understand the concept applications of counselling.	5	Cr
CO-7	evaluate the knowledge on counselling skills.	3,4	Ev
CO-8	analyze the various crisis in counselling.	5	An

SEMESTER V			
Core:IX	**Counselling Psychology**		
Code:18UPSC53	**Hrs/Week:5**	**Hrs/Sem: 60**	**Credit:4**

Unit I Introduction

Counselling: Definition, process and goals.- Guidance and counselling – Need for counselling – Emergence and growth of Guidance and Counselling – Status of Guidance ND Counselling Movement in India.

Unit II Counselling Approaches and Practices

Directive or authoritarian approach – Relevance of Psychoanalysis – Non Directive approach: Humanistic-Existential approach – Roger's Self Theory – Behaviouristic approach: Reciprocal inhibition, Behaviour modification – Eclectic approaches.

Unit III Counselling Processes

Preparation for counselling – Counselling relationship – Content and process of counselling, counselling interactions, Counsellor-counselee relationship, factors affecting counselling process – Effective counsellor's skills: Characteristics and attitudes; Counselling Interview – Nature and significant features, setting and types of counselling interview, appropriate use of communication and interviewing techniques, degree of lead, silence, relationship techniques, sharing of experiences, resistance.

Unit IV Counselling Issues

Professional preparation and training for counselling: Counselling preparation and professional issues, academic preparation, practical skills, selection and training of counsellors, preparation of counsellors; Ethics in Counselling: Codes of professional ethics, Common ethical violations by Mental Health Professionals.

Unit V Psychological Testing and Diagnosis

Tools and techniques used in counselling and guidance: Testing and Non testing devices, Tools used in assisting individuals towards self-discovery; Test interpretation in counselling, Issues of diagnosis in counselling – Limitations.

Text books

1. Gibson & Mitchell (2003). *Introduction to Counselling and Guidance*. VI Edition. Pearson Education.

2. Nelson-Jones, R. (2011). *Theory and Practice of Counselling and Therapy*. V Edition. Sage Publications, New Delhi.

3. Rao S. Narayanan (1992). *Counselling and Guidance. II Edition,* Tata McGraw-Hill Publications.

Books for Reference

1. Parischa, Prem (1976). *Guidance and Counselling in Indian Education.*

2. Baron, R.A. & Byrne, D. *Social Psychology (9th ed).* Delhi :Pearson Education 2000.

SEMESTER - VI			
Core XII Industrial Psychology			
Code : 18UPSC63	**Hrs / Week: 5**	**Hrs / Sem.: 75**	**Credit: 4**

Vision:

To inculcate the basic knowledge about industrial psychology.

Mission:

To develop students to fit into the industrial background of their native town.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the aspects of positive psychology	1	Re
CO-2	compare and understand the various aspects of positive psychology	1	Un
CO-3	apply knowledge about handling others in daily life in a positive way	1, 2 , 8	Ap
CO-4	analyze the need of knowledge of positivity	1 , 8	An
CO-5	evaluate the means of developing an understanding about positive social interaction	1, 2 , 8	Ev
CO-6	create new theories and concepts of positive psychology	1 , 8	Cr
CO-7	create a society devoid of negativity	1, 2 , 8	Cr
CO-8	develop a better understanding about people through positive psychology	1, 2 , 8	Cr

SEMESTER - VI			
Core XII Industrial Psychology			
Code : 18UPSC63	**Hrs / Week: 5**	**Hrs / Sem.: 75**	**Credit: 4**

Unit I Introduction to Industrial Psychology

Introduction to Industrial Psychology. Definitions & Scope. Scientific Management, Human Relations Schools and Hawthorne Experiments

Unit II Leadership

Nature. Leadership styles. Leadership traits. Leadership Behaviours. Subordinate contingencies. Environmental contingencies. Theories of leadership: Path goal theory, Normative Decision theory. Visionary leadership. Charismatic leadership. Transformational leadership. Transactional leadership. Leadership grids.

Unit III Individual in Workplace

Motivation and Job Satisfaction. Stress Management. Organisational Culture. Leadership and Group Dynamics

Unit IV Work Environment and Engineering Psychology

Work Environment and Engineering Psychology, Fatigue, Boredom, Accidents and Safety Job Analysis. Recruitment and Selection: Reliability and Validity of Recruitment Tests

Unit V Training and Development

Training and Development. Types of training. Coaching. Instructional design. Organizational learning. Management training Models of Development.

Text Book

1. *Advanced Industrial Psychology*. Sharma R.N. (2004) Atlantic Publications, Delhi.

Books forReference

1. *Industrial Psychology*. Narendar Singh McGrawHill Publishers, New Delhi.

2. *OrganisationalBehaviour* (14^{TH} ED) Robbins P., Judge A. & Vohra N. Pearsons publication, Delhi. 2012

SEMESTER IV			
Skill based Elective	**Sports Psychology**		
Course Code: 21UPSS41	**Hrs/Week:2**	**Hrs/Sem: 30**	**Credit: 2**

Objectives:

To introduce the students to the field of Sports Psychology

To develop an understanding about the various aspects and components of this developing field.

Course outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the basic concepts and principles of sports psychology	2	Un
CO-2	apply the concepts learnt in personality development	2,3	Ap
CO-3	analyse how psychology is applied in the field of sports	1,2	An
CO-4	analyze the various emotions associated with sports	2,5	An
CO-5	evaluate the social factors that influence sportsmanship	2,5	Ev
CO-6	create new expertise and skill development programs essential for sports	2,4,7	Cr
CO-7	develop a scientific approach towards sports	1,2	Cr
CO-8	develop a knowledge that makes them true researchers and solve society's problem	1,2,7	Cr

SEMESTER IV			
Core skill based	**Sports Psychology**		
Course Code: 21UPSS41	**Hrs/Week:2**	**Hrs/Sem: 30**	**Credit: 2**

Unit I Introduction

Definition – Brief history – Personality characteristics and sporting behaviour – Trait theories – Narrow band theories of personality - Attentional style – Situational and interactional approaches.

Unit II Personality development & attitude to sports

Personality development: Psychodynamic approach to personality development – Social learning theory – Applying social learning theory to sport – Gender and sport

Attitudes: Nature of attitudes – Measuring attitudes – Attitude formation to sports – Attitude to competition – Attitudes to sports and sporting behaviour.

Unit III Aggression, arousal, anxiety and sporting performance

Aggression: Definition – Link between aggression and performance – Individual difference in sporting aggression – Situational factors affecting aggression – Reduction of aggression

Arousal and anxiety: Definitions – Factors inducing anxiety and stress – Relationship between arousal and performance – Relationship between anxiety and performance – Stress management

Unit IV Social factors and Motivation in sports

Social factors: Groups and teams – Social facilitation – Negative effects of team membership – Leadership

Motivation: Definition – Types – Self efficacy – Counterfactual thinking – Pathological motivation and sports.

Unit V Skill acquisition and expertise

Definitions – Classifying abilities and skills – Stages of skill acquisition – The information processing approach to skills – Memory – Theories of motor learning – Expert performance – Enhancing skill and expertise: Role of practice.

Text book

1. Jarvis, M. (2006). *Sports Psychology – A Student's Handbook*. Routledge Taylor & Francis Group, London & New York.

Reference books

1. Webster S. *Sport Psychology: An A Level Guide for Teachers and Students*. Jan Roscoe

Publications,1999.

2. Cox, R.H. *Sport Psychology: Concepts and Applications* McGraw–Hill Humanities

3. Jarvis, M. *Sports Psychology*. London & New York: Routledge Taylor & Francis Group, 1999.

SEMESTER III	
Self-Study Course **Human Rights**	
Course Code:21UPSSS1	**Credit:2**

Objectives:

To make every student aware of the various human rights present in our nation.
To provide the basic knowledge of all the human rights so as to make their lives even more safe and secure.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	learn the basic concepts and principles of Human Rights	8	Re
CO-2	compare and contrast the various impacts of laws on women and children	8	Un
CO-3	apply knowledge about conceptual human rights in daily life	8	Ap
CO-4	analyze the need of knowledge of Human Rights in daily life	8	An
CO-5	evaluate the means of developing an understanding about the various laws for women	8	Ev
CO-6	create new laws and awareness about the laws among people	8	Cr
CO-7	create a flawless society	8	Cr
CO-8	create a nation with law abiding citizens	8	Cr

SEMESTER III	
Self-Study Course **Human Rights**	
Course Code:21UPSSS1	**Credit:2**

Unit I Conceptual Background of Human Rights and Duties

(i) Rights: inherent, inalienable, universal, indivisible
(ii) Values: Dignity, liberty, equality, justice, unity in diversity
(iii) Need for balance between Rights and Duties, Freedom and Responsibility

Unit II Philosophical and Historical Perspectives

(i) Theories of human rights
(ii) History of human rights civilization
(iii) Human rights movements

Unit III Human Rights and Duties in India

(i) Evolution: Independence movement, making of the Constitution
(ii) Indian Constitution: Fundamental Rights - Fundamental duties –
(iii) Enforcement and protection mechanism of human rights in India: Judiciary - National Human Rights Commission and other Commissions and Committees - Non-governmental organizations - Information Media–Education

Unit IV Child Protection

Understanding & Identifying Child Sexual Abuse – Need for prevention – Preventive approaches in the education setting – POCSO Act – Need for Child Protection in schools

Unit V Policies and Protection of Women

Legislations for Protection of Women's Rights - National Policy for Empowerment of Women - Government schemes meant for welfare of women in India - Suggested steps for violence prevention - Suggested areas for future research on women

Books for References:

1. Begum, S.M., ed., *Human Rights in India: Issues and Perspectives* .New Delhi: APH PublishingCo., 2000.
2. National Council for Teacher Education, *Human Rights and National Values: Self-Learning Module, volumes I-III* .New Delhi, 1996.

3. UNICEF, *The Child and the Law* .New Delhi: UNICEF, 1994.
4. Sibnath Deb &AparnaMukerjee.*Impact of Sexual Abuse on Mental Health of Children.* New Delhi, India:Concept Publishing Company,2009.
5. Agarwal, H.O., *Implementation of Human Rights Covenants with Special Reference to India*.Allahabad: KitabMahal, 1983.

SEMESTER – V			
Part III	**Core Elective I: Aquaculture**		
Code:15UZOE51	**Hrs/ Week: 5**	**Hrs/ Sem:75**	**Credits: 5**

Objectives

- To enumerate aquacultural potential and practices in India
- To impart knowledge on fish culture techniques to augment food production from aquatic resources.

Unit I **Culturable Species**

Scope of aquaculture – aquaculture in India – fresh water, coastal and marine aquaculture. Culturable organisms and their qualities.
Fin fishes – carps , cat fishes and others
Shell fish- shrimp, prawn, crab – edible mussel, pearl oyster.
Cultivable sea weeds

Unit II **Culture Methods and Farm Management**

Extensive, semi - intensive and intensive, monoculture, polyculture, integrated fishfarming – paddy - cum fish culture, animal husbandry - cum fish culture, sewage- fed fish culture. Pond construction and management.

Unit III **Culture Techniques**

Fin fish - culture of Indian major carps
Shell fish - culture of marine prawn, edible oyster, pearl oyster

Unit IV **Fish feed and Disease management**

Fish feed – artificial feed - feed formulation, live feed and their culture- artemia, rotifers, microalgae.
Diseases – bacterial, viral and fungal diseases , ectoparasites and endoparasites - prevention and management, nutritional deficiency diseases.

Unit V **Preservation and Marketing**

Fish preservation – freezing, canning, dry curing, salt curing, smoke curing, irradiation, special cured products.
Marketing- marketing techniques, Government participation-CMFRI, CIFA, CIBA, CIFNET, MPEDA, FSI, Marine biological station, hydro-biological research station, FFDA, NABARD, IDBI

Text Books

1. Santhana Kumar and Selvaraj,A.M. 2006 Concepts of Aquaculture, Mac ram Publications, Nagercoil.

Books for Reference

1. Jhingran,V.G . 1982. 2nd edition. Fish and Fisheries of India, Hindustan Publishing Corporation, Delhi.
2. Khanna,S.S .An Introduction to Fisheries. Central Book Depot, Allahabad.
3. Santhanam,R.M, Sukumaran and Natarajan,P. 1987. A Manual of Freshwater Aquaculture. Oxford & IBH publishing Co Pvt Ltd, Janpath, New Delhi.
4. Dinabandhu Sahoo, S.Z. Qasim. 2009. Sustainable Aquaculture. A.P.H Publishing Co, NewDelhi.
5. Agarwal, S.C. 1994. A Hand book of Fish Farming. Naranda Publishing House, Delhi.
6. Chaudhuri , A.B. 2009. Aquaculture Resurgence Birth of Blue Revolution. Daya Publishing House, Delhi.
7. Sailendra Ghosh. 2009. Fisheries and Aquaculture Management. Adhyayan Publisher & Distributors, NewDelhi.

SEMESTER- V			
Part –III Core Elective II: Biotechnology			
Code : 15UZOE52	Hrs/Week : 5	Hrs/Sem : 75	Credits : 5

Objectives

- To familiarize with basic concepts and techniques of biotechnology.
- To understand the applications of scientific and engineering processes.
- To gain an insight on the link between biotechnology and welfare of mankind

Unit I **Cloning Vectors**

Introduction – scope and importance of biotechnology – cloning vehicles – bacterial plasmid vectors - pBR 322 and Ti plasmid – bacteriophage vectors - lambda and M13- animal viral vector - SV40 – role of restriction and modification enzymes.

Unit II **Gene cloning and Screening**

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – hybridization technique – blotting techniques - Southern, Northern and Western.

Unit III **Animal Cell, Tissue and Organ Culture**

Culture media – cell culture techniques - monolayer culture and immobilized culture of cell lines – techniques and applications of human embryonic stem cell culture - organ culture – techniques – tissue engineering of artificial skin and cartilage.

Unit IV **Environmental and Bioprocess Technology**

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol.

Unit V **Biotechnology and Human Welfare**

DNA probes and diagnosis of genetic disorders – DNA finger printing technique – gene therapy and treatment of genetic diseases – vaccines – recombinant DNA vaccines and viral vaccines – Human Genome Project – types – methods of sequencing – potential benefits to mankind.

Text Books

1. Kumaresan, V. 2010. Animal Biotechnology, Saras Publication, Nagercoil.
2. Kumaresan, V. 2009. Applied Animal Biotechnology, Saras Publication, Nagercoil.

Books for Reference

1. Singh, B.D. 2005. Biotechnology, Revised edition, Kalyani Publishers, Chennai.
2. Dubey, R.C. 2006. Text Book of Biotechnlogy, 4th edition, S. Chand and Co Ltd, New Delhi.
3. Rema, L.P. 2009. Applied Biotechnology, MJP Publishers, Chennai.
4. Shailendra Singh, 2007. Applied Biotechnology, 1st edition, Campus Books International New Delhi.
5. Clark and J. Pazdernik. 2009. Biotechnology, Elsevier Academic Press, California, USA.
6. Ramadass, P. 2009. Animal Biotechnology – Recent Concepts and Development. MJP Publishers, Chennai.

SEMESTER - VI			
Part - III	Core Elective III	Sericulture	
Code : 15UZOE61	Hrs / week : 6	Hrs / sem : 90	Credits : 5

Objectives

- To know the importance of sericulture
- To give an insight about the art of sericulture and
- To explore the scope for sericulture to adopt it as a vocation after their graduation.

Unit I **Introduction**

Scope of sericulture - sericulture in India – role of Central Silk Board (CSB), Central Sericultural Research and Training Institute(CSRTI) – Silkworm Seed Technology Laboratory(SSTL).

Unit II **Moriculture**

Commercial varieties of mulberry - mulberry cultivation – cultivation practices - biofertilizers – foliar spray for mulberry - triacontanol and seriboost.
Diseases of mulberry - bacterial – viral – fungal – nematode and deficiency diseases - pests of mulberry – symptoms and control measures.

Unit III **Silk worm rearing**

Mulberry silk worm – morphology - development – silk gland. Silk worm rearing – rearing house – rearing appliances – rearing operations – chawki rearing – rearing of late age worms – application of sampoorna.

Unit IV **Cocoon Mounting and Marketing**

Mountages - mounting methods – harvesting of cocoons – transport of cocoons – physical characters of cocoons – defective cocoons – moth emergence - cocoon markets.Silkworm diseases - bacterial, fungal and viral diseases - pests – symptoms and control measures.

Unit V **Silk reeling**

Cocoon stifling – methods of stifling – storage of cocoons – deflossing cocoon cooking – realing operations. reeling appliances – cottage basin – filature units - raw silk testing – silk marketing - by-products of sericulture - uses of silk.

Text Books

1. Ganga G. and J. Sulochana Chetty. 1991. An Introduction to Sericulture. Oxford & IBH Publishing Co Pvt. Ltd. New Delhi

Books for Reference

1. Krishnaswami S.1990. New Technology of Silkworm Rearing. Published by Central Silk Board, Bangalore.
2. Hisao Aruga. 1990. Principles of Sericulture. Published by Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi

3. Tammanna N.Sonwalker. 1993. Hand Book of Silk Technology. Published by Wiley Eastern Ltd. Madras.
4. Dr.Manjeet S. Jolly. 1987. Appropriate Sericulture Techniques. Published by Director, International Centre for Training and Research in Tropical Sericulture, Mysore.
5. Kamal Jaiswal, Sunil P. Trivedi, B.V. Pandey and P.N.Pandey 2009. Indian Sericulture. ALFA Publication, New Delhi

SEMESTER III			
Part – III	**Skill Based Elective: Basics of Computers**		
Code : 15UZOS31	**Hrs/Week :2**	**Hrs/Sem : 30**	**Credits: 3**

Objectives

- To develop skills relevant to computer technology
- To be well equipped with up to date knowledge on computer operations and applications.

Unit I **Introductions to World of Computers**

Computers – types – applications – input and output devices – meaning of hardware and software.

Unit II **MS-Word Basics**

Creating documents – saving files - opening documents - printing files –spelling and grammar check – word art.

Unit III **MS – Excel Basics**

Spread sheet – data entry – creating charts and graphs.

Unit IV **MS-Power Point Basics**

Creating Power Point presentation – clip Art – saving – running a slide show

Unit V **Information Network**

Basics of internet communication –Internet browsing – search engines – E -Mail advantages and disadvantages.

Text Books

1. Arumugam N.2010 Introduction to Computers,SarasPublications ,Nagercoil.

Books for Reference

1. Rajaraman V. 1985 Fundamentals of Computers, Prentice Hall of India.
2. Peter Norton, 2009. Introduction to Computers 6th edition, Tata McGraw Hill, New Delhi

SEMESTER IV			
Part - III	**Skill Based Elective : Vermitechnology**		
Code : 15UZOS41	**Hrs/Week : 2**	**Hrs/Sem: 30**	**Credits : 2**

Objectives

- To get a basic knowledge of various aspects of vermicomposting.
- To develop skills in vermicomposting for self-employment.

Unit I **Vermiculture Technique**

Definition- need for vermiculture-species selection -vermiculture process

Unit II **Vermicomposting Technology**

Selection of suitable species of earthworm, preparation of worm bed – maintainance of vermicomposting bed- harvesting the worms

Unit III **Vermicomposting Methods**

Pit method- bin method, windrow method, vermiwash- preparation- composition- applications

Unit IV **Vermicompost**

Vermicompost- chemical composition, physical and biological features- applications.

Unit V **Economic Importance of Earthworm**

Earthworm - as bait- as food - in agriculture - in medicines- in laboratory research purpose- benefit to society.

Text Book

1. Gupta P. K. 2012. Vermicomposting for Sustainable Agriculture 2nd Revised Edition, Agrobios, India.

Books for Reference

1. Talashilkar S. C. and Dosani 2005 Earthworm in Agriculture First edition Agrobios Publications, Jodhpur
2. Renganathan L. S. 2006. Vermibiotechnology from Soil Health to Human Health. First edition, Agrobios, India.
3. Prakash Malhotra, Economic Zoology, 2008 First edition. Adhyayan Publishers and Distributers, New Delhi.

SEMESTER-V			
Part – III Skill Based Elective – Medical Nutrition Therapy			
Code : 15UZOS51	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 3**

Objectives

- To disseminate information on basic aspects of diet therapy.
- To inculcate aptitude for the planning and preparation of therapeutic diets.
- To instill the spirit of caring sick.

Unit I **Diet Therapy**

Introduction – principles of diet preparation – normal diet in the hospitals – liquid – semiliquid – light – soft diet – bland diet – regular diet – different types of feeding – oral feeding – tube feeding – IV feeding.

Unit II **Therapeutic Diet for Liver and Kidney Diseases**

Causes – types – symptoms and principles of dietary management in infective hepatitis and cirrhosis of liver – glomerulonephritis – chronic renal failure - diet in dialysis and renal transplantation.

Unit III **Therapeutic Diet for Diabetes and Cardiovascular Diseases**

Risk factors – symptoms – principles of planning diet and management of Diabetes mellitus – atherosclerosis – hypertension – congestive heart failure.

Unit IV **Therapeutic Diet in Febrile Conditions and Allergy**

Febrile condition – short duration – typhoid – long duration – tuberculosis – diet in allergy – definition – classification – common food allergy – test of allergy – diet therapy.

Unit V **Therapeutic Diet for Cancer and Burns**

Cancer – etiology – symptoms and dietary guidelines – burns – degree of burns – principles of dietary management.

Practical Experience

- Planning, preparing and serving diet.
- Visit to cancer care centre.
- Observation of patients in kidney care and diabetic care centres.

Text Books

1. Mudambi, S.R. and M.V.Rajagopal 2009. Fundamentals of Food, Nutrition and Diet Therapy. New Age International Publishers, 5th edition, New Delhi.

Books for Reference.

1. Gopalan, C.Ramashasthri, B.V. and Balasubramanian 1998. Nutritive Value of Indian Foods, NIN, ICMR.
2. Blank, F.C. 2009. A Handbook of Foods and Nutrition Agrobios (India) Jodhpur, India.
3. Srilakshmi, B. 2009. Human Nutrition (for B.Sc. Nursing Students). New Age International Publisher, New Delhi.
4. Srilakshmi, B. 2010. Dietetics. 6th edition, New Age International Publishers, New Delhi.

SEMESTER V			
Core VIII: Animal Physiology			
Code: 18UZOC52	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Vision

Understand the physiological processes that regulate body functions and the regulation of organ systems and develop independent thinking skills and written and oral communication abilities

Mission

Apply knowledge of a physiological mechanism to explain how the physiological processes occur in an animal.

Course outcome

CO.No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO – 1	compare the structure and functions and co-ordination of organs and organ systems	1	Un
CO – 2	assess the causes, diagnosis, prevention and treatment of illnesses	2	Ev
CO – 3	develop personal healthy life style	6	Cr
CO – 4	demonstrate the different lab experiments	5	Un
CO – 5	experiential learning, analysis and drawing conclusion	4	Cr
CO-6	find way for scientific investigation	6	Ev
CO-7	develop various skills which will be helpful in expressing ideas and views clearly and effectively	7	Ap
CO-8	imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality	8	Cr

SEMESTER V			
Core VIII: Animal Physiology			
Code: 18UZOC52	Hrs/Week: 5	Hrs/Sem: 75	Credits: 4

Unit I **Digestion and Nutrition**

Intracellular and extracellular digestion – role of enzymes in digestion of carbohydrates, proteins and lipids – absorption of digested food materials – malnutrition.

Unit II **Respiration and Circulation**

Respiration: Types of respiratory pigments – transport of respiratory gases – anaerobiosis - Respiratory Quotient.

Circulation: Composition of blood – blood coagulation – structure of human heart – heart beat – origin and conduction – cardiac cycle – blood pressure.

Unit III **Excretion and Homeostasis**

Excretion: Structure and function of nephron – mechanism of urine formation in man – nitrogenous waste products – ammonotelism, ureotelism, uricotelism – ornithine cycle – dialysis. Osmoregulation: in crustaceans and fishes – thermoregulation – mechanisms – ectotherms – endotherms – heterotherms

Unit IV **Muscular, Nervous and Chemical Coordination**

Structure of skeletal muscle and myofibril – molecular organization, mechanism and chemistry of muscle contraction.

Structure of neuron – conduction of nerve impulse - synaptic transmission – neuromuscular junction – reflex action - receptors – photo and phonoreceptors. Endocrine glands: structure and functions of pituitary and pancreas.

Unit V **Reproduction and Behavioural Physiology**

Anatomy of reproductive organs in human – ovary – testis – reproductive cycles – hormonal control of reproduction. Animal behaviour – types – learning and learned behaviour – Biological clock – circadian rhythm – circannual and lunar periodicity.

Text Book

1. Maria Kuttikan, A. and N. Arumugam. 2004. *Animal Physiology.* Saras Publication Kottar, Nagercoil.

Books for Reference

1. Sembulingam, K., Prema Sembulingam. 2008. *Essentials of Medical Physiology*. JaypeeBrothers. New Delhi

2.Rastogi, S.C. 1979. *Essentials of Animal Physiology* – Wiley Eastern Ltd. New Delhi.

3.William S. Hoar. 1987. *General and Comparative Physiology* 3rd Edition. Prentice Hallof India (P) Ltd.

4.Verma, P, Tyagi, S. and V.K. Agarwal. 2002. *Animal Physiology*. S.Chand & CompanyLtd. New Delhi.

5.Prosser, C.L. and F.A Brown. 1984. *Comparative Animal Physiology*. SaundersPhiladelphia.

6.Sambasivah Kamalakara Rao and Agustin Chellappa. 1983. *Animal Physiology* S. Chand and Company.

7.aNagabhrushanam, R., Kodarkar, M.S. and R. Sarojini. 2002. *Text book of Animal – Physiology*, Second Edition, Oxford and IBH Publishing Co, Pvt. Ltd.

SEMESTER -V			
Core IX Cell Biology and Genetics			
Code: 18UZOC53	**Hrs/week : 5**	**Hrs/Sem: 75**	**Credits: 4**

Vision :

To give an insight on basic organization and functions of the cellular components and the principles of inheritance at the cellular level in organisms.

Mission :

To provide unique integrated approach of Cell Biology and Genetics, covering cellular organization, inheritance and hereditary disorders, to gain an enhanced knowledge and understanding of biology and inheritance.

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the organization of the cell and to differentiate between prokaryotic and eukaryotic cell.	2	Un
CO-2	describe the structure and functioning of cell organelles as a system to carry out cellular processes	2	Un
CO-3	analyse the complexity and harmony of the cell from the acquired knowledge	2	An
CO-4	explain the types of chromosome; composition, structure, and replication of DNA	4	Ev
CO-5	demonstrate the genetic basis of Mendelian and non-Mendelian inheritance	5	Un
CO-6	develop the ability to think critically, analyse and use the information gained to solve problems related to genetics	6	Cr
CO-7	evaluate hereditary patterns for genetic disorders by applying genetic information to innovate solutions for health related issues	6	Ev
CO-8	apply the practical and conceptual knowledge of Cell biology and Genetics to understand other fields of biology	8	Ap

SEMESTER -V			
Core IX Cell Biology and Genetics			
Code: 18UZOC53	**Hrs/week : 5**	**Hrs/sem: 75**	**Credit: 4**

Unit I Cell and Plasma membrane

Protoplasm theory - Cell theory. Prokaryotic and Eukaryotic cells. Plasma membrane-structure, chemical composition, specialized structures and functions.

Unit II Cell Organelles

Cytoplasm- ultrastructure and functions of mitochondria, golgi apparatus, endoplasmic reticulum, lysosome, ribosome.

Unit III Nucleus

Ultrastructure and functions - nucleus, nuclear membrane, nucleolus. chromosome – structure – types, giant chromosomes - polytene chromosome, lampbrush chromosome. DNA- chemistry, structure and replication.

Unit IV Mendelian Genetics

Mendelian laws – monohybrid and dihybrid cross – back cross – test cross – incomplete dominance – inheritance of combs in fowls – multiple alleles – multiple genes – skin colour in man.

Unit V Sex linked Inheritance and Genetic Disorders

Sex determination in man – sex linked inheritance in man – haemophilia – colour blindness. Inborn errors of metabolism – phenylketonuria – albinism. Mutant haemoglobins – sickle cell anaemia. Syndromes – autosomal – Down's syndrome – sex chromosomal – Turner's and Klinefelter's syndrome.

Text books

1. Arumugam, N. 2017. *Cell Biology*. Saras Publications, 114/ 35G ARP. Camp Road, Periavilai, Kottar P.O, Nagercoil.
2. Meyyan, R.P. 2007. *Genetics*. Saras Publications, 114/ 35G ARP. Camp Road, Periavilai, Kottar P.O, Nagercoil.

Books for Reference

1. Power, C.B. 2004. *Cell Biology*. Himalaya Publishing House, Ramdoot Dr. Bhalenaomang Gingaon Mumbai.
2. Verma, P.S. and V.K. Agarwal. 2008. *Cytology* (8^{th} edition). S.Chand and Co Ltd 7361 Ram Nagar, New Delhi .

3. De Robertis, E.D.P. and E.M.F De. Robertis, 1988. *Cell and Molecular Biology* 9th International Edition, K.M. Varghese Company, Mumbai.
4. Verma, P.S. and V.K. Agarwal. 2008. *Genetics*. 9th Edition, S. Chand and Co Ltd., New Delhi.
5. Gardner, Simmons and Snustad. 1991. *Principles of Genetics*, 8th Edition. John Wiley and Sons. Inc. New York.

PRACTICALS

Hrs / Week : 2 **Credit - 1**

1. Preparation of squamous epithelium.
2. Onion root tip squash: Observation of different stages of mitosis.
3. Chironomous larva: Mounting of polytene chromosomes.
4. Observation of cells through ultramicroscope.
5. Micrometry.
6. DNA – Watson & Crick model, Golgi complex, endoplasmic reticulum, mitochondria, ribosome (models/ charts)
7. Verification of Mendel's monohybrid cross using beads.
8. Verification of Mendel's dihybrid cross using beads.
9. Sex linked inheritance of colour blindness and haemophilia (chart).
10. Genetic basis and clinical manifestations of Down's, Klinefelters and Turner's syndrome (chart).

Books for Reference:

1. Verma P.S. 1992. *A Manual of Practical Zoology - Chordates*. S. Chand & Company Ltd. Ram Nagar, New Delhi -.
2. Jayasurya, Dulsy Fatima, Meyyan, R.P., Arumugam, N. and V. Kumaresan 2013. *Practical Zoology*. *(Cell Biology-Embryolgy- Animal Physiology- Immunology Ecol Genetics- Evolution - Microbiology - Biochemistry - Biophysics*) Saras Publication, Kottar P.O., Nagercoil.
3. Emmanuel C., Rev. Fr. S. Ignacimuthu, S.J. and S. Vincent. 2006. *Applied Genetics - Recent Trends and Techniques*. MJP Publishers, 47, Nallathambi Street, Triplicane, Chennai
4. Eldon John Gardner, Michael J. Simmons and D. Peter Snustad. 1991. *Principles of Genetics.* Eighth Edition. John Wiley & Sons, INC. New York.

SEMESTER - VI			
Core XI : Biostatistics and Bioinformatics			
Code : 18UZOC62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision

- To explore the integration and application of statistics and bioinformatics in biology

Mission

- To acquire the skills and perspectives on statistics and bioinformatic tools in analysis and interpretation of data

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	attain an insight on statistical methods for analysis of biological data	1	Kn
CO 2	acquire knowledge on the bio informatics concepts for analyzing molecular data	1	Kn
CO 3	identify the problems in data analysis and match the appropriate statistical method and corresponding software	4	Un
CO 4	analyse and use the bioinformatics tools for advanced sequence alignment, database searches, genome analysis and protein structure studies	8	Ap
CO 5	undertake statistical operations in biology	7	Ap
CO 6	operate commonly used bioinformatic tools and statistical methods and understand their limitations	8	Ap
CO 7	apply bioinformatics in life science research	8	Ap
CO 8	understand and critically evaluate the data analysis procedures in publications of molecular biology research	2,3	Un

SEMESTER - VI			
Core XI : Biostatistics and Bioinformatics			
Code : 18UZOC62	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I **Biostatistics – Collection and Display of Data**

Introduction – populations and samples – types of variables – collection of primary data – survey – census - sampling methods – sources of secondary data – classification of data – frequency distribution – presentation of data – tables - parts -types – diagrams – line diagram – bar diagram – pie diagram – graphs – histogram.

Unit II **Measures of Location and Dispersion**

Concept – computation for grouped and ungrouped data – relative merits and limitations of measures of central tendency mean, median and mode – measures of dispersion – range, variance, standard deviation, standard error and coefficient of variation.

Unit III **Statistical Inference and Correlation Analysis**

Probability theory – terminology – types - theorems of probability - chi- square test and goodness of fit – correlation – definition – types – scatter diagram – Karl Pearson's correlation coefficient – calculation of r value and interpretation – testing the significance of relationship using student's t-test.

Unit IV **Bioinformatics – An Overview**

Definition – scope – applications of bioinformatics – properties of biological databases –databases retrieval tools – PubMed – Medline – Locuslink – Entrez - SRS

Unit V **Protein and Nucleotide Sequence Databases.**

Protein sequence databases – NCBI – SWISS PROT - nucleotide sequence databases – EMBL – GENBANK - sequence alignment softwares – BLAST – FASTA – applications of bioinformatics tools in research on bioinformatics.

Text Book

1. Arumugam, N. 2010. *Biostatistics, Computer Applications, Bioinformatics and Instrumentation,* Saras Publication, Nagercoil

Books for Reference

1. Palanisamy. S. and M. Manoharan. 1990. *Statistical Methods for Biologists.* Palani Paramount Publications, Palani

2. Gurumani, N. 2005. *An Introduction to Biostatistics.* 2nd edition, MJP Publishers, Chennai
3. Agarwal, S.K. 2008. *Biostatistics,* APH Publishing Corporation. New Delhi
4. Arunima Mukherjee, 2008. *Bioinformatics,* Oxford Book Company, Jaipur, India
5. Thiagarajan, B. and Pa.Rajalakshmi. 2009. *Computational Biology.* MJP Publishers, Chennai

PRACTICALS

Hours / Week : 2 **Credit - 1**

1. Preparation of a questionnaire and collection of data by survey method.
2. Demonstration of simple random sampling by simulation using students (lottery and table of random number method)
3. Construction of continuous frequency table for the weight / height of students.
4. Diagrammatic presentation of data - simple bar diagram and pie diagram
5. Graphical presentation of data – histogram, frequency polygon and frequency curve
6. Calculation of mean, median, mode, standard deviation, standard error and coefficient of variation using neem leaves
7. Study of probability and chi - square test with two coins tossing experiment
8. Calculation of correlation coefficient and testing its significance
9. BLAST
10. FASTA

Books for Reference

1. Rajadurai, M. 2010. *Bioinformatics – A Practical Manual*, PSB Book Enterprises, Chennai.
2. Gurumani, N. 2005. *An Introduction to Biostatistics.* 2nd edition, MJP Publishers, Chennai.

SEMESTER VI			
Core XII Ecology and Biodiversity			
Code: 18UZOC63	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits:4**

Vision

To support advanced knowledge building in ecological principles and conservation ecology

Mission

To develop knowledge and critical understanding of ecology, conservation and biodiversity science and practice and sustainable use and management of its ecosystem services.

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	understand and relate the interactions and the interdependence among environmental factors and living organisms.	1,2	Un
CO – 2	compare the adaptations of the organisms in different habitats	2	Un
CO – 3	analyse the mechanisms regulating the dynamics composition and organization of communities	2	Un,An
CO – 4	explore the interactions between organisms, the dynamics of populations and environment	1,3	Un,An
CO –5	explain different levels of biodiversity	1	Un,
CO – 6	discuss the direct and indirect values of biodiversity	1,3	Cr
CO-7	identify key threats to biodiversity evaluate management options for conserving biodiversity	1,3	Ap,Ev
CO-8	develop skills and competencies for career in eco-conservation and Eco- tourism	7	Ap

SEMESTER VI			
Core XII Ecology and Biodiversity			
Code: 18UZOC63	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits:4**

Unit I **Ecological Factors**

Abiotic factors : Basic concepts and biological effects of temperature and light
Biotic factors : Intra and interspecific relationships -mutualism, commensalism and antagonism (antibiosis, parasitism, predation and competition) – Biogeochemical cycles: carbon - nitrogen and phosphorous cycles

Unit II **Population& Community Ecology**

Population - Definition – density and estimation, natality – mortality – age distribution – age pyramids – population growth patterns –population fluctuations- population equilibrium — biotic potential – regulation of population density – dispersal – dispersion – population interaction
Community : concepts and characteristics – diversity – structure – community dominance – community stratification – periodicity – community interdependence
Ecotone– Edge effect – ecological niche – Ecological succession

Unit III **Habitat Ecology**

Aquatic - Freshwater – pond
Marine – classification of pelagic and benthic zones ,
Deep sea characteristics , fauna and adaptations .
Terrestrial habitat – desert and cave , characteristics , fauna and adaptations .

Unit IV **Biodiversity**

Definition and levels of Biodiversity (Genetical, Ecological, and Species diversity), values of biodiversity , Threats and loss of biodiversity – causes (natural, and manmade). Hot spots of biodiversity (with special reference to India) IUCN threat categories . Common threatened animal Taxa of India – Red Data Book

Unit V **Biodiversity Conservation and Management**

Conservation of Biodiversity : *In- situ* conservation (Sanctuaries,National parks , Biosphere Reserves, World Heritage sites) Project Tiger – *Ex- situ* conservation (Botanical gardens, gene banks , cryopreservation)
Role of Organizations in conservation: International Union for Conservation of Nature and Natural Resources (IUCN) , Zoological Survey of India (ZSI) , World Wildlife Fund (WWF), National Bureau of Plant Genetic Resources (NBPGR) and Convention on Rio Summit Agenda 21, Biodiversity Act, 2002 .

Text Books

1. Arumugam, N. 2010. *Concepts of Ecology*. Saras Publication, Kottar, Nagercoil.
2. Saha,T.K. 2008. *Ecology and Environmental Biology*. Books and Allied (P) Ltd,Kolkata.

Books for Reference

1. Kumaraswamy, K, AlagappaMoses, A. and Vasanthy, M. 2004. *Environmental Studies* Publication Division.
2. Prabhakar, V.K. 2004. *Environmental Education*. Anmol publications(P) Ltd, New Delhi.
3. Agarwal, K.C. 1999. *Environmental Biology*. AgroBotanica.
4. Verma, P.S. and V.K.Agarwal. 2013. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology.* S.Chand& Company.
5. Arumugam, N and V.Kumaresan. 2014. *Environmental Studies*, Saras Publication, Nagercoil.
6. Verma and Agarwal. 1985. *Principles of Ecology*. S.Chand& Company Ltd, New Delhi.
7. Veer BalaRastogi and M.S.Jayaraj. 1988. *Animal Ecology and Distribution of Animals*. Kedar Nath& Ram Nath, Delhi
8. Krisnamoorthy, K.V. 2004. *An Advanced Text Book of Biodiversity.* Oxford and IBH, New Delhi

PRACTICALS

Credit - 1

1. Estimation of dissolved O_2 in water sample (pond / sea water)
2. Estimation of alkalinity in water sample (pond / sea water)
3. Estimation of BOD of water samples collected from various sources
4. Detection of transparency of water by Secchi disc
5. Analysis of plankton – fresh water / marine
6. Museum specimens / slides / models and charts
   - Mutualism (Hermit crab & Sea anemone)
   - Commensalism (Echeneis & Shark)
   - Parasitism (Sacculina on crab)
   - Map showing Biosphere Reserves of India
   - Hotspots of India
   - Endangered animals : Greater one horned Rhinoceros , Asiatic lion
   - Endemic animals :Lion tailed Macaque , NilgrisTahr
7. Report on visit to any place of ecological interest – (compulsary).

Books for Reference

1. Jeyasuriya, Arumugam, N. and Dulcy Fatima. 2013. Narayanan L.M *Practical Zoology Vol.3* Saras Publications, Kottar, Nagercoil.
2. Methods in Hydrobiology Manual, *Centre for Advanced Studies in Marine Biology*, Annamalai University.
3. Krisnamoorthy, K.V. 2004. A*n Advanced Text Book of Biodiversity*, Oxford and IBH, New Delhi.

SEMESTER V			
Core Integral I : Marine Biology			
Code: 18UZOI51	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Vision

To provide quality education and training in the field of marine biology and environment

Mission

Provides an excellent education in marine biology, emphasizing the flora and fauna of marine environment

To raise awareness about marine environments for the community and the society

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	classify the different ecological zones of marine environment, diversity of marine organisms and their adaptations	1,2	Un
CO - 2	explain the physical and chemical properties of sea water and their significance to marine life	1,4	Un, Ev
CO - 3	appraise the ocean production, characteristics and types of coral reefs, mangroves and estuaries	3	Ev
CO - 4	outline the formation, types and properties of the dynamics of ocean	1,2	Un
CO - 5	analyse various types of marine resources and assess the various environmental concerns related to the use and abuse of marine resources	5,6	An, Cr
CO - 6	gain specialized skills in a range of theoretical and practical applications	8,	Cr
CO - 7	develop awareness of scientific issues in marine biology within the larger social context	6	Ap, Cr
CO - 8	design and implement effective solutions to problems in marine environment	7,8	Cr

SEMESTER V			
Core Integral I : Marine Biology			
Code: 18UZOI51	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Unit I Marine Habitat

Classification of marine habitat. Characteristics of pelagic and benthic divisions – intertidal, rocky, sandy and muddy shores – the features of flora, fauna and adaptations.

Unit II Physical and Chemical Properties of Sea Water

Physical properties – temperature, temperature distribution, dissolved gases, T/S diagram. Chemical properties - Nutrients (major, minor and trace elements) illumination, salinity - distribution.

Unit III Biological Characteristics of the sea

Plankton – classification, adaptations and methods of collection. Ocean production - Energy flow in the marine environment. Coral reef, mangroves, estuaries - characteristics and types.

Unit IV Dynamics of the Ocean

Tides - generating forces, types, effects of tides in coastal areas; Waves - formation, properties, types - tsunami.

Unit V Resources of the Sea

Chemical resources - manganese nodules, beach placers, Oil resource (Petroleum) Fishery products - fish meal and fish oil. Formation, ornamental and medicinal importance of natural pearls.

Text Book

1. Olivia J. Fernando. 1999. *Sea water - Properties and dynamics.* Dhanesh Publications, Ponnagam, Thanjavur.

Books for Reference

1. Gross, G., 1993. *Oceanography: A view of the Earth*. Sixth edition. Prentice Hall Inc., New Jersey.
2. McCormick, J.M. and J.V. Thiruvathaakal. 1976. *Elements of Oceanography*. W.B. Saunders Company, Philadelphia.
3. Nybakken, J.W. 1997. *Marine Biology – An Ecological Approach*. Addison Weslay Longman, Inc. California, 477pp.
4. Girish Chopra, 2006. *Coastal and Marine Geography*, Common Wealth Publisher, Delhi.
5. Veena. 2012. *Understanding Marine Biology*- Discovery Publishing House PVT.LTD New Delhi
6. Russel. 1970. *Marine Ecology*. Academic Press- London and New York.
7. Nelson and Smith. 1973. *Oil Pollution and Marine Ecology*-Plenum press, New York.

SEMESTER – V			
Core Integral II: Commercial Aquaculture			
Code:18UZOI52	**Hrs/ Week: 4**	**Hrs/ Sem:60**	**Credits: 4**

Vision

To highlight the importance of aquaculture to augment food production

Mission

To impart knowledge on fish culture techniques, health management measures and fish preservation

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the biology of a variety of commercially important food fishes.	1	Un
CO-2	analyse the different methods of integrated fish farming	7	An
CO-3	understand the conditioning factors and how they can be manipulated	1, 2	Un
CO-4	interpret the basic culture methodologies of commercially important species	8	Ev
CO-5	acquire knowledge on feed organisms and feed formulation	1	Un
CO-6	identify the common aquaculture diseases and apply appropriate measures for fish health management	8	Ap
CO-7	explain the different techniques of fish processing and preservation	4	Un, Ev
CO-8	apply principles and concepts to solve problems that may be encountered in commercial production	7	Ap

SEMESTER – V			
Core Integral II: Commercial Aquaculture			
Code:18UZOI52	**Hrs/ Week: 4**	**Hrs/ Sem:60**	**Credits: 4**

Unit I **Cultivable Species**

Importance of aquaculture – Current status of aquaculture in India – Cultivable organisms and their qualities. Fin fishes – carps and live fishes. Shell fishes- shrimp, lobster – edible oyster, mussel, pearl oyster. Cultivable sea weeds.

Unit II **Culture Methods and Farm Management**

Polyculture, integrated fish farming – paddy - cum fish culture, animal husbandry - cum fish culture, Management of culture ponds - control of water quality parameters - fertilization - control of predators and weeds.

Unit III **Culture Techniques**

Fin fish - culture of Indian major carp (Catla) - seed collection, breeding and culture techniques

Shell fish - culture of marine prawn, pearl oyster

Unit IV **Fish feed and Disease management**

Fish feed – artificial feed - feed formulation and composition of formulated feed, live feed organisms. Common diseases – white spot disease, dropsy, fin rot, gill rot, saprolegniasis. Parasites - argulus, lernea - prevention and management. Principles of fish health management

Unit V **Fish Processing and Preservation**

Fish preservation – freezing, canning, dry curing, salt curing, smoke curing, Irradiation, special cured products. Preservation and export techniques.

Text Book

1. Santhana Kumar and A.M. Selvaraj. 2006. *Concepts of Aquaculture*. Mac ram Publications, Nagercoil.

Books for Reference

1. Santhanam, R., Sukumaran, M. and P. Natarajan. 1990. *A Manual of Freshwater Aquaculture.* Oxford & IBH publishing Co Pvt. Ltd, Janpath, New Delhi.
2. Dinabandhu Sahoo, S.Z. Qasim. 2009. *Sustainable Aquaculture*. A.P.H Publishing Co, NewDelhi.
3. Agarwal, S.C. 1994. *A Hand book of Fish Farming*. Naranda Publishing House, Delhi.
4. Chaudhuri, A.B. 2009. *Aquaculture Resurgence Birth of Blue Revolution*. Daya Publishing House, Delhi.
5. Sailendra Ghosh. 2009. *Fisheries and Aquaculture Management*. Adhyayan Publisher & Distributors, New Delhi.
6. Santhanam,R., N. Ramanathan and G. Jegathesan 1990. *Coastal Aquaculture in India.* First Edition, CBS Publishers, New Delhi.

SEMESTER – VI			
Core Integral III – Sericulture			
Code : 18UZOI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Vision

Towards exploring the scope of various techniques involved in sericulture and moriculture for self employment.

Mission

To impart knowledge and technical skills in various aspects of sericulture and moriculture.

Course Outcome

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	acknowledge various organizations involved in the welfare of sericulture.	7	Un
CO - 2	interpret the practices of Moriculture.	3	Un
CO -3	attain information on the various diseases and pests affecting mulberry and its control measures.	1	Ev
CO - 4	develop skills on various silkworm rearing processes and operations.	8	Ap
CO - 5	use the knowledge of cocoon mounting and harvesting.	7	Ap
CO - 6	enumerate silkworm diseases and its control measures.	7	Un
CO - 7	involve in cocoon stifling, deflossing and reeling.	8	Ap
CO - 8	understand the uses of the products and byproducts of sericulture.	7	Un

SEMESTER – VI			
Core Integral III – Sericulture			
Code : 18UZOI61	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit I **Introduction**

Introduction to sericulture – sericulture in India and world – role of Central Silk Board(CSB), Central Sericultural Research and Training Institute(CSRTI) –

Unit II **Moriculture**

Commercial varieties of mulberry – mulberry cultivation – cultivation practices – biofertilizers – foliar spray for mulberry – bacterial – viral – fungal –nematode and deficiency diseases – pests of mulberry – symptoms and control measures.

Unit III **Silkworm Rearing**

Mulberry silkworm –Popular silkworm breeds and hybrids in India- morphology– silk gland. Silk worm rearing – rearing house – rearing appliances – rearing operations – chawki rearing – rearing of late age worms – application of sampoorna.

Unit IV **Cocoon Mounting and Marketing**

Mountages – mounting methods – harvesting of cocoons – transport of cocoons – defective cocoons – cocoon markets. Silkworm diseases – bacterial, fungal and viral diseases – pest (Uzifly) symptoms and control measures.

Unit V **Silk Reeling.**

Cocoon stifling – methods of stifling – storage of cocoons – deflossing cocoon cooking – reeling operations. reeling appliances – cottage basin – filature units – uses of silk.

Text Book

1. Ganga, G. and J. Sulochana Chetty. 1991. *An Introduction to sericulture*. Oxford & Publishing Co Pvt. Ltd. New Delhi

Books for Reference

1. Krishnaswamy S. 1990. *New Technology of Silkworm Rearing.* Published by Central Silk Board, Bangalore.
2. Hisao Aruga. 1990. *Principles of Sericulture*. Published by Oxford & IBH Publishing Co. Pvt.Ltd., New Delhi.
3. Tammanna N. Sonwalker. 1993. *Hand Book of Silk Technology*. Published by Wiley Eastern Ltd, Madras.
4. Manjeet S. Jolly. 1987. *Appropriate Sericulture Techniques*. Published by Director, International Centre for Training and Research in Tropical Sericulture, Mysore.
5. Kamal Jaiswal, Sunil, P., Trivedi, B., Pandey, V. and P.N. Pandey 2009. *Indian Sericulture*. ALFA Publication, New Delhi.

SEMESTER V			
Core V	**Biotechnology (Common Core)**		
Course Code: 21UBCC51	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 2**

Objectives:

- To provide broad scope of biotechnology in various fields including agriculture, medicine, environment and forensic studies through effective teaching modules.
- To attain competence in handling biotechnological experiments that enable them to carryout research projects and lifelong profession accomplishment.
- Create awareness in applying modern tools for biotechnological innovation and priorities the ethical implementation of potential biotechnology.

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss different types of animal and plant cloning vectors	1,2	Kn, Un
CO-2	scan the role of restriction enzyme in genetic modification	4	Un
CO-3	clarify the human genome sequences and its application in human welfare	4,7	Un, An
CO-4	apply various gene transfer techniques to generate genetically modified organisms	2,7	Cr
CO-5	perform cell culture, organ culture and stem cell culture to realize the positive impact in health care	6	Un, Ap
CO-6	encapsulate the characteristic features of microbes and their role in production of industrial products and environmental reclamation	5,6	An
CO-7	relate biotechnological achievement and its benefits to mankind	6,7	Ap, Ev
CO-8	get hands on experience to conduct experiments, analyze and interpret data for investigating problems in biotechnology and allied fields	7,8	Ap

Unit I **Cloning Vectors**

Introduction – Scope and importance of biotechnology – Gene cloning techniques - cloning vehicles – bacterial plasmid vectors – pBR322 and Ti plasmid – bacteriophage vectors – lambda – M13 – Plant viral vector – CaMV- Gemini virus and tobamo virus – animal viral vector – SV40- Role of restriction and modification enzymes.

Unit II **Gene Cloning and Screening**

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – PCR – hybridization technique – Southern, Northern and Western.

Unit III **Animal Cell Culture and Genome Project**

Culture media – cell culture techniques – monolayer culture and immobilized culture of cell lines – techniques and applications of human embryonic stem cell culture – tissue engineering of artificial skin and cartilage. Human Genome Project – types – DNA sequencing methods - Maxam and Gilbert method, Sanger method – potential benefits to mankind.

Unit IV **Environmental and Bioprocess Technology**

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol – Biodiesel – Biofertilizer – mass cultivation and application of Azolla.

Unit V **Plant Tissue Culture and Health Care Biotechnology**

Plant tissue culture – media - callus culture – plant embryo culture- in vitro pollination – organ culture – suspension culture and anther culture. Edible vaccines- Bt cotton – Golden rice- DNA probes and diagnosis of genetic disorders – DNA fingerprinting technique – gene therapy and treatment of genetic diseases.

Text Books

1. Dubey R.C. S. *A text book of Biotechnology*. New Delhi, Chand and Comp. Ltd, 2004.
2. Kumaresan, V. *Biotechnology* Nagercoil, Saras Publication, 2010.

Books for Reference

1. Clark and J. Pazdernik. *Biotechnology*, California, USA. 2009.
2. Elsevier Academic Press, Dubey, R.C. *Text Book of Biotechnlogy*, New Delhi. 4th edition, S. Chand and Co Ltd, 2006.
3. Ramadass, P. *Animal Biotechnology – Recent Concepts and Development*. Chennai. MJP Publishers. 2009.

4. Rema, L.P. *Applied Biotechnology*, Chennai. MJP Publishers, 2009.
5. Shailendra Singh, *Applied Biotechnology*, 1st edition, New Delhi. Campus Books International, 2007.
6. Singh, B.D. *Biotechnology,* Chennai. *Revised edition*, Kalyani Publishers. 2005.

Practical

Course Code: 21UBCCR1 **Hours/ Week : 2**

1. Isolation of Blue Green Algae
2. Isolation of protoplast
3. Plant tissue culture – anther culture, embryo culture and nodal culture
4. Preparation of synthetic seed
5. Estimation of dissolved oxygen and BOD
6. Separation of protein by column chromatography
7. Isolation of Plasmid
8. DNA Estimation by UV-Visible Spectrophotometric method
9. Preparation of animal tissue culture media
10. Preparation of SDS – PAGE (Gel mould only)

Book for Reference:

1. Aneja, K.R., *Experiments in Microbiology, Plant Pathology and Tissue Culture*, New Delhi. Wishwa Prakashan, (A Division of Wiley Eastern Ltd).
2. Asish Verma, Surajit Das, Anchal Singh. Laboratory Manual for Biotechnology. New Delhi: S. Chand and Company Ltd., 2008.
3. Joseph Sam Brook and David S. Russel. Molecular Cloning – A Laboratory Manual, New York, Cold Spring Harbor: Cold Spring Harbor Laboratory Press. 2001.

SEMESTER I			
Core I	**Invertebrata**		
Course Code: 21UZOC11	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Objectives:

- To impart knowledge on invertebrate animals.
- To elaborate the organization, functional morphology, anatomy and taxonomic position of representative invertebrates.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	know the distinctive features of taxonomic classes within the phyla covered	1	Kn
CO -2	recognize the common members of each phylum and of selected classes	1	Kn
CO – 3	analyze the important concepts in invertebrate body structure and organization, including body symmetry, body cavity, gut formation, segmentation	2	An
CO – 4	examine the important biological processes in invertebrates, including locomotion, body support, reproduction, development, feeding, digestion, excretion, osmoregulation etc.	2	An
CO – 5	impart information on the ecological and economic importance of invertebrates.	2	Un
CO – 6	aware of the importance and diversity of invertebrates	2	Un
CO – 7	develop basic laboratory skills including microscopy, dissection and careful observation.	8	Cr
CO – 8	use knowledge in invertebrates as basic course for further subjects on higher level study.	8	Ap

Unit I Protozoa and Porifera

Salient features of invertebrates.
Protozoa- General characters and outline classification up to classes with Indian or local examples.
Type study: *Paramecium caudatum*: Morphology, nutrition, osmoregulation, excretion. Reproduction (Binary fission and conjugation).
General topic: Life cycle, pathogenicity and control measures of *Entamoeba histolytica.*

Porifera - General characters and outline classification up to classes with Indian or local examples.
Type study: *Leucosolenia*- External morphology – body wall – Reproduction.
General topics – Canal system in sponges

Unit II **Coelenterata and Platyhelminthes**

Coelenterata **-** General characters and outline classification up to classes with Indian or local examples.
Type study: *Obelia* – External characters and reproduction
General topic: Polymorphism in coelenterates.
Platyhelminthes **-** General characters and outline classification up to classes with Indian or local examples.
Type study: *Taenia solium*- Morphology and reproduction
General topic: Parasitic adaptations in Platyhelminthes

Unit III **Aschelminthes and Annelida**

Aschelminthes - General characters and classification up to classes with Indian or local examples.
Type study: *Ascaris* – External morphology and life cycle
General topic: Nematode parasites – *Wuchereria bancrofti, Ancylostoma duodinale*

Annelida- General characters and classification up to classes with Indian or local examples.
Type study: Earthworm – Morphology and reproduction
General topic: Biological significance of earthworm

Unit IV **Arthropoda**

General characters and classification up to classes with Indian or local examples.
Type of study: *Penaeus* – external morphology – reproduction and life history.
General topic: Beneficial insects (Honey bee).

Unit V **Mollusca and Echinodermata**

Mollusca -General characters and classification up to classes with Indian or local examples.

Type of study: *Pila globosa*– morphology, reproduction and nervous system
General topic: Pearl formation in bivalves
Echinodermata - General characters and classification up to classes with Indian or local examples.
Type study: *Asterias* – External morphology – water vascular system
General topic: Larval forms of echinoderms and their phylogenetic significance.

Text Books:

1.Kotpal R.L. *Modern Text Book of Zoology: Invertebrates.* Meerut: Rastogi Publications 2009.
2.EkambaranathaIyer M. and T.N. Ananthakrishnan. *A Manual ofZoology*. Vol. 1. India: S. Viswanathan Pvt Ltd 1977.

Books for Reference

1.Nair N.C. Leelavathi. S and N.A. Soundara Pandian. *Text book ofInvertebrates*. Nagercoil: Saras Publication 2006.

2.Murugan. T and N. Arumugam. *Invertebrates*. Nagercoil: Saras Publication,2006.

3.Jordan. E.L and P.S. Verma. *Invertebrate Zoology*. New Delhi: S. Chand andCompany Ltd, 2007.

4. Mary. S. Gardiner. *The Biologyof Invertebrates*. New York : Mc Graw-Hill BookCompany 1972.

5. Robert. D Barnes. *Invertebrate Zoology*. Japan Holt Saunders, InternationalEditions 1982.

Websites for Reference

http://www.enchantedlearning.com/subjects/invertebrates/index.s
html http://animalkingdom.net/category/invertebrates/
http://animaldiversity.org/

SEMESTER II			
Core II	**Chordata**		
Course Code: 21UZOC21	**Hrs/ Week : 6**	**Hrs/ Sem : 90**	**Credits : 6**

Objective:

- To impart information on the morphology and comparative anatomy of chordates.
- To provide knowledge on the organization and diversity of chordates.

Course Outcomes:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the fundamental organization of chordates.	1	Un
CO-2	classify the phylum Chordata	1	Un
CO-3	appreciate the basic concepts of chordate diversity	1	Un
CO-4	analyse the characters of different classes of the chordates	2	An
CO-5	identify the major groups within the phylum Chordata	1	Un
CO-6	reason out the inclusion of different representative animals in particular class	8	An
CO-7	recognize the different structural organizations from evolutionary point of view	8	Ev
CO-8	compare the anatomy of different functional systems in chordates.	2	Ev

Unit I Chordata- Prochordata

Chordata introduction - General characters of chordates and classification up to classes with examples. General characters of prochordates, Type study: *Amphioxus*- external morphology - digestive and excretory system. External morphology and biological significance of the following – *Ascidian, Balanoglossus*. General characters of vertebrates, Agnatha - General characters - Type study: Petromyzon - External morphology, breeding and migration.

Unit II Pisces and Amphibia

Pisces: General characters and classification up to sub-classes with examples. Typestudy: *Scoliodon sorrakowah* - Fins and scales, digestive system, respiratory system, circulatory system, sense organs, reproductive system - General topic: Migration of fishes

Amphibia: General characteristics and classification up to orders with examples. Type study: *Rana hexadactyla* – External morphology, skin, digestive, respiratory, circulatory and nervous system, reproductive system, General topic: Parental care in Amphibia

Unit III Reptilia and Aves

Reptilia: General characters and classification up to order. Type study: *Calotes* - External morphology, digestive system and circulatory system only. General Topic: Identification of poisonous and non poisonous snakes.

Aves: General characteristics and classification up to subclasses. Type study: *Columba livia* - external morphology, flight muscle, digestive system, respiratory system, urinogenital system. General topic: Migration in birds and flight adaptations of birds.

Unit IV Mammalia

Mammalia: General characteristics and classification up to subclasses with examples. Type study: *Oryctolagus cuniculus* – dentition, digestive system, respiratory system,

circulatory system, urinogenital system. General topics: Egg laying mammals and adaptations of aquatic mammals.

Unit V Comparative Anatomy

Comparative anatomy: Respiratory system- skin, gills, lungs, air sacs, air bladder and accessory respiratory organs in fishes. Circulatory system – Evolution of heart and aortic arches, venous system and lymphatic system.

Text Books

1. Kotpal R.L. *Modern Text Book of Zoology - Vertebrates.* Meerut: Rastogi Publications.2019.
2. Jordan E.L and Verma P.S. *Chordate Zoology.* New Delhi: S. Chand & Co Ltd. 2006.
3. Thangamani. A, Prasanna Kumar. S. Narayanan. L.M, N. Arumugam. *Chordata.* Nagercoil: Saras Publication. 2006.

Books for Reference

1.Ekambaranatha Iyer M., Anantha Krishnan T.N. *Manual of Zoology Vol II* Chennai: S.Viswanathan Pvt Ltd. 1995.

2.Jordan E.L and Verma P.S. *Chordate Zoology.* New Delhi: S. Chand & Co. Ltd. 2006.

3.Newman. H.H. *The Phylum Chordata.* Motikala: Satish Book Enterprise.1987.

4.Prasad S.N. *Vertebrate Zoology.* Allahabad: Kitab Mahal Private Ltd. 2005.

SEMESTER III			
Part III Core III: Developmental Zoology			
Code: 21UZOC31	**Hrs/Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Objectives

To acquire a greater appreciation of life and its development

To understand the complexity of developmental processes and the underlying mechanism

To attain knowledge on reproductive technology and stem cells

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO-1	expose to concepts and process in developmental biology	1,2	Un
CO-2	Illustrate the events occur during fertilization	8	Un
CO-3	Acquire knowledge about the developmental process andembryogenesis	6	Un
CO-4	explain the sequential changes from cellular grade of organization to organ grade of organization	7	Un
CO-5	describe the development of extra embryonic membrane and the nature and physiology of placenta	3	Un,An
CO-6	Create awareness on new technology in embryology and its relevance to Man	1,7	Cr
CO-7	Create awareness on advanced reproductive technologies	1,3	Un, Cr
CO-8	Analyse the causes of infertility in human and can take preventive measures.	2,3	An

SEMESTER III			
Core III: Developmental Zoology			
Code:21UZOC31	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Unit I **Gametogenesis**

Basic concepts of developmental biology -Gametogenesis – spermatogenesis, oogenesis- sperm and egg of chick and man

Unit II **Development of Chick**

Fertilization : Pre and post fertilization events - cleavage, gastrulation and fate Map of Chick

Unit III **Development of Human**

Cleavage – Fate map of human - gastrulation in human Organogenesis- Development of heart and brain in mammal

Unit IV **Organizer & Foetal membrane**

Organizer- primary and secondary organizers, morphogenetic fields and gradient hypothesis, embryonic stem cells- culture & applications, placenta in mammals – types and physiology

Unit V **Assisted Reproductive Technology**

Manipulation of reproduction in human - Infertility (Male & Female) - Poly Cystic Ovarian Disease (PCOD) - artificial insemination,test-tube babies - amniocentesis - Birth control- contraceptive devices–surgical, hormonal methods, physical barriers – IUCD, termination of gestation

Text Books

1. Arumugam. N. 2006 *Developmental Zoology*, Saras Publication
2. Mohan P. Arora 1991 *Organic Evolution*, Himalaya Publishing House.

Books for Reference

1. Berril. M.J. 1982. *Developmental Biology*, Tata McGraw- Hill Publishing Company Ltd.New Delhi.
2. Verma.P.S. and U.K. Agarwal, *Chordate Embryology* (10th Edition) S.Chand&

Company Ltd, New Delhi.

3. Balinsky, B. I. 1981. *Introduction to Embryology*. Saunders College, Philadelphia.
4. Jay M Savage, 1998, *Evolution*, Amerind Publishing House Co, New Delhi.
5. Paul Amos Moody ,1997, *An Introduction to Evolution*, Kalyani Publishers, Ludhiyana
6. Arumugam.N 2001 *Evolution* , Saras publication, Kottar, Nagercoil.

SEMESTER VI			
Core IX	**Immunology and Microbiology**		
Course Code: 21UZOC61	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives

- To highlight the importance of immunity, immune system, and lymphoid organs
- To elucidate the nature of microorganisms and the culture techniques of bacteria
- To learn the role of microbes in agriculture, food and in medical field.

Course outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the importance of immunity and immune response	2	Un
CO-2	explain the structure and functions of different types of lymphoid organs	2	Ev
CO-3	demonstrate the types and basic structure of immunoglobulins	4	Un
CO-4	classify bacteria and outline the general structure of microbes	1	An
CO-5	analyse the causes and prevention of food poisoning, food spoilage and to discuss preservation methods	7	An, Cr
CO-6	explain the causative agents, symptoms of microbial diseases and to propose preventive measures	7	Un, Cr
CO-7	to perform experiments in Immunology and interpret the results	8	Ev
CO-8	to develop skills in fundamental techniques in microbiology including sterilization, isolation and culture of bacteria	6, 8	Cr

Unit I **Immunity Types and Lymphoid Organs**

Immunity – types – innate immunity – factors controlling innate immunity – acquired immunity –types – active and passive immunity, Lymphoid organs – thymus, bone marrow, spleen and lymph nodes.

Unit II **Immune Response**

Cells of the immune system – development and fate of stem cells - Lymphocytes, B Lymphocytes, T Lymphocytes - types of T cells and macrophages –Immune response – humoral - primary and secondary – B cell activation - cell mediated immune response – Tcell activation – biological functions of cell mediated immunity.

Unit III **Antigens and Antibodies**

Antigens – definition – epitopes – cross reactive antigen - heterophile antigen – Frossman antigen – haptens. Antibodies (Immunoglobulins) - definition – structure and functions of immunoglobulin – Ig classes - IgG, IgA, IgM, IgD and IgE.

Unit IV **Structure, Shape and Culture of Microbes**

Importance and scope of Microbiology – classification of bacteria - general structure of bacteria, fungus and virus. Culture media, continuous and batch culture techniques – bacterial growth curve.

Unit V **Food, Agricultural and Medical Microbiology**

Food Microbiology: Food poisoning - botulism, salmonellosis; food spoilage and preservation methods. Agricultural Microbiology: Rhizosphere - microorganisms - symbiotic and asymbiotic nitrogen fixation. Medical Microbiology: Causative agent, symptoms, prevention and control of tuberculosis, gonorrhea, candidiasis, dermatophytosis, dengue and COVID-19.

Textbook

1. Kannan, I. *Immunology*. Chennai: MJP Publishers 2007
2. Chakraborty, P.A. *Text Book of Microbiology*. Kolkata: New Central Book Agency (P) Limited. 1995.

Books for Reference

1. Arumugam, N., Mani, A., Narayanan, L.M., Dulsy Fatima and A.M.Selvaraj. *Immunology and Microbiology*. Nagercoil : Saras Publication. 2015.
2. Rao, C.V. *An Introduction to Immunology*. New Delhi: Narosa Publishing House. 2005.
3. Joshi K.R and Osamo N.O. *Immunology.* India: Agro Botanical Publishers, 4th Edition, 1994.
4. Surendra Naha. *Fundamentals of Immunology*. New Delhi: Dominant Publishers & Distributors Pvt. Ltd. 2012.
5. Pelczar, M.J, Chan, E.C.S. and N.R. Krieg. *Microbiology* New Delhi: Mc Graw– Hill Book Company. 1986.
6. Arti Kapil. *Text Book of Microbiology.* India: Universities Press (India) Pvt. Ltd. 9th Edition, 2013.

PRACTICALS

Course Code: 21UZOCR6

Hours/ Week: 2 **Credit: 1**

1. Lymphoid organs– chart/ slides of histology
2. Single Radial Immuno diffusion (Demonstration)
3. Double Immuno diffusion (Demonstration)
4. Microscopic observation of different types of lymphocytes
5. Sterilization techniques
6. Preparation of culture media
7. Serial dilution technique
8. Simple staining of bacteria

9. Gram staining of bacteria
10. Hanging drop technique.
11. Study of distribution of microorganisms in nature – soil, water and air.
12. Culture and counting of bacterial colonies using colony counter.
13. Spotters – autoclave, hot air oven, laminar flow hood, inoculation needle, agar plate.

Books for Reference

1. Jayasurya, Dulsy Fatima, Meyyan, R.P., Arumugam, N. and V. Kumaresan. *Practical Zoology.* (*Cell Biology- Embryology - Animal Physiology - Immunology- Ecology-Genetics-Evolution - Microbiology - Biochemistry - Biophysics*). Nagercoil: Saras Publication, Kottar P.O.2013.
2. James Cappuccino and Natalie Sherman. *Microbiology A Laboratory Manual*. Tokyo: Addison - Wesly- Hyman Inc.1990.

SEMESTER III			
NME I	**Basic Biotechnology**		
Course Code: 21UZON31	**Hrs/ Week : 2**	**Hrs/ Sem: 30**	**Credit: 2**

Objectives

- To impart basic knowledge on biotechnology
- To develop skills in biology using various biotechniques
- To motivate the students to take up career in biotechnology related fields in their future

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the basic principles of Biotechnology	1	Un
CO-2	distinguish between prokaryotic and eukaryotic cells from their structural studies	2	An
CO-3	understand the restriction enzymes and cloning vectors and assess their use in genetic engineering.	4	Un, Ev
CO-4	analyse the structure of DNA, and use various techniques to visualize, manipulate and separate the DNA molecules	4, 5	Un, An
CO-5	apply the various gene manipulation techniques to generate genetically modified organisms	6	An
CO-6	evaluate techniques of gene delivery and cloning to adapt in manipulation of genes	5	Ev
CO-7	discuss the preparation and characterization of appropriate nano materials in the field of nanotechnology	7	Cr
CO-8	to perform biotechnology experiments to isolate separate and amplify DNA molecules	8	Cr

Unit I **Introduction to Basic Biotechnology**

Definition, history of Biotechnology - scope of Biotechnology; structure of cell - eukaryotic and prokaryotic cells.

Unit II **Basics of Gene Manipulation**

Structure of DNA - gene concept - central dogma of life - concept of genetic engineering - Type II Restriction enzymes and DNA ligases in genetic engineering - cloning vectors – definition - general characters - plasmid cloning vector – pBR322 - construction of recombinant DNA - basic steps in cloning.

Unit III **Techniques in Biotechnology**

Agarose gel electrophoresis, SDS PAGE, PCR - Gene delivery methods – transformation, transfection, methods, biolistic method (gene gun).

Unit IV **Genetic Modification of Organisms**

Transgenic animals and plants - methods of production of transgenic organisms - outline of microinjection mediated gene transfer to animals - outline of Agrobacterium mediated gene transfer to plants – GMOs – Super mouse, Gold fish, Golden rice, Bt Cotton.

Unit V **Demonstrations/ Model/ Chart**

DNA isolation, restriction digestion, agarose gel electrophoresis, SDS PAGE, PCR, Structure - DNA, tRNA (Model/ Chart).

Text Book:

Kumaresan, V. *Biotechnology*. Nagercoil: Saras Publication, 6th edition, 2012.

Books for Reference:

1. Dubey, R.C. *A Textbook of Biotechnology*. New Delhi: S. Chand and Company Ltd., 2009.
2. Rastogi, S.C. *Biotechnology Principles and Applications*. Chennai: Reprint, Narosa. Publishing House, 2020.
3. Singh, B.D. *Biotechnology*. New Delhi: Kalyani Publishers. 2015.
4. Sathyanarayana, V. *Biotechnology*. Kolkatta:. Books and Allied (P) Ltd. 15th Edition. 2020.
5. Harisha S. *Biotechnology Procedures and Experiments Hand Book*. New Delhi: Lakshmi Publications. First Edition. 2008.
6. Asish Verma, Surajit Das, Anchal Singh. *Laboratory Manual for Biotechnology*. New Delhi: S. Chand and Company, Ltd., 2008.

SEMESTER IV			
NME II	**Applied Biotechnology**		
Course Coe: 21UZON41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credit: 2**

Objectives

- To impart comprehensive knowledge on various aspects of modern biotechnology.
- To understand the applications of biotechnological innovations for environmental protection and human welfare.

Course Outcomes

CO. No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the production of different bio-products	4	Un
CO-2	examine the nature and feature of SCP and aerobic and anaerobic digestion	4,5	An
CO-3	apply the techniques to clean up the environment through various treatment methods	3,7	Ap
CO-4	create awareness to cure cancer	4	Cr
CO-5	understand the importance of biosafety and IPR	8	Un
CO-6	evaluate the synthesis and applications of bio-products	7	Ev
CO-7	adopt appropriate tools and techniques in biotechnological manipulation	7	Cr
CO-8	apply the experimental procedures to the spectrum of fields making use of Biotechnology	8	Ap

Unit I **Food and Beverage Biotechnology**

Fermented food – yoghurt, bread – microbial biomass – nutritive value of Single Cell Protein and mushroom cultivation (White button mushroom) - wine and beer. (Demo – Mushroom cultivation & Microbial production of wine).

Unit II **Fuel Biotechnology**

Biogas – substrates- process of production – applications; biodiesel – manufacture - advantages.

Unit III **Environmental Biotechnology**

Sewage treatment – primary, secondary and tertiary treatments. Bioremediation – types, bio remediation of ground water - In-situ and Ex-situ bioremediation.

Unit IV **Health Care Biotechnology**

Gene therapy methods – germ line and somatic cell line – gene therapy for cancer.

Unit V **Regulations in Biotechnology**

Biosafety – guidelines, Intellectual Property Right – copy right and trade mark – patent.

Text Book

1. Kumaresan, V. *Biotechnology.* Kottar, Nagercoil: Saras Publication: - 6th edition. 2012.

Books for Reference

1. Dubey, R.C. *A textbook of Biotechnology*. New Delhi: S. Chand and Company Ltd. 2009
2. Rastogi, S.C. *Biotechnology, Principles and Applications*. Chennai: Narosa Publishing House. 2012.
3. Singh, B.D. *Biotechnology*. New Delhi: Revised edition. Kalyani Publishers. 2015
4. Sathyanarayana, V. *Biotechnology*. Kolkatta: Books and Allied(P) Ltd.15th edition 2020
5. Harisha S. *Biotechnology Procedures and Experiments Hand Book*. New Delhi, India: Infinity Science Press, LIC, Hinghum, Massachusett. 2007.
6. Asish Verma, Surajit Das, Anchal Singh. *Laboratory Manual for Biotechnology*. New Delhi: S. Chand and Company. 2008.

SEMESTER IV			
Skill Based Elective	**A. Clinical Laboratory Technology**		
Course Code: 21UZOS41	**Hrs/ Week: 2**	**Hrs/ Sem: 30**	**Credits: 2**

Objectives

- To become skilled persons for employment.
- To learn the utility and the applications of the instruments.
- To study the etiology of various diseases affecting human beings.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	1	Un
CO-2	analyze and distinguish various types of blood cells	2	An
CO-3	understand the pathological diseases and explain the test for hepatitis, AIDS and intestinal parasite	3	An
CO-4	evaluate critical thinking of biochemical test	5	Un
CO-5	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to conduct biological research	6	Un
CO-6	develop skills in various lab techniques	7	Cr
CO-7	acquire knowledge to handle clinical equipments	4	Un
CO-8	design, carryout and interpret scientific experiments	8	Ap

Unit I **Best Laboratory Practices and Instrumentation**

Best laboratory practices - norms to be followed in a clinical lab - sterilization - dry heat (hot air oven), moist heat (autoclave) and UV radiation (laminar flow chamber) – X- Ray - CT scan and MRI scan.

Unit II **Haematology**

Collection and storage of blood, preparation and use of blood components - blood groupings (A,B,O & Rh factor). Estimation of haemoglobin.

Unit III **Clinical Pathology**

Dialysis - hepatitis test – hemolytic jaundice - analysis of sputum - AIDS (ELISA Western blot test) Diagnosis of dengue and COVID-19.

Unit IV **Clinical Biochemistry**

Estimation of cholesterol, urea, uric acid, creatinine of blood - assay of enzyme alkaline phosphatase.

Unit V **Demonstration/ Charts/ Models/ Hands-on Training/ Hospital Visit**

Stethoscope, sphygmomanometer, electrocardiogram, EEG and echo cardiogram - analysis of urine - routine physical examination.

Text Book:

1. Ramnik Sood. *Medical Laboratory Technology*, Methods and Interpretations New Delhi: Jaypee Brothers Medical Publishers (P) Ltd.2005.
2. Jyoti Saxena, Mamta Banuthiyal and Indu Ravi Laboratory. *Manual of Microbiology, Biochemistry, and Molecular Biology*. New Delhi: Scientific Publishers (India). 2015.

Books for Reference:

1. Biswajit Mohanty and Sharbari Basu. *Fundamentals of Practical Clinical Biochemistry.* New Delhi: B.I Publications Pvt. Ltd. 2006.
2. Estridge, B.H., Reynolds, A.P. and N.J. Walters. *Basic Medical Laboratory Techniques.* Banglore: Thomson Delmar Learing Fastern press (Bangalore) Pvt. Ltd. 4th edition 2000.
3. Kannai, L. Mukherjee. *Medical Laboratory Technology.* Chennai: Tata Mc Graw Hill Publishing Company Limited, Vol-I, Vol-II and Vol-III. 1997.

SEMESTER III	
Self Study (Compulsory) **Wildlife Conservation**	
Course Code : 21UZOSS1	**Credits: 2**

Objectives:

- To recognize the importance of wildlife conservation.
- To study the techniques of wildlife census.
- To learn the role of Sanctuaries and National Parks in wildlife conservation.

Course outcome

CO. No	upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire knowledge on the need for conservation of wildlife	1	Un
CO-2	explain about the status and conservation of endangered species.	1	Un
CO-3	be aware of wildlife wealth of India and the threatened species	1	Un
CO-4	apply principles of wildlife management in protecting the threatened species	3	Ap
CO-5	analyse the values, benefits of wildlife and cause for wildlife depletion	3	An
CO-6	understand the Wildlife Conservation Policies and to improve the conservation strategies.	8	Un, Cr
CO-7	assess wildlife population by learning the various census techniques	6	Ev
CO-8	discuss the role of Wildlife Sanctuaries and National Parks in wildlife conservation	3	Cr

Unit I **Wildlife Census Techniques**

Wildlife census techniques - direct method - line transect method – block count method- indirect method - pellet analysis method - pugmark techniques.

Unit II **Need for Conservation**

Wildlife values and benefits - causes of wildlife depletion – need for conservation - endangered species of reptiles, birds and mammals in India.

Unit III **Wildlife and their Management**

Principles of wildlife management - wildlife wealth of India - threatened wildlife, threats to survival and management of Red Panda, Musk deer, Great Indian Bustard, Olive Ridley turtle, Nilgiritahr, Nilgiri langur.

Unit IV **Sanctuaries and National Parks**

Definition – importance – Vedanthangal, Koonthankulam Bird Sanctuary – Mudumalai Sanctuary- Anamalai Sanctuary - National Parks - Guindy Deer Park – Gulf of Mannar Biosphere Reserve.

Unit V **Wildlife Conservation Policies**

The World Conservation Union (IUCN), Red Data Book.
World Wildlife Fund (WWF), Indian Board of Wildlife (IBWL) – National Board for Wildlife (NBWL), Man and Biosphere Programme (MAB), Project Tiger. Wildlife Protection Act 1972, Significance of NGO's in wildlife conservation.

Books for Reference

1. Anubha Kaushik and Kaushik C.P. *Environmental Science & Engineering*. New Delhi: New Age International (p) Publishers. 2020.
2. Hosetti B.B. *Concepts in Wildlife Management*. New Delhi: Daya Publishing house, A division of Astral International Pvt. Ltd. 2017.
3. Dr. Reena Mathur. *Wildlife Conservation and Management*. Meerut: Rastogi Publications; 1st Edition. 2018
4. Seshadri, B. *India's Wildlife Reserves*. New Delhi: Sterling Publishers 1990.
5. Saharia, V.B. *Wildlife in India*. Dehradun: Nataraj Publication.1998.
6. Verma, P.S. and Agarwal V.K. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. New Delhi: S. Chand & Company Pvt. Ltd, Ram Nagar. 2009.
7. Brain Groombridge. *Global Biodiversity*. London SE1 8 HN: Chapman & Hall, 2-6 Boundary Row. 1992.

Semester III			
Core VII Human Resource Management			
Code : 15UBAC33	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 4**

Objectives:

- **To make students understand the concept of HRM.**
- **To enable students to keep themselves abreast of knowledge on various strategy of HRM.**

Unit I

Human Resource Management - Nature and Scope of the HRM - Managerial and Operating Functions - Difference between Personnel management and HRM – Human Resource Planning.

Unit II

Recruitment – Selection – Methods of Selection – Use of various Tests – interview techniques in Selections.

Unit III

Placement and Induction - Training – Methods – Techniques – Training vs Development.

Unit IV

Performance Appraisal – Methods – Promotions and Transfers – Compensation – Steps in compensation.

Unit V

Human Resource Audit – Nature – Benefits – Scope – Approaches

Text Book

- L.M.Prasad , Human Resource Management, Sultan Chand & Sons, New Delhi.

Books for Reference:

- Dr.C.B.Gupta, Human Resource Management, Sultan Chand & Sons, New Delhi.
- C.P.Memoria, Personnel Management,Himalaya Publishing House.

Semester VI			
Core XIII - Retail Management			
Code : 15UBAC61	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 5**

Objectives:

- **To emphasize the emergence of retail sector in India and other countries.**
- **To explore business opportunities /Management of retail sector.**

Unit I

Definition –meaning –retailers-functions-services rendered by retailers-Kinds of retailing and its features-Merits and demerits-Retailing scenario in Global and in India.

Unit II

Customer behavior-stages in buying process-factors determining customers buying decisions-pricing in retailing-pricing strategies.

Unit III

Retail shop location planning –factors influencing choice of location-location strategies-store design-finance-workshop on the strategic profit model-Activity based costing.

Unit IV

Franchising-Meaning –franchising in India-franchise market-Application of Information Technology to retailing –Brand management-Mall management.

Unit V

Retail audits-Evaluation of customers about retail service-service problems and complaints-approaches to develop customer services.

Text book

- Retail management-Suja Nair

Books for Reference:

- Retail management-Gibson G.Vedmani.

Semester V			
Core Elective Production Management			
Code : 15UBAE51	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 5**

Objectives:

- **To make students understand the concept of production management**
- **To familiarize to learners with different production / manufacturing techniques and to develop decision making as to production.**

Unit – I

Meaning – Definition – Scope – Nature of Production – Production vs Operation management – Characteristic of production function – importance of production management

Unit – II

Plant Location – Factors Affecting Plant Location – Plant Layout – Principles – Objectives of Laying Out – Types of Layout – Product Process – Fixed – Combination Layout – Advantages and Disadvantages.

Unit – III

Production planning and control – objectives and functions – planning – routing – scheduling – dispatching – expediting and follow up – charts – inventory management – EOQ reorder quantity – maximum and minimum level – safety stock.

Unit – IV

Plant maintenance – organization for maintenance – merits and demerits – safety engineering – good housekeeping – Japanese 5s model.

Unit – V

Works study – objectives – procedures - method study – work measurement – motion study – procedure and employees

Text Book

- Production and operations management – K.Aswathappa

Books for Reference:

- Production and Operations management – S.N.Chary
- Production and operations management – K.K.Ahuja

Semester V			
Core XII – Advertising and Sales Promotion			
Code :18UBAC52	Hrs/Week :6	Hrs/Sem :90	Credits :4

Vision:

To enable the students to learn the basic concepts of advertising .

Mission:

To acquaint the students with thorough knowledge of various advertising media and advertising agency.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the basic idea of advertising and its nature and benefits.	1	Un
CO -2	understand the types of advertising on the basis of demand, geographical, time.	7	Un,Ap
CO-3	understand media and factors influencing media plan.	2	Un,Re
CO-4	know advertising copy and its types.	8	Ev,Re
CO-5	gain the information on services rendered by advertising agency.	2	Un,Re
CO-6	understand the creativity in advertising copy	7	Un
CO-7	understand the importance of advertising agency.	2	Re
CO-8	know the various classification of print media.	7	Cr

Semester V			
Core XII – Advertising and Sales Promotion			
Code :18UBAC52	Hrs/Week :6	Hrs/Sem :90	Credits :4

Unit –I Introduction:

Advertising: Meaning – Definition – Evolution – Objectives-Nature and Scope of Advertising – Benefits of Advertising – Limitations-Advertising - Evolution of Advertising.

Unit – II Classifications:

Types of Advertising – Product and Institutional Advertising – On the basis of Audience, GeographicCoverage & Medium – Push and Pull Strategy – Professional Advertising.

Unit – III Types of Media:

Media:Meaning-Definition – Print Media – Indoor &Outdoor Advertising – Direct Mail Advertising – Radio and TV, Film Advertising – Factors influencing Media Planning.

Unit –IV Advertising Copy:

Advertising copy - Meaning-Definition-Creativity – Activities comprising Creative Design Process – Qualities of good Advertising Copy - Classification of Copy – Components of Advertising Copy.

Unit – V Advertising Agency:

Meaning of Advertising Agency – Functional departments of Advertising – Service rendered by Advertising Agency – Functions of an Advertising Agency – Types of

Agency.

Text Book

1.Bhargav P.K.Advertisement Management, New Delhi: Damins Garg for Murarilal & Sons, Darya Ganj.

2. Rustom & Davar, Sahrab R.Davar. Salesmanship and publicity, New Delhi: – Vikas Publisihing House,

Books for Reference:

1.Mahendra Mohan, Advertising Management, New Delhi: Tata McGraw Hill.

2.Mr. RajeevBatra JohnG. Myers David Aaker.A,. Advertising Management, New Delhi: 5th Edition, Pearson education Pvt.Ltd.

Semester V			
Core XIII – Management Accounting			
Code:18UBAC53	Hrs/Week:6	Hrs/Sem:90	Credits:4

Vision:

To help the management to take quality decision for controlling the business activities effectively.

Mission:

To Enable the students to understand the financial analysis and interpretation of the business operation.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the basic concepts of management accounting.	7	Un,Re
CO-2	prepare the financial statement analysis.	8	An
CO-3	understand the long term debt and liquidity level of assets through debt equity and liquidity ratios.	5,7	Cr,Ev
CO-4	calculate the turnover of stock debtors and creditors.	8	Ap
CO-5	prepare fund flow and cash flow statement.	4	Ap,Re
CO-6	know the appropriate position of cash flows and out flows.	8	Cr,Ev
CO-7	understand the basic concepts of break even analysis.	1	Ev
CO-8	calculate the variances of material and labour.	1	Cr

Semester V			
Core XIII – Management Accounting			
Code:18UBAC53	Hrs/Week:6	Hrs/Sem:90	Credits:4

Unit – I Introduction:

Management Accounting – Meaning – Nature, scope, functions, advantages and disadvantages – Management Accounting Vs Financial Accounting and Cost Accounting – Financial statement analysis – comparative, common size and trend analysis.

Unit - II Ratio Analysis:

Ratio analysis – Merits and Demerits – Classification of Ratios – Ratio Analysis for Liquidity, Activity, Solvency and Profitability.

Unit - III Fund Flow & Cash Flow Statement:

Fund Flow Statement and Cash Flow Statement – Meaning - Merits and Demerits – Difference between Cash Flow and Fund Flow - Preparation of Fund Flow and Cash Flow Statements.

Unit – IV Marginal Costing:

Marginal costing – Meaning - Merits and Demerits – Cost Volume Profit Analysis – Break Even Analysis – Application of Marginal Costing – Make or Buy decision - Shut Down or Continue Decision and Selection of Sales Mix.

Unit – V Standard Costing:

Standard Costing and Variance Analysis – Meaning - Advantages and Disadvantages – Steps involved in Standard Costing – Variance – Material Variances – Labour Variances.

Note: Theory 30%, Problems 70%

Text Book:

1. Jain S.P. &Narang K.L Cost and Management Accounting, New Delhi: Kalyani Publishers.
2. SaxenaV.K. &VashistC.D Cost and Management Accounting, New Delhi: Sultan Chand & Sons,

Books for Reference:

1. Maheshwari S.N.Cost and Management Accounting Sultan Chand & Sons,
2. PandeyI.M. Management Accounting. New Delhi: Vikas Publishing House (P) Ltd.

Semester VI			
Core XIV – Service Marketing			
Code :18UBAC61	Hrs/Week :6	Hrs/Sem :90	Credits :4

Vision:

To understand the meaning of services and the significance of marketing the services.

Mission:

To enable the students will be able to apply the concepts of services marketing in promoting services.

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand services marketing	1,3	Un
CO -2	learn about services on specific industries.	2	Un,Re
CO-3	understand the services provided in financial services.	6	Un,Re
CO-4	analyse professional service marketing in health care and advertising agency.	7	Un,Re,Cr
CO-5	understand marketing of educational services.	1,2	Un,Re, Cr
CO-6	understand professional service marketing in advertising agency.	1	Un
CO-7	understand marketing of educational services.	2	Re
CO-8	gain knowledge on marketing of charity services	3	Re

Semester VI			
Core XIV – Service Marketing			
Code : 18UBAC61	Hrs/Week :6	Hrs/Sem :90	Credits :4

Unit –I Understanding Services:

Definition of services – Characteristics – Generic difference between Goods and Services Myths of services- Evolution of service firms - Services Marketing Mix - Triangle of Service

Marketing.

Unit –II Marketing services of specific services:

Hotel Industry- Characteristics of Hotel – Market Segmentation- Marketing Mix of Hotel Industry-Hotel Industry in India-Tourism Industry- Characteristics – Market Segmentation – Tourism Marketing Mix- Recent trends in Tourism – Tourism in India- Transportation – Characteristics of Marketing Mix- Transportation in India.

Unit –III Marketing of Financial services :

Meaning of Bank – Market Segmentation- Marketing Mix – Recent trends in Banking Insurance Industry– Market Segmentation – Marketing Mix- Recent trends in Insurance

Marketing.

Unit –IV Professional service Marketing:

Health Care – Market Segmentation – Marketing Mix- Recent trends in Indian Health Care

Industry- Evolution of Advertising Agency- Segmentation& Marketing Strategy – Marketing Mix-Advertising agency in India-Retailing Industry – Characteristicsof Market Segmentation –Recent Trends.

Unit –V Marketing of Educational Services:

Education Services – Classifications- Characteristics – Technology and its Role in Education-Education in India- Charities Marketing – Business function in Charities Marketing Planning & Market Mix- Charity Organisations in India.

Text Book:

1. Srinivasan.R.Services Marketing, , New Delhi: 2004 – The Indian Context, Prentice Hall of India

Books for Reference:

1. Srinivasan.R. Services. Marketing, New Delhi: 2010 ,The Indian Context, Prentice Hall of India,
2. Bhattacharya.C Services. Marketing , New Delhi: 2009. Excel books India.

Semester VI			
Core XV - Production Management			
Code:18UBAC62	Hrs/Week:6	Hrs/Sem:90	Credits:4

Vision:

To improve the overall productivity of the manufacturing concern.

Mission:

To enable the students to apply the strategies for maximising the output of goods with minimum cost.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand production system.	1	Un
CO-2	analyse the factors relating to plant layout and plant locations.	8	Ev
CO-3	understand the concepts of work study and motion study.	8	Un
CO-4	analyse the production planning and control.	4	An
CO-5	understand the process of routing and scheduling.	1,3	Un
CO-6	understand the objectives of quality control.	3,6	Un
CO-7	gain knowledge on the basic concepts of quality certification.	5,7	Un
CO-8	understand the objectives and importance of material management.	1,3	Un

Semester VI

Core XV - Production Management			
Code:18UBAC62	Hrs/Week:6	Hrs/Sem:90	Credits:4

Unit – I

Production Management– Scope and Significance –Production System – Functions and Types – Factors influencing Plant Location – Plant Layout and its kinds.

Unit - II

Work Study - Time Study - Motion Study – Work Measurement– Principles and factors - Maintenance of Plant – Types.

Unit - III

Production Planning and Control – Definition – Objectives and Importance –Elements of Production Planning – Routing and Scheduling.

Unit - IV

Quality Control and Inspection – Objectives and Significance – SQC – AGMARK,ISI and ISO – Certification Marks.

Unit - V

Material Management – Objectives and importance – Purchasing – Procedure – Store Keeping – Objectives – Functions - JIT.

Text Books:

1. Moorthy Y.L.R. Brand Management, New Delhi: 2012 – First Edition,Vikas Publishing House.
2. Kevin Lane Keller, Strategic Brand Management: Building, Measuring and Managing, New Delhi: 3rd Edition 2007, Prentice Hall of India.

Books for Reference:

1. Ramesh Kumar, Managing Indian Brands, New Delhi: 2002. Vikas Publications.
2. MahimSagar, Deepali Singh, D.P.Agarwal. Achintya Gupta.Brand Management Chennai (2009): Ane Books Pvt., Ltd.

Semester VI			
Core XVI – Financial Management			
Code:18UBAC63	Hrs/Week:6	Hrs/Sem:90	Credits:4

Vision:

To develop strategies and plans for the long term financial goals of the organisation.

Mission:

Ensure accurate and timely financial reporting, procurement compliance with applicable rules and regulations.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	enhance the practical and applied aspects of capital	1	Un,Ap
CO-2	calculate the credit period of the business	8	Ap
CO-3	find out the short term and long term solvency of a business.	8	An
CO-4	ensure a proper system of communication at all levels of management.	5,7	Cr
CO-5	utilize the capital more economically	1,3	Un,Ap
CO-6	check and evaluate actual results.	6	Ev
CO-7	prepare both operating and financial budget.	3,6	Cr,Ap
CO-8	analyse the relationship between the cost volume and profit	6	An

Semester VI			
Core XVI – Financial Management			
Code:18UBAC63	Hrs/Week:6	Hrs/Sem:90	Credits:4

Unit – I Financial Management:

Meaning – Objectives - Functions and Limitations – Responsibilities of financial manager. Capital Structure: Meaning – Essentials and Principles of Capital Structure – Factors determining Capital Structure – (Theory only).

Unit – II Source of Finance:

Long term, Medium term and Short term – Types of securities – Debt, Equity and Preference stock – Working Capital Management: Techniques of forecasting working capital (Simple problems)

Unit – III Cost of capital:

Concept – Importance – Classification – Determination of cost of capital (Simple problems)

Unit – IV Budget and Budgetary control:

Meaning - Characteristics – Advantages - Limitations and essentials of a successful budgetary control – Classification of budgets – Preparation of Production, Sales and Cash budgets – Flexible budget.(Simple problems)

Unit – V Capital Budgeting:

Meaning - Importance – Factors affecting capital investment proposals – Capital budgeting

Appraisal methods – PayBack – ARR – NPV – IRR methods.(Simple problems)

Note: Theory 30% , Problems 70%.

Text Book:

1. Khan.M.Y& Jain P.K Financial Management, New Delhi: TMH.
2. Prasanna Chandra,Financial Managaement Theory and Practice, New Delhi:THM.

Books for Reference:

1. Maheshwari S.N. Cost and Management Accounting New Delhi:Sultan Chand & Sons.
2. Pandey I.M. Financial Management New Delhi: Vikas Publishing House (P) Ltd.

Semester V	
Self Study Course - Customer Relationship Management	
Code : 18UBASS3	Credit : 2

Vision:

To understand the importance of customer satisfaction in competitive scenario.

Mission:

Explore different methods and techniques for establishing effective CRM to satisfy the customers.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	know the basics of customer relationship management.	1	Un
CO-2	understand the driving forces and benefits of customer relationship management.	4,8	Ap
CO-3	know about the usage, components and types of customer relationship management.	4,7	Un
CO-4	know about the CRM framework	4	Cr
CO-5	understand the usage of technology tools in CRM	2,4	Un
CO-6	impart basic knowledge on Call center process	8	Cr,Ap
CO-7	enhance customer satisfaction and retention	1,6	Ev
C0-8	deal with strategy formulation for customer retention.	7	Un,Ap

Semester V	
Self Study Course - Customer Relationship Management	
Code : 18UBASS3	Credit : 2

Unit - I

CRM – Introduction – Definition – Need for CRM – Complementary Layers of CRM – Customer Satisfaction – Customer Loyalty – Product Marketing.

Unit - II

Customer Learning Relationship – Key Stages of CRM – Benefits of CRM – Growth of CRM Market in India – Key Principles of CRM.

Unit - III

CRM Program – Groundwork for Effective use of CRM – Information Requirement for an Effective use of CRM – Components of CRM – Types of CRM.

Unit - IV

CRM Process Framework – Governance Process – Performance Evaluation Process.

Unit - V

Use of Technology in CRM – Call Center Process – CRM Technology Tools –

Implementation- Requirements Analysis – Selection of CRM Package – Reasons and Failure of CRM.

Text Books

1 Anderson Customer Relationship Management, New Delhi 2000: Tata McGraw Hill Publishing Co.

Books for Reference:

1. Dr.Ravi Kalakota E-business – Roadmap for success, New Delhi :2000 Pearson education Asia.

2. S,Shanmugasundaram Customer Relationship Management, New Delhi:2008,

SEMESTER – V			
Part III Core XI (Common Core) - Human Resource Management			
Code:18UMCC51	Hrs/Week: 6	Hrs/Sem: 90	Credit : 4

Vision:

To enable the students to understand the basic concepts in HRM.

Mission:

To familiarize students on the various aspects of HRM.

Course Outcome:

CO No.	Upon completion of this course, students will be able to:	PSO addressed	CL
CO – 1	gain knowledge on the basic concepts of planning human resource and help them to understand basic techniques of business.	1,2	Un
CO – 2	understand the basic selection process in human resource management.	1,2,3	Un
CO – 3	know the importance of training and development in human resource management.	2,3,4	Ap
CO – 4	know about the transfer policies	2,3,5	Un,Re
CO – 5	gain knowledge on compensation methods.	3,4	Un,An
CO - 6	understand the promotional policies in business	3,4	Un,Re
CO – 7	know and apply the significance and problems in performance appraisal.	3,4,5	Ap
CO - 8	know and apply the methods of performance appraisal	3,4,5	Ap

SEMESTER – V			
Part III Core XI (Common Core) - Human Resource Management			
Code:18UMCC51	Hrs/Week: 6	Hrs/Sem: 90	Credit : 4

Unit-I : Introduction

Human Resource Management: Meaning - Objectives - Nature and Scope - Importance – Functions - and Problems of HRM - Personnel Management Vs. HRM - Qualities and Qualifications of Human Resource Managers.

Unit-II : Human Resource Planning, Recruitment And Selection

Human Resource Planning: Meaning - Need and Importance - Objective - Problems - Process – Recruitment: Meaning - Factors Influencing Recruitment - Sources of Recruitment - Problems in Recruitment – Selection: Meaning - Factors Affecting Selection Decisions - Selection Policy - Steps in Selection.

Unit-III : Training And Development

Training: Need and Importance - Objective - Types - Steps in Training Programme – Methods of Training - Evaluation of Training Programmes – Development: Meaning - Concept and Essentials of Management Development Programmes.

Unit-IV : Transfer, Promotion & Compensation

Transfer: Objective - Transfer Policy - Promotion: Purpose - Promotion Policy-DemotionCompensation: Objective – Principles.

Unit-V : Performance Appraisal

Performance Appraisal: Meaning - Need and Importance - Objective - Problems in Performance Appraisal - Factors Influencing Performance Appraisal – Methods of Performance Appraisal.

Text Book:

Chitra Atmaram Naik, Human Resource Management, Chennai: Ane Books Pvt.Ltd.

Books for Reference:

1. Dr..Gupta C.B, Human Resource Management, New Delhi: Sultan Chand & Sons.
2. Memoria C.P., Personnel Management, Mumbai: Himalaya Publishing House.
3. Prasad L.M., Human Resources Management, New Delhi: Sultan Chand & Sons,

Semester I			
Allied– I	**Business Environment**		
Course Code:21UBAA11	**Hrs/Week:4**	**Hrs/Semester: 60**	**Credits:4**

Objectives:

- Provide thorough knowledge about the emerging concepts of business environment.
- To inculcate the effects of different external as well as internal environment of business, in the learners.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept and levels of business environment	1,3	Un
CO-2	gain knowledge on business economic system	1, 4	Un, An
CO-3	have an effective knowledge on socio and cultural environment	1,3,4	Un, An
CO-4	observe knowledge on legal business environment	3	An, Cr
CO-5	inculcate the information of privatizations	3,7	Un
CO-6	inculcate knowledge on globalization	3, 5	Un, An
CO-7	impart information on private & public sector	3	Un
CO-8	input the concept of role of government in business	7, 8	Un, Cr

Semester I			
Allied – I	**Business Environment**		
Course Code:21UBAA11	**Hrs/Week:4**	**Hrs/Semester: 60**	**Credits:4**

Unit I: Business Environment and factors

Introduction – Concept of business – Definition – Nature – scope – Purpose, levels of business environment-factors of business environment –micro-macro- Economic systems – capitalist economy, socialist economy, mixed economy

(12 hours)

Unit II: Economic &socio cultural environment

Introduction – Economic environment of business – Nature of economy – structure of economy – Economic policies – Business & society Indian business culture – culture and organizational behaviour.

(12 hours)

Unit III: Political & legal Environment

Introduction – Political environment and economic system – Types of political systems, changing profile of Indian economy - Business risks posed by the Indian political system.

(12 hours)

Unit IV: Organisational Environment

Introduction – Public sectors, organisation of public sector enterprises, private sector, joint sectors, formation of joint sectors enterprise, co-operative sectors. **(12 hours)**

Unit V: Internalisation

Introduction – Meaning of Privatization – Objective of disinvestment, Privatization in India, problems with privatization – Introduction – Meaning of globalization – Organisations Introduction to facilitate globalizations – GATT – Objective and evaluation of GATT – WTO – functions – Role of government in business.

(12 hours)

Text Book:

1. Dr.K.Aswathaapa - *Business Environment* - New Delhi, Himalaya Publishing House, 16thEdition 2020.

Books for Reference:

2. Francis Cherunilam - *Business Environment*, New Delhi, Himalaya Publishing House, 27th Revised Edition 2021.

3. Dr. Rosy Joshi Sangam Kapoor - *Business Environment,* Chennai, Kalyani Publishers, 5th Edition 2015.

Semester II			
Allied II	**Business Ethics and Corporate Social Responsibility**		
Code: 21UBAA21	**Hrs/Week : 4**	**Hrs/Sem: 60**	**Credits :4**

Objectives:

- Provide the skills with which to recognize and resolve ethical issues in business.
- Import the importance of ethical, moral and corporate social responsibility of business.

Course Outcomes:

CO.No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand and illustrate the theoreticalfoundation of business ethics	1	Un
CO-2	understand the knowledge of business andeconomic concepts from an ethicalperspective.	3	Un
CO-3	know the importance of ethical conduct of business environment and community development.	1,3	Un
CO-4	analyse and resolve ethical issue in business.	1,3	An
CO-5	perform and critically examine their own values.	1,3,5	CR
CO-6	confidently apply systematic ethical reasoningto business dilemmas and communicateeffectively in oral and written forms.	4,6	CR
CO-7	expose the concepts, logic and rhetorical conventions of CSR	7	Ap
CO-8	know the role of government and application of procedures into the business.	1	Un ,Ap

Semester II			
Allied II	**Business Ethics and Corporate Social Responsibility**		
Course Code: 21UBAA21	**Hrs/Week :4**	**Hrs/Sem: 60**	**Credits :4**

UNIT-I: Concept of Ethics and CSR

Definition and Nature of Business Ethics and CSR-Need for Business Ethics –benefits of Business ethics-Role and Importance of business Ethics and values.

(12 hours)

UNIT-II: Concept of Morality and Values

Morality –Meaning –features of moral standards –Ethical theories –Indian Ethos in ethics –ethos in work life-value systems-definition-categorization of values-factors to build values-impact of ethics in business.

(12 hours)

UNIT-III: Unethical Business Practices

Bribery and corruption –causes of corruption and bribery-Business bribery-causes-Theft and piracy-sources-Trade secret –sources-Intellectual property rights..

(12 hours)

UNIT-IV: Organisational Ethics

Workplace ethics-meaning-factors influencing ethical behavior at work-Importance of ethical behavior at workplace-guidelines for managing ethics in the workplace.

(12 hours)

UNIT –V: CSR Legislation in India.

Corporate social responsibility –Need for CSR-CSR Models –Benefits of CSR-CSR activities. Corporate Governance –meaning –code of corporate governance-CSR provisions in companies Act.

(12 hours)

Text Books:

1. Dr.S.S.Khanka -*Business Ethics & Corporate Governance, Principles and practices*, New Delhi, S.Chand and company limited, 1st Edition 2014.

Books for Reference:

2. Dr.ManuelG.Velsquez - *Business Ethics (Concepts and Cases)*, New Delhi, Prentice Hall India Learning Private Limited, 6th Edition 2006.

3. Dr.S.Sankaran–*Business Ethics& values,* Chennai, Margham Publications, Reprint Edition 2005.

Semester IV			
Allied IV - International Business			
Code : 21UBAA41	**Hrs/Week: 4**	**Credit : 4**	**Hrs/Sem:60**

Objectives:

- To give international perspective to learners as to establishment of business and running of business in the era of Globalization.
- To enable students to have an adequate knowledge on international business.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	communicate the nature theories and competitive advantages of international business.	3, 4	Un
CO-2	describing the modes of entering into international business-licensing, franchising, exporting and key projects.	4, 6	An
CO-3	Elaborate the detailed study on MNC'S-growth, structure, merits and demerits.	5, 8	Ap
CO-4	Impart the international marketing Intelligence-sources, characteristics and process of IMI'S	3, 6, 8	An
CO-5	Identify the financing foreign Trade-functions of ECGC,EXIM.	1, 4, 8	An
CO-6	Elaborate the procedure to be implemented for STC,AEPC,TTCI	3, 8	Ap
CO-7	Understand the nature of international business	1	Un
CO-8	find the method of sharing gains in productivity with workers by rewarding them financially	5	An, Re

Semester IV			
Allied IV - International Business			
Code : 21UBAA41	**Hrs/Week: 4**	**Credit : 4**	**Hrs/Sem:60**

Unit – I Nature Theories and Competitive Advantage:

Evolution – nature of international business – reasons and stages of internationalization – approaches and theories of international business – comparative advantages and problems of international business.

Unit – II Modes of Entering International Business

International business analysis – modes of entry – exporting – licensing – franchising – contract manufacturing – turn key projects – foreign direct investment modes of entry.

Unit – III Multinational Corporations

Meaning of MNC, international companies, global company, and transnational corporation – Factors for the growth of MNCs – organizational design and structure of MNCs – merits and demerits of the MNCs – role of MNCs in India.

Unit – IV International Marketing Intelligence

Meaning – information required – sources of information – characteristics of sounds IMIs – meaning of marketing research – scope and process of marketing research.

Unit – V Promotion and Financing Foreign Trade

Functions of ECGC, EXIM bank , STC, TTCIL, ITPO, AEPC.

Text Book

- Introduction to International Business – P.Subha Rao [Himalaya publishing House]

Reference Books

- Cherunilam Francis, Internatioanl Trade and Export Management - Himalaya Publishing House - Mumbai.
- T.T. Sethi, Money Banking & International Trade - S.Chand & Co., - Delhi.
  Robert J.Carbaugh, International Economics - Thomson Information Publishing Group –

Semester I			
Core II	**Accounting for Managers**		
Course Code:21UBAC12	**Hrs/Week:5**	**Hrs/Sem.:75**	**Credits:4**

Objectives:

- To achieve national recognition in accounting education.
- To enable students learn the fundamental aspects of financial,management and cost accounting and acquire skills in portraying the financial portion of a business.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	apply cost accounting methods , evaluate and apply it in business performance	2	Ap
CO-2	gain knowledge in the preparation of books of accounts.	6	Cr
CO-3	have an effective understanding of analysis of depreciation.	1, 9	An
CO-4	apply the knowledge to prepare the final accounts of sole trader.	9	Cr, Ap
CO-5	tounderstand the knowledge of material and labour cost.	1	Un
CO-6	employ critical thinking and skills to analyze financial data.	9	Re
CO-7	prepare cash and fund flow statement of accounts.	1, 9	Ap, Ev
CO-8	find the method of sharing gains in productivity with workers by rewarding them financially	5	An, Re

Semester I			
Core II	**Accounting for Managers**		
Course Code:21UBAC12	**Hrs/Week:5**	**Hrs/Semester: 75**	**Credits:4**

UNIT –I Book Keeping and Accounting:

Book keeping and Accounting –Financial Accounting –Double Entry –Preparation of Journal- Ledger-Trial Balance –Preparation of Final Accounts –Trading and Profit or Loss and Balance Sheet..

(15 hours)

UNIT – II Depreciation Accounting:

Depreciation -Meaning-Characteristics – Causes- Methods of calculating Depreciation – Straight-Line Method –Diminishing Balance Method-Annuity Method.

(15 hours)

UNIT – III Cost Accounting and Material Control:

Cost Accounting -Meaning –Features –Importance –Classifications Of Cost – Preparation Of Cost Sheet

Material Control–EOQ -Bincard –LIFO –FIFO

(15 hours)

UNIT – IVOverheads

Overheads –Classification of Overheads –Allocation and Apportionment of Overhead Expenses –Bases of Apportionment –Re-Apportionment of Cost

(15 hours)

UNIT – V Marginal Costing and Cash/Fund Flow Statement

Marginal Costing –Marginal Cost -Concept –Marginal cost and Costing –Break Even Analysis

Cash And Fund Flow Statement –Concept-Importance –Limitation –Preparation Of Cash and Fund Flow Statement.

(15 hours)

Note: Theory – 40% , Problem – 60%

Text Book:

1. M.C. Shukla, T.S.Grewal & S.C.Gupta - *Advanced Accountancy*, New Delhi,Sultan Chand & Sons, 19th Edition 2016.

Books for Reference:

1.R.S.N Pillai & Bagavathi –*Management accounting* ,New Delhi: Sultan Chand & Sons, 4th Edition 2010

2. S.P.Jain & K.L.Narang - *Advanced Accountancy*, New Delhi: Kalyani Publishers, 18th Edition 2014.

3. R.L.Gupta & Radhasamy.M - *Advanced Accountancy*, New Delhi: Sultan Chand & Sons, 8th Edition 2014

Semester II			
Core III	**Organisational Behaviour**		
CourseCode :21UBAC21	**Hrs/Week :5**	**Hrs/Sem :60**	**Credits :4**

Objectives:

- To provide an overview of theories and practices in organizational behaviour in individual, group and organisational level.
- Acquaint the students with the fundamentals of managing business and to understand individual and group behaviour at work place so as to improve the effectiveness of an organisation.and to effectively analyze and approach various organisational situations

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the importance of organisational behavior and its various approaches.	1	Un
CO -2	learn the roleofeach individuals in job performance.	4	Un
CO-3	deliver the concepts and principles of perception and learning.	1,3,5	Ap
CO-4	elaborate various motivational theories and its importance.	1,4,5	Un,Ap
CO-5	identify the various leadership styles and skills required for working in groups and organisational climate	1,7,5	An, Ap
CO-6	inculcate the knowledge on group behavior and team building	7	Ap
CO-7	gain a brief knowledge on organizational conflicts and culture	2,5	Un
CO-8	elaborate the process of organizational change and development	2	Un,Re

Semester II			
Core III	**Organisational Behaviour**		
CourseCode :21UBAC21	**Hrs/Week :5**	**Hrs/Sem :75**	**Credits :4**

Unit – I Introduction to Organisational Behaviour:

Meaning-Definition –Key elements of OB-Nature and scope of OB-Need for studying OB - Contributing discipline to OB -Various approaches to OB.

(15 hours)

Unit- II Personality & Perception:

Concept of Personality –Definition-Determinants of Personality –Types of Personalities- Theories of Personality-Causes of personality development-Perception – Meaning-Definition –Perceptual Process-Factors affecting Perception- Perception and its application to OB-Ways to improve Perception.

(15 hours)

Unit- III Motivation& Leadership:

Meaning of Motivation- Nature of Motivation-Theories of Motivation-Abraham Maslow's Need Hierarchical Theory-Herzberg's two factor theory-McGregor's Theory X and Y-Urwick's Theory. Leadership: Meaning - Definition-leader –Meaning-Definition- Characteristics – Differences between Manager& Leader- Functions of Leadership- Leadership styles.

(15 hours)

Unit-IV Foundation of Group Behaviour&Team Building:

Group-meaning-definition – Characteristics of Group-Purpose of joining Groups - Theories of group formation -Types of groups - Stages of group development –.Team – Meaning – Definition-Distinguish between Team & Group - Types of teams – Team building process- Causes of team failure-Creating successful team.

(15 hours)

Unit –V Organisational Conflicts and Culture:

Conflict – meaning – definition – sources of conflict-types of conflicts– Negotiations – meaning- definition-negotiations process.Organisational culture –creating& sustaining organisational culture

(15 hours)

Text Books:

1. Aswathappa K. *Organisational Behaviour,* Mumbai: Himalaya Publishing House: 16th Edition 2020.

Books for Reference:

1. Khanka S.S – *Organisational Behavio*ur, New Delhi: S.Chand& Co Ramnagar, Reprint Edition 2006.

2. Fred Luthans *Organisational Behaviour,* New Delhi, McGraw Hill International Edition, 13th Edition 2015.
3. Stephen. P. Robbins, *Essentials of Organisational Behaviour*, New Delhi: Prentice Hall of India, 14th Edition 2017.

Semester II			
Core VI	**Business Statistics**		
CourseCode:21UBAC22	**Hrs/Week:6**	**Hrs/Sem:75**	**Credits:4**

Objectives:

- To create a responsive and sustainable statistical system.
- Provide excellent training in scientific data collection- data management- methods and procedures of dataanalysis.

Course Outcomes:

CO.No.	Upon completion of this course- students will be able to	PSO addressed	CL
CO-1	understand the meaning- nature and methods of statistics.	1	Un
CO-2	identify population- sample parameter and sampling frame.	6	An
CO-3	determine the sample as a voluntary response sample or a convenience sample.	1-6	An
CO-4	determine the approximate location of the median and quartiles.	6	An
CO-5	describe the characteristics of the correlation coefficient.	4-6	Ap
CO-6	state the assumptions of inference about the regression model.	1	An-Cr
CO-7	measure the degree of economic changes overtime.	3	An-Ap
CO-8	measure the combined fluctuations in a group related variables.	1-3	Cr

Semester II			
Core IV	**Business Statistics**		
CourseCode:21UBAC22	**Hrs/Week:6**	**Hrs/Sem:75**	**Credits:4**

Unit - IIntroduction to Statistics:

Statistics as a Subject of Study- Describing Characteristics by numbers- Information and Data- Processing information and use of statistical procedures- Statistical variables: Qualitative and QuantitativeMean- Median and Mode.

(15 hours)

Unit - IIFrequency Distribution and Graphs:

Frequency- Stem and Leaf Display- Frequency Distributions- Data Grouping: Discrete and Continuous- Introduction to Graphs- Graph for Qualitative variables- Graph for Quantitative variables.

(15 hours)

Unit - III Measures of Dispersion- Skewness and Kurtosis:

Measures of Dispersion- Range- Co-efficient of Range- Quartiles- Inter-Quartile Range and Quartile Deviation- Co- efficient of Quartile Deviation- Mean Deviation- Co- efficient of Mean Deviation- Standard Deviation- Co- efficient of Variation- The Lorentz Curve- Skewness and Kurtosis; Measures of Skewness: Absolute and Relative; Co-efficient of Skewness: Karl Pearson's- Bowley's and Kelly's; Moments and Moments based measures of Skewness (β_1)and Kurtosis (β_2)

(15 hours)

Unit - IV Correlation and Regression:

Introduction to Correlation- Karl Pearson's product moment Co-efficient of Correlation- Positive-negative and zero correlation- Correlation through Scatter diagrams- Interpretation of Correlation Co-efficient- Simple and Multiple Correlation; Regression - Multiple Regression.

(15 hours)

Unit – V Index Number:

Construction of Price and Quantity index numbers -Laspeyres'- Paasche's - Edgeworth - Marshall's- Fisher's method - Relative methods -Tests of index number formulae: Time and Factor reversal tests - General index number - Chain base index number - Cost of living index number (CLI) - Analysis of Time Series.

(15 hours)

Note: Theory 25%- Problems 75%

Text Book:

1. Roger E. Kirk *Statistics: An Introduction*-United States, Thomson-Wadsworth Publication, Fifth Edition 2008.

Books for Reference:

1. Vittal P.R- *Business Mathematics & Statistics*- Chennai, Margham Publications, 5th Edition 2018.

2. Gupta S.C. and Kapoor V.K.- *Statistics*- New Delhi: Sultan &Chand, 11th Edition 2008.
3. Pillai R. S. N. &Bagavathi V.- *Business Statistics*- New Delhi: Sultan &Chand, 7thRevised Edition 2008.

SEMESTER III			
Core V – Business Economics			
Course Code : 21UBAC31	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Objectives

- To understand the applications of economics theories in business decisions
- To determine the profit maximizing price and output for a firm operating different forms of market

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Understand the concept of economics	1,3,5	Un
CO-2	Analysis of demand and supply	7	An
CO-3	Learn about the concept of production and cost function	5	Un
CO-4	An awareness of market structure and competition	8	Ap
CO-5	Evaluate the elements of money and inflation	1,2,3	Ev
CO-6	Exhibit ability to perfect competition	9	Un, Ap
CO-7	Gain a knowledge of fundamentals of economics	1,5	Ap
CO-8	Evaluate national income	1,2,3	Ev

SEMESTER III			
Core V – Business Economics			
Course Code : 21UBAC31	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 6**

Unit –I Fundamentals of Economics

Business Economics – Meaning – Definition – Nature – Scope – Role of business economics - Scarcity and Efficiency – Fundamentals of economic problem – Central economic problem – Relationship of business economics with other disciplines –Opportunity Cost - Production Possibility Frontires (PPF) – Productive Efficiency Vs Economic Efficiency – Economic growth & stability – Micro economics and Macro economics – Positive and Normative economics – Economic cycle

Unit –II Demand and Supply Analysis

Meaning – Definition – Nature – Scope – Function - Law of Demand – Expectation to the law of demand – Determinants of demand – Elasticity of demand – Factors influencing elasticity of demand - Demand Schedule and demand curves – Advertising and Demand – Advertising Elasticity of demand – Factors affecting advertising elasticity of demand – Demand Forecasting – Meaning – Methods – Significance- Supply - Meaning – Definition – Nature – Scope – Function - Law of Supply – Supply curve – Determinants of supply – Contraction and expansion of supply – Increase and decrease in supply – Elasticity of supply –Determinants of Elasticity of supply

Unit – III Theory of Production and Cost Function

Meaning – Definition – Function – Continuous aggregate production function – Cobb Douglas production function – Translog production function – Use of production function in Decision –making –Law of production – Law of variable

proportion – Least Cost Combination Principle – Limitation – Cost Function – Theory of cost – Basic concepts – Short –run Total cost curve – Fixed and variable cost – Semi-variable cost – Total cost- Average and marginal cost

Unit – IV Market Structure and Competition

Market – Meaning – Definition – Classification of markets – Perfect and Imperfect market –Different market structure - Competition – Perfect competition – Feature of perfect competition – Monopoly – Features of monopoly – Discriminating monopoly – Degree of monopoly – Social cost of monopoly - Monopolistic competition – Features of monopolistic competition – Oligopoly – Characteristics of oligopoly

Unit –V Introduction to Macro Economics

Money –Meaning – Definition – Function – Measurement of money supply – Demand and supply of money - Money market Demand and supply – Money market equilibrium – Inflation –Impact – Reason for inflation – Inflation Vs Unemployment tradeoff – National Income – Definition – Concept of national Income – Computation of national income – Difficulties in measurement of national income – National income and Real income -

Text Book

1. P.L.Mehta, *Managerial Economics*, New Delhi, Sultan chand & sons, 2016.

Books for Reference

2. S . Shankaran, *Managerial Economics* Chennai, Margham Publications, 5th Edition, 2016
3. Karl E. Case and Ray C. fair, *Principles of Economics*, New Delhi, Pearson Education Asia, 12th edition, 2014.

4. A. H. L. Ahuja, *Business Economics* New Delhi, S.Chand, 11th edition, 2013
5. Paul A. Samuelson, William D. Nordhaus, Sudip Chandhuri and Anindya Sen, *Economics* New Delhi, Tata McGraw Hill, 19th edition, 2010.
6. G.S.Gupta, *Macro Economics*, New Delhi, McGraw Hill Education, 2017.

SEMESTER IV			
Core – VI Quantitative Techniques For Managers			
Course Code:21UBAC41	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits:6**

Objectives:

- To create a responsive and sustainable statistical system.
- To provide excellent training in scientific data collection, data management, methods and procedures of data analysis.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the meaning, nature and methods of data collection.	1	Un
CO-2	determine the approximate location of the median and quartiles.	6	An
CO-3	describe the characteristics of the correlation coefficient.	4, 6	Ap
CO-4	determine the sample as a voluntary response sample or a convenience sample.	1, 6	An
CO-5	determine the approximate location of the median and quartiles.	6	An
CO-6	describe the characteristics of the correlation coefficient.	4, 6	Ap
CO-7	state the assumptions of inference about the regression model.	1	An, Cr

CO-8	find the method of sharing gains in productivity with workers by rewarding them financially	5	An, Re

SEMESTER IV			
Core – VI Quantitative Techniques For Managers			
Course Code:21UBAC41	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits:6**

Unit I Simulation:

Simulation – Types of simulation – Steps – Advantages – Disadvantages - Stochastic Simulation and Random Numbers - Monte Carlo Simulation - Random Number Generation - Simulation of Inventory Problems - Simulation of Queuing Problems - Simulation of Investment Problems - Simulation of Maintenance Problems

Unit II Transportation Problem:

Introduction - Mathematical Model of Transportation Problem - General Mathematical Model of Transportation Problem - The Transportation Algorithm - Methods for Finding Initial Solution - North-West Corner Method (NWCM) - Least Cost Method (LCM) - Vogel's Approximation Method (VAM)

Unit III Linear Programming

Introduction - Definitions - Graphical Solution Methods of LP Problems - Extreme Point Solution Method - Maximization LP Problem - Minimization LP Problem - Mixed Constraints LP - Alternative (or Multiple) Optimal Solutions - Unbounded Solution - Infeasible Solution – Redundancy

Unit IV Operations Research

The History of Operations Research - Definitions of Operations Research - Features - Operations Research Approach to Problem Solving - Models and

Modelling in Operations Research - Advantages of Model Building - Methods for Solving Operations Research Models - Methodology of Operations Research - Advantages - Opportunities and Shortcomings - Features of Operations Research Solution - Applications of Operations Research - Operations Research Models in Practice – Computer software for operations research

Unit V Probability

Sample space and Events, Simple and Compound Events, Probability and Probability distributions: Normal Distribution, Binomial and Poisson Distribution.

Text Book:

1. N.D.Vohra, *Quantitative Techniques in Management,* New Delhi,Mc Graw Hill Education, 4th Edition.

Books for Reference:

2. J.K.Sharma, *Operations Research theory and application*, New Delhi,Macin Publication, 2017.

3. Hamdy Taha, *Operations Research*, United kingdom, Pearson education, 2019.

SEMESTER III			
NME I- Introduction to Management			
Course Code:21UBAN31	**Hrs/Week:2**	**Hrs/Semester:30**	**Credits:2**

Objectives:

- To impart the basic management knowledge, and skills to the students so as to enhance their managerial capabilities and enable them to apply in the practical field.
- Provide thorough knowledge on theoretical aspects and emerging trends and developments in management.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the meaning, nature and basic concepts of management.	1	Un
CO-2	understand the evolution of management	2	Un
CO-3	describe the diversity of management	4, 6	An
CO-4	understand the classical management theories of management	1,2	Un
CO-5	understand the behavioural and modern management theory	1,2	Un
CO-6	understand the functions performed by management	1,4,7	Ap
CO-7	describe the roles and responsibilities of a manager	1,4,7	An, Ap
CO-8	state the qualities and functions of a manager	1,4,7	An, Ap

SEMESTER III			
NME I -Introduction to Management			
Course Code:21UBAN31	**Hrs/Week:2**	**Hrs/Semester: 30**	**Credits:2**

Unit I Basics in Management

Introduction to Management-meaning –definition-Evolution of management-features of management-objectives of management-Importance of management –levels of management.

Unit II Diversity in Management

Management as a process – management as an activity – management as a discipline – management as a group- management as a science – management as an art- management as a profession-Difference between Management and Administration.

Unit III Contribution of Management

Theories in Management -Contributions – Eltan Mayo, Henry Fayol, F.W.Taylor

Unit IV Functions of Management

Planning: meaning –objectives –nature -Organising: meaning –nature – objectives-Staffing: meaning-objectives-functions -Controlling: meaning– characteristics -Directing: meaning- principles-Co-ordination: Meaning – features –techniques.

Unit V Role of Manager

Manager: Meaning –definition – role of manager: Interpersonal - Informational – Decisional-key responsibilities of a manager – qualities of a good manager – functions performed by a manager-Difference between worker and a manager.

Text Book:

1. L.M.Prasad, *Principles & Practice of Management* – New Delhi, Sultan Chand & Sons – 14th Edition 2020

Books for Reference:

2. C.B.Gupta - *Management Theory & practice,* NewDelhi, Sultan Chand & Sons, 5th Edition 2017

3. P.C. Tripathi& P.N Reddy - *Principles of Management,* NewDelhi, Tata McGraw Hill, 6th Edition 2010.

4. Weihrich and Koontz – *Management,* A *Global Perspective.,* NewDelhi, Tata McGraw Hill 14th Edition 2019.

5. N.Premavathy - *Principles of Management,* Chennai, Sri Vishnu Publication, 7th Edition 2003.

SEMESTER III			
CORE SB – Logistics Management			
Course Code :21UBAS31	**Hrs/Week : 4**	**Hrs/Sem :60**	**Credits :4**

Objectives

- To enable students to have knowledge in shipping field operation.
- To familiarize students on the various aspects of logistics.

Course outcome:

CO.No.	Upon completion of this courses, students will be able to	PSO addressed	CL
CO - 1	Understand the concept of logistics management and its evolution	1	Un
CO – 2	Impart the knowledge on logistics transportation	7	Un
CO – 3	Understand the importance of logistics to the economy	2	Re
CO – 4	Gain knowledge on performance measurement and logistics audit	5	Un,Cr
CO – 5	Provide knowledge on types of inventory	7	Cr
CO – 6	Know about supply chain management	2,4	Cr
CO – 7	Demonstrate about global logistics	3,5	Re

CO - 8	Describe about international distribution channel strategies	1	Ap

SEMESTER III			
Core SB - Logistics Management			
Course Code : 21UBAS31	**Hrs/Week :4**	**Hrs/Sem: 60**	**Credits :4**

Unit I Introduction to Logistics management

Logistics management – meaning – definition - The Evolution Of Logistics – Importance Of Logistic to the economic development - Current trends in Logistics- Logistics in the Supply Chain Context

Unit II Logistics Delivery and Fulfilment

Unitization, Palletization And Containerization –Cannel and water Transportation. Air Transportation - Road Transport - Rail Transport - Ports and Facilities – Inland container depot – Export clearance freight station

Unit III Costs and Performance Measurements

Performance measurement – meaning, internal and external, need system, level and dimensions, logistics audit –Procedure, Characteristics- total logistics cost –Concept, Accounting methods in logistics

Unit IV Logistics Strategy and Supply Chain Management

Logistics Strategy- Warehousing - Inventory- types –material handling – order

processing – supply chain management–Meaning, Characteristics, Essential, Process, Types, Elements- Logistics Intermediaries And Outsourcing

Unit V Global Logistics

Introduction - International Distribution Channels Strategies – Exporting – Licensing – Joint Ventures – Controlling Logistics Activity - Strategic logistics planning – green logistics - E logistics –Global logistics scenario - Technology in Logistics

Text Book:

1. Ganapathy , Nandi *Logistics Management*, New Delhi, Oxford University Press, 6 January 2015

Books for Reference:

2. Martin Christopher *Logistics and Supply Chain Management* Mumbai, FT Publishing international 5th edition.

3. Paul A Myerson *Lean Supply Chain and Logistics Management* New Delhi, MCGraw Hill, 1st Edition.

4. Doughan Lambert, *Fundamentals of logistics management* New Delhi, Mc Graw Hill, 1998

SEMESTER IV			
Core SB - Office Automation			
Course Code: 21UBAS41	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Objectives

- To provide basic understanding of office management and its procedures
- To train students in theoretical and practice skills of using and maintaining office equipments

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Understand the basic nature, scope, duties and responsibilities of office management	1,4	Un
CO-2	Understand scientific approach of office management	4	Un
CO-3	Know the importance of Office system procedures and effective communication process	1	Cr
CO-4	Analyze the office forms, design, management and control	2,3,5	An
CO-5	Understand office environment and building accommodation	1,8	Un
CO-6	Identify the difference between Electronic Records and Paper Analog	7	Re
CO-7	Evaluate modern tendencies in record makin	5	Ev
CO-8	Understand the concept of contributing growth in	1	Un

	office work		

SEMESTER IV			
Core SB - Office Automation			
Course Code: 21UBAS41	**Hrs/Week : 4**	**Hrs/Sem : 60**	**Credits : 4**

Unit - I Introduction to Office management

Office management - Meaning – Definition –Nature – Scope - Importance and functions –Elements –Types – Factors contributing the growth of office work – Effective management techniques –Scientific office management – Concept of 5S office management -Office manager –Role - Qualities - Duties- Responsibilities – Challenges -Functions –Relation of office with other departments

Unit – II Office Systems

Office systems – Meaning - Definition – Importance - Objectives–Planning and Designing –Advantages – Limitations - Characteristics of Well-Designed System - Various stages in computerising commercial system – Effective preparation of office manuals.

Unit – III Forms, Design, Management and Control

Office forms – Meaning – Definition – Types - Advantages - Disadvantages – Forms design – Methods – factors affecting forms design – Specimen Form - Forms Control – Steps – Factors Affecting form control.

Unit –IV Office Accommodation, Layout and Environment

Office Accommodation – Meaning – Definition – Principles –Office Environment – Safety and Health - Location of an office – Office Building - Office Layout – Office Lighting - System – Office Furniture –Types – Modular System furniture – Office Machine –Security Equipment - Principles and types of security equipment

Unit – V Office Records Management

Record Management – Meaning – Definition - Purpose and Importance – Process and Control - Role and Responsibilities – Policy - Electronic Records Vs Paper Analog – Record Management Equipment System - Record Life Cycle – Electronic Record System – Modern Tendencies in Record Making - Filing – Essential and Characteristics of Filing System – Classification and methods of files– Modern Methods of filing – Modern filing design – Centralized Vs Decentralized filing system

Text Book

1. V. Balachandran and Dr. V. Chandrasekaran, *Office Management* - Tata McGraw-Hill Companies,2009.

Books for Reference

2. S.P. Arora, *Office Organisation and Management* New Delhi, Vikas Publishing House Private Limited, 2018.
3. R.K.Chopra *Office Organisation and Management* Himalaya Publishing House, 2009.

SEMESTER III	
Self-Study/Online course: Personality Development	
Course Code:21UBASS1	**Credits:2**

Objectives:

- To realize the humanness and its inner strength.
- Enhance the capacity of understanding one's own personality and growth in self-actualization.

Course Outcome:

CO.NO.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	understand the importance of personality development	1	Un
CO-2	describe the emergence of goal setting in human life	1	An
CO-3	learn about self-monitoring	1	Un
CO-4	understand about perception and attitude.	4	Un
CO-5	know the knowledge on team building	5	An
CO-6	investigate on leadership style and conflict management	7	Ap
CO-7	understand and analyse the importance of communication	3	An,Cr
CO-8	learn the emergence of social graces.	8	Un,Ap

SEMESTER III	
Self-Study/Online course: Personality Development	
Course Code:21UBASS1	**Credits:2**

Unit -I Personality

Definition- Determinants**-**Personality traits- Theories of personality- Importance of personality development. Self-awareness- Meaning – benefits of self-Awareness- Developing self- Awareness. SWOT-Meaning-Importance –application-components-goal setting-Meaning- Importance Effective goal setting-Principle of goal setting-Goal setting at right level.

Unit-II Self Monitoring

Meaning-High Self-Monitor versus low self-monitor-Advantage and Disadvantage Self Monitor-Self-Monitoring and job performance. Perception-Definition-Factor influencing perception- perception process-Attitude-Meaning –Formation of Attitude-Type of Attitude-measurement of Attitude-Barrier to Attitude change-Methods to Attitude Change.

Unit-III Team Building

Meaning –Type of team-importance of team building-creating Effective Team. Leadership-Definition-Leadership style-Theories of leadership-Quality of effective leader. Negotiation skills-Conflict Management-Definition-Type of Conflict-Level of Conflict-Conflict Resolution-Conflict Management.

Unit-IV Communication

Definition-Important of communication-process of communication-Communication symbols-Communication Network-Barriers in communication- overcoming communication Barriers.Transactional analysis-Meaning EGO states-stress management-Meaning-Sources of stress-symptoms of stress-consequences of stress-Managing stress.

Unit-V Social Graces

Meaning-Social Grace at work-Acquiring social Graces. Table manners-meaning-Table etiquettes in Multicultural Environment-Do's and Don'ts of Table etiquette Dress code-Meaning- Dress code for selected Occasions-Dress Code for an interview. Group Discussion-Meaning- Personality traits required for group discussion-Process of Group Discussion-Group discussion Topics. Interview-Definition-type of skill-employer expectation-Planning of the Interview-Interview Questions critical InterviewQuestion.

Text Book:

1. Dr.Narayanan Rajan. S, Dr.Rajasekaran. B,Venkadasalapthi.G, Vijuresh Nayaham.V and Herald M.Dhas. *Personality Development*, Tirunelveli: publication Division, Manonmaniam SundaranarUniversity,

Books for Reference:

2. Stephen P. Robbins, *Organisational Behaviour*, New Delhi: Prentice Hall of India Private limited, Tenth Edition,2008.

3. Jit S. Chandan. *Organisational behaviour*, Delhi: Vikas publishing House PrivateLimited, Third Edition, 2008.

4. Dr. Ramachandran K.K. and Dr. K. Karthick. *From campus to Corporate*, NewDelhi: Macmillan Publishers IndiaLimited, 2010.

SEMESTER- I			
CORE III – QUANTITATIVE TECHNIQUES FOR ECONOMICS			
Code: 17PECC13	**Hours / Week :6**	**Hrs / Semester: 90**	**Credits :4**

Objective:

The main objective of this paper is to train the students to use the techniques of mathematical and statistical analysis, which are commonly applied to understand and analyze economic problems.

UNIT-1 FUNCTIONS AND DIFFERENTIATION **20 Hrs**

Concept of function and types of functions; Multivariable functions - Interpretation of revenue, cost, demand, supply and production functions - Limit, Continuity and derivatives - Rules of differentiation - Elasticity and their types - Rules of Partial differentiation and interpretation of partial derivatives.

UNIT II MATRIX AND DETERMINANT **15 Hrs**

Concept of Matrix and Determinant – their types, simple operations on matrices, matrix inversion and rank of matrix; Solution of simultaneous equations through Cramer's rule and Matrix inverse method- Introduction to input-output analysis

UNIT III PROBABILITY **15 Hrs**

Basic concepts and definitions of probability; Laws of addition and multiplication; Conditional probability; Bay's theorem (statement); Binomial, Poisson and Normal distribution

UNIT IV STATISTICAL ANALYSIS PROCEDURES **20 Hrs**

Types of data and statistical analysis procedures: Univariate, Bivariate and Multivariate (only overview); Hypothesis Testing procedure based on Z, t, x2 and F-test and one-way ANOVA.

Basic concepts of sampling- random and non-random sampling

UNIT V LINEAR PROGRAMMING **20 Hrs**

Linear programming – Basic concept, Nature of feasible, basic and optimal solution; Solution of linear programming problem through graphical and simplex method - Concept of a game; Two person Zero sum game; value of a game; strategies- simple and mixed; Dominance rule; Solution of a game by linear programming.

Reference Books:

- Quantitative Methods by D.R. Agarwal
- Basic Mathematics for Economists by R.C. Joshi, New Academic Publishing
- Croxton, F. E., D. Cowden and S. Klicin, Applied General Statistics, Prentice Hall, New Delhi.
- Gupta S.C. and V.K. Kapoor, Fundamentals of Applied Statistics, S. Chand and Sons New Delhi.
- Gupta S. C. Fundamentals of statistics, Himalaya Publishing house, New Dehlhi.
- Gupta S.P. and Gupta M. P. Business statistics, Sultan chand and sons, New Delhi.

SEMESTER – I			
CORE IV – MODERN BANKING			
Code: 17PECC24	**Hours / Week: 6**	**Hrs / Semester: 90**	**Credits: 5**

Objective:

To enable the students to learn the basic concepts of banking law and practice and help to the students to solve the problem while enhancing banking system

UNIT – I – INTRODUCTION

Origin of banks – Types of banks – Unit banking – Branch banking – Merits & Demerits. Modern banking – Meaning – Importance

UNIT– II BANKING INSTRUMENTS

Cheques – Meaning – Types – Crossing – Draft – Meaning – Comparison between Cheque and Draft – Endorsement – Meaning – Types

UNIT – III COLLECTING BANKER

Meaning- Duties – Paying Banker – Responsibilities – Bank lending – Principles of sound lending policy

UNIT – IV ELECTRONIC BANKING

Traditional banking vs Modern banking- E Banking – Meaning – Activities – Advantages and limitations- E-Banking in India

UNIT – V TRENDS IN E – BANKING

Online banking – Concept and meaning – Credit card & Debit card- Meaning, uses & Difference between Credit card & Debit card. Mobile banking – Virtual Banking – E Payments – Electronic Fund Transfer (EFT) – automatic Teller Machine (ATM) – Uses – Electronic Money Transfer – Uses of EMT.

Text Book: Banking Theory law and Practice – Prof. E.Gordon & Natarajan

Reference Books:

1.Banking Theory, law & Practice – P.N .Varshey.

2. Banking Theory& Practice – P.K. Srivastava.

3. E- Business – C.S. Rayudu.

SEMESTER- I			
CORE ELECTIVE I – MICRO FINANCE AND RURAL DEVELOPMENT			
Code: 17PECE11	**Hours / Week :6**	**Hrs / Semester: 90**	**Credits :4**

Objectives: This Paper gives an idea to the students regarding rural economy, their features, the problems of rural persons and artisans and their need for credit. It also explains the sources of rural credit.

UNIT-I: ROLE OF MICRO FINANCE 15Hrs

Concepts and definition of micro finance - History of micro finance - Role of Micro Finance in Economic Development - Micro Finance Institution – structure and functions of micro finance institution in India –micro credit-merits and demerits– impact of micro finance.

UNIT – II RURAL CREDIT INSTITUTIONS 20Hrs

Rural credit - institutional credit - Commercial Bank, Co-operative Bank, RRB, NABARD – Problems of Co-operative Credit society – Problems of Non institutional credit – Need for Micro Finance.

UNIT – III MICRO FINANCE AND POVERTY ALLEVIATION 15Hrs

Reasons for poverty in rural area – Role of micro finance in agriculture, entrepreneurial development, Employment generation and income enhancement – Problems of Micro Finance.

UNIT – IV MICRO FINANCE AND SELF HELP GROUP 20Hrs

Concept and meaning of SHG's – origin of SHG's – objectives – structure and nature of SHG's – functions of SHG's – production and marketing of the products of SHG's – SHG's and women empowerment – NGO's and SHG' - Evaluation of SHG's.

UNIT – V CURRENT AND FUTURE SCENARIO OF MICRO FINANCE 20Hrs

Experience of micro finance practices in developed and developing countries – Different phase of micro finance in India – SWOT of Micro Finance case studies - Growth of micro finance in Bangladesh, Highlights of Self Employed Women's Association (SEWA), Kalanjiam.

REFERENCE BOOKS:

1. Karmakar, K.G. (2000), "Rural Credit Self Help Group; Micro finance Need and Concepts in India Sage pub, New Delhi.
2. Lalitha (2003), "Main steraming Micro finance" Mohit Pub, New Delhi.
3. Lalitha (2003), "Microfinance and Rural Development Dominant Pub, New Delhi.

SEMESTER- II			
ELECTIVE – II – (IDE) - MANAGERIAL ECONOMICS			
Sub. Code: 17PHRE21	**Hours/ Week :6**	**Hours/ Semester: 90**	**Credits: 4**

Objectives:

To impart a basic knowledge of the concept and tools of Economics analysis as relevant for managerial decision making and to provide a fair understanding of the aggregate economic system within a firm operates.

UNIT – I: ROLE AND SCOPE OF MANAGERIAL ECONOMICS 20Hrs

Meaning, Nature and scope of Managerial Economics- Difference between Economics and Managerial Economics in Decision Making

UNIT – II: DEMAND, SUPPLY ANALYSIS AND FORECASTING 15Hrs

Demand- Law of Demand – Elasticity of Demand, Supply – Law of Supply- Demand forecasting – Techniques and Methods

UNIT – III: PRODUCTION, COST AND REVENUE ANALYSIS 20Hrs

Production function – Types – Returns to scale, Law of variable proportions, Cost – Types of cost, Revenue – Types of revenue.

UNIT – IV: MARKET STRUCTURE AND PRICING 20Hrs

Price and output decision under different markets – Perfect competition – Imperfect competition(Monopoly and Monopolistic Competition only)- Various types of pricing – Price strategy and policy.

UNIT – V: PROFIT PLANNING AND CAPITAL BUDGETING 15Hrs

Profit – Planning and strategies – Profit maximization conditions – Process – Capital Budgeting – Cost of capital, Capital rationing and profitability index.

Text Book: Mithani - Managerial Economics

Reference Books:

1. Joel Dean: Managerial Economics (Prentice Hall)
2. R.P.Maheswari and A.N.Gupta: Business Government and Society (Vikas, New Delhi)

Semester –I			
Core - I	**ADVANCED MICROECONOMIC ANALYSIS- I**		
Course Code: 21PECC11	**Hrs / Week: 6**	**Hrs / Semester : 90**	**Credits : 4**

Objectives:

- To understand the basic concepts of microeconomics.
- To focuses on analyzing the manner in which markets resolve the problem posed by a scarcity of resources.
- To analyze the behavior of consumers in terms of the demand for products,
- To analyze the performance of firms under different market structures,

Course Outcome:

CO. No	Upon Completion of this course students will be able to	PSO addressed	CL
CO - 1	identify and apply relevant terminology and concepts to economic issues and problems.	3	Ap
CO - 2	compare and contrast the market system of economics with other systems	4	Ap
CO - 3	use demand and supply models in the analysis of real world issues.	2	Kn
CO - 4	use market structure models to explain and to predict business firm behavior	6	Ap
CO - 5	use the theory of consumer choice to explain and to predict consumer behaviour.	5	Kn
CO - 6	evaluate the consequences of economic activities and institutions for individual and social welfare.	7	Ev
CO - 7	identify the basic features of alternative representations of human behaviour in economics.	4	Ev
CO - 8	analysis of the economic behaviour of individuals, firms and markets.	1 , 3	Ap

Semester –I			
Core - I	**ADVANCED MICROECONOMIC ANALYSIS- I**		
Course Code: 21PECC11	**Hrs / Week: 6**	**Hrs / Semester : 90**	**Credits : 4**

UNIT I: Introduction and Basic Concepts **15 Hrs**

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 **20 Hrs**

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 **20 Hrs**

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 **20 Hrs**

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. *Advanced Economic Theory*. New Delhi: Sultan Chand and Co. 2006

Books for Reference

1. Koutsoyiannis.A. *Modern Microeconomics.* London:Macmillan Press2nd edition 2008
2. Sen.A. *Micro Economics Theory and Applications.* New Delhi: Oxford University Press,1999
3. Stigler.G. *Theory of Price*. New Delhi: Prentice Hall of India, 4th edition 1996
4. Varian.H. *Microeconomic Analysis*.New York: W.W. Norton, 2000

Semester –I			
Core - II	**ADVANCED MACROECONOMIC ANALYSIS- I**		
Course Code: 21PECC12	**Hrs / Week: 6**	**Hrs / Semester : 90**	**Credits : 4**

Objectives:

- To identify the determinants of various macroeconomic aggregates
- To evaluate the determinants of international trade and financial flows.
- To provide students with a broad overview of the aggregate economy.
- To expose the theories of economic growth and theories of the business cycle.

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO - 1	analysis of the establishment of the functional relationship between the large aggregates.	7	Ap
CO - 2	understand the macroeconomic theoretical structure that is considered essential for the proper comprehension of the different issues and policies.	3	Ev
CO - 3	study of Macroeconomics and analysis of body of empirical economic knowledge.	6	Ap
CO - 4	understand the systemic facts and latest theoretical developments for empirical analysis.	5	An
CO - 5	identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.	4	Un
CO - 6	discuss the linkages between financial markets and the real economy, and how these linkages influence the impact of economic policies over differing time horizons.	7	An
CO - 7	describe the main macroeconomic theories of short term fluctuations and long term growth in the economy.	1	Ap
CO - 8	critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.	3	Re

Semester –I			
Core - II	**ADVANCED MACROECONOMIC ANALYSIS- I**		
Course Code: 21PECC12	**Hrs / Week: 6**	**Hrs / Semester : 90**	**Credits : 4**

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

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 **15 Hrs**

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

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

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 **20 Hrs**

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 **20 Hrs**

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

Text Book:

Maria John Kennedy. *Macro Economic Theory*. New Delhi: PHI Learning, 2012.

Books for Reference:

1. Glahe Fred.R. *Macro Economics: Theory and Policy*, New York: Harcourt Brace JovanovichInc, 2000.
2. Laidler.D.E.W. *Demand for Money Theory and Evidence*. New York:Dum-Don Valley,1999.
3. Romer. D.L. *Advanced Macro Economics*. New York: McGraw Hill Company Limited, 2nd edition 1996
4. Shapiro.E. *Macro Economic Analysis*. New Delhi: Galgotia Publications1998
5. Ackley.G. *Macro Economics: Theory and Policy*. New York: Macmillan Publication, 2nd edition 1996.

Semester– I			
Core - III	**STATISTICS FOR ECONOMISTS- I**		
Course Code: 21PECC13	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To introduce statistical methods and provide an insight into their uses in economics.
- To demonstrate application of a range of statistical techniques to economic problems.
- To understand that they will need to make informed decisions using data.
- To understand of the limitations of statistical inference and of the ethics of data analysis and statistics.

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO Addressed	CL
CO - 1	increase the skills in describing, analysing and interpreting statistical data	1	Le
CO - 2	make basic statistical calculations and critically evaluate the basis for these calculations;	8	Le
CO - 3	use graphical and numerical methods to calculate and illustrate descriptive statistics	2	Kn
CO - 4	identify the statistical concepts in questions about economic models	6	Ap
CO - 5	identify common problems which may affect regression analyses	4	Le
CO - 6	identify the appropriate regression model to apply to an economics dataset	2	Ap
CO - 7	manipulate the probability models that are most widely used in economics, and apply them correctly and carry out the appropriate statistical analysis	6	Kn
CO - 8	use the basic concepts of probability and bayes Theorem	7	Le

Semester– I			
Core - III	**STATISTICS FOR ECONOMISTS- I**		
Course Code: 21PECC13	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

UNIT-I: Measures of Averages and Dispersion **15 Hrs**

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 **20 Hrs**

Meaning, assumptions and limitations of simple correlation and regression analysis – Pearson's product moment and Spearman's rank correlation co-efficient – Concept of least squares and the regression lines

UNIT-III: Analysis of Time Series **15 Hrs**

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

UNIT-IV: Probability **20 Hrs**

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 **20 Hrs**

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.* New Delhi: S.Chand& Sons Ltd, 1st edition 2001

Books for Reference

1. Gupta, S.C., *Fundamentals of Applied Statistics.* New Delhi: S.Chand& Sons
2. Speigal. M.R., *Theory and Problems and Statistics*. London: McGraw Hill Book Co.,
3. R.S.N. Pillai & Bagavathi. *Statistics.* New Delhi: S.Chand &Company Ltd, 2006

Semester– I			
Core - V	**ECONOMICS OF FARM BUSINESS**		
Course Code: 21PECC15	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To explain the fundamental aspects of managing a farm business
- Interpret and analyse the financial and economic performance of a farm business
- Apply appropriate economic and financial techniques to analyse new farm investments
- Select and apply appropriate methods for analyzing risk and uncertainty involved in farm business decisions

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO - 1	apply economic principles to understand the conduct and performance of agricultural sector.	2	Ap
CO - 2	understand the causes of green revolution.	3	Kn
CO - 3	understand role and impact of institutional support to agricultural sector.	5	Le
CO - 4	be able to demonstrate an awareness of various agricultural market structures.	4	Kn
CO - 5	understand the role of pricing policy in agricultural sector.	8	Ev
CO - 6	be able to identify core principles of micro economics, especially related to agricultural production, cost analyses price and application of this is economics principles to selected farm management problems.	5	Kn
CO - 7	demonstrate strong conceptual knowledge of farm business	6	Re
CO - 8	develop critical thinking and problem solving skills applicable to farm business and management practices	7	Kn

Semester– I			
Core - V	**ECONOMICS OF FARM BUSINESS**		
Course Code: 21PECC15	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

UNIT-I: Principles of Farm Management **20 Hrs**

Meaning and Scope of Farm Management –Importance of the Subject of Farm Management In India. Principals Involved In Farm Management Decisions: Principle of VariableProportion - Cost Principle - Principles of Factor Substitution - Law of Equimarginal Return - Opportunity Cost Principle - Principle of Combining Enterprises

UNIT- II: Farm Resources **15 Hrs**

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 **15 Hrs**

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 **20 Hrs**

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 Marketable Surplus, Marketing Costs and Margin.

UNIT-V: Price Policy and Public Distribution **20 Hrs**

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*- New Delhi: Kalyani Publishers, 2nd edition 2006

REFERENCES:

1. A.N.Sharma and V.K.Sharma. *Elements of Farm Management*. New Delhi: Prentice-Hall ofIndia Pvt. Ltd, 3rd edition 2000.
2. Sadhu and Singh. *Fundamentals of Agriculture Economics*.Bombay: Himalaya PublishingHouse,1999
3. Earl.O.Heady. *Economics of Agricultural Production & resources.*New Delhi:Prentice Hall, 2008
4. Rudder Datt and K P M Sundaram. *Indian Economy*.New Delhi: S.Chand & Company Ltd, 3rdedition 2011

Semester– II			
Core- VI	**ADVANCED MICRO ECONOMIC ANALYSIS- II**		
Course Code: 21PECC21	**Hrs/Week: 5**	**Hrs/ Semester: 75**	**Credits: 4**

Objectives:

- To provide non-specialists economics student with a good introduction to the fundamental principles of microeconomics.
- To familiarize students to use the concepts to which they are introduced to facilitate analysis of the functioning of the micro economy.
- To analyse how individual decision-makers, both consumers and producers, behave in a variety of economic environments.

CO. No	Upon Completion of this course, students will beable to	PSO Addressed	CL
CO - 1	identify and apply relevant terminology and concepts toeconomic issues and problems.	7	Re
CO - 2	compare and contrast the market system of economicswith other systems.	8	Ap
CO - 3	use demand and supply models in the analysis of real-world issues.	4	Kn
CO - 4	use market structure models to explain and to predictbusiness firm behaviour	1	Un
CO - 5	use the theory of consumer choice to explain and topredict consumer behaviour.	2	Le
CO - 6	students will be able to evaluate the consequences of economic activities and institutions for individual and social welfare.	6	Un
CO - 7	students will be able to identify the basic features of alternative representations of human behaviour in economics.	5	Ap
CO - 8	analysis of the economic behaviour of individuals, firms and markets.	3	Kn

Semester- II			
Core VI	**Advanced Micro Economic Analysis- II**		
Course 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 theoryand 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 ofdistribution: 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 Minimaxstrategies – Equilibrium points (Saddle)

UNIT –V: Economics of Risk and Uncertainty **15Hrs**

Individual Behaviour towards risk, expected utility and certainty - Risk and Riskaversion competitive firms under uncertainty – Factor demand under price uncertainty –Economics of information – Search for New Market Models.

Text Book:

Kennedy, Maria John M. *Advanced Micro Economic Theory.* Bombay: HimalayasPublishing House, 2nd Edition 1999

Books for Reference:

1. Da Costa. *Prices and Distribution.* New Delhi: Tata McGraw Hill. G.C. Production,1980
2. Hirshleifer, J and A. Glazer .*Price Theory and Applications.* New Delhi: Prentice Hallof India, 1997
3. Stigler. G. *Theory of Price.* New Delhi: Prentice Hall of India. 4th Edition 2012.

Semester – II			
Core - VII	**ADVANCED MACRO ECONOMIC ANALYSIS- II**		
Course Code: 21PECC22	**Hrs/Week: 5**	**Hrs/ Semester: 75**	**Credits: 4**

Objectives:

- To learn the fundamentals of economics and they can apply these concepts to their lives and to the world in which they live
- To identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.
- To understand the prevailing economic and business policy in totality and its impact on the energy sector.
- To apply economic concepts to complex business realities as well as support them to forecast in the energy business.

CO. No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO - 1	analyse of the establishment of the functional relationship between the large aggregates.	2	Le
CO - 2	understand the macroeconomic theoretical structure that is considered essential for the proper comprehension of the different issues and policies.	4	Kn
CO - 3	study of Macroeconomics and analysis of body of empirical economic knowledge.	1	Kn
CO - 4	understand the systemic facts and latest theoretical developments for empirical analysis.	4	Un
CO - 5	students will be able to identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.	7	Kn
CO - 6	students will be able to discuss the linkages between financial markets and the real economy, and how these linkages influence the impact of economic policies over differing time horizons.	3	Le
CO - 7	students will be able to describe the main macroeconomic theories of short term fluctuations and long term growth in the economy.	6	Kn
CO - 8	students will be able to critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.	4	Ap

Semester – II			
Core - VII	**ADVANCED MACRO ECONOMIC ANALYSIS- II**		
Course Code: 21PECC22	**Hrs/Week: 5**	**Hrs/ Semester: 75**	**Credits: 4**

UNIT-I: Demand for Money and Supply of Money **15 Hrs**

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 **15 Hrs**

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 **15 Hrs**

Theories of Schumpeter, Kaldor, Samuelson and Hicks, Control of business cycles-Relativeefficacy of monetary and fiscal policies

UNIT-IV: Recent Developments in Macroeconomics **15 Hrs**

Monetarism Vs Keynesianism – Supply side Economics – New Classical Macro Economics –Rational Expectation

UNIT-V: Macro Economic Policy **15 Hrs**

Monetary policy – Fiscal policy – Incomes policy – Objectives – Instruments and Applications toDeveloping Economy

Text Book:

Maria John Kennedy. *Macro Economic Theory*.New Delhi: PHIL 2nd edition 2012

Reference Books:

1. Glahe, Fred, R *Macroeconomics Theory and Policy*.New York : Harcourt BraceJovanovich, Inc,1973
2. Laidler, D.E.W.*Demand for Money: Theory and Evidence*.New York: Dum-Don Valley,1977
3. Romer, D.L. *Advanced Macroeconomics*.New York: McGraw Hill Company Ltd., 1996
4. Ackley, G. *Macroeconomics: Theory and Policy*.New York : Macmillan PublicationsPvt.Ltd, 1978
5. Branson, W.A. *Macroeconomic Theory and Policy*.New York : Harper and Row,3rdedition 1989

Semester – II			
Core - VIII	**STATISTICS FOR ECONOMISTS- II**		
Course Code: 21PECC23	**Hrs/Week: 5**	**Hrs/ Semester: 75**	**Credits: 4**

Objectives:

- To introduce statistical methods and provide an insight into their uses in economics
- To develop the skills required to work effectively and inclusively in groups, as in a real work environment.
- To write effectively and communicate their ideas regarding Descriptive & Inferential statistics with clarity.
- To understand and know how to use statistics in their research work.

Course Outcome:

CO. No	Upon Completion of this course, students will beable to	PSO addressed	CL
CO - 1	increase the skills in describing, analysing and interpreting statistical data	1	Le
CO - 2	make basic statistical calculations and critically evaluate the basis for these calculations;	8	Le
CO - 3	use graphical and numerical methods to calculate and illustrate descriptive statistics	2	Kn
CO - 4	identify the statistical concepts in questions about economic models	6	Ap
CO - 5	identify common problems which may affect regression analyses	4	Re
CO - 6	identify the appropriate regression model to apply to an economics dataset	12	Un
CO - 7	manipulate the probability models that are most widely used in economics, and apply them correctly and carry out the appropriate statistical analysis	16	Kn
CO - 8	use the basic concepts of probability and Bayes Theorem	17	Le

Semester – II			
Core - VIII	**STATISTICS FOR ECONOMISTS- II**		
Course 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 controlcharts for variables and attributes – Concept of Reliability – failure rate and reliability functions – reliability of series and Parallel systems and other simple configurations – renewal density andfunctions.

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 simple procedure, the two phase method and the M technique with artificial variables.

UNIT-III: Quantitative Economics **15 Hrs**

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 – forecasting.

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.* New Delhi: S.Chand& Sons Ltd, 2nd edition 2001

Books for Reference

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
3. R.S.N. Pillai & Bagavathi. *Statistics*. New Delhi: S. Chand &Company Ltd,2nd edition, 2000

Semester– III			
Core - XII	**INDIAN ECONOMY**		
Course Code: 21PECC32	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India.
- In the post-Independence period, with particular emphasis on paradigm shifts and turning points.
- To develop all these themes, the course is divided into specific modules.

CO. No	Upon Completion of this course, students will be Able to	PSO addressed	CL
CO - 1	know the development process in India after independence	6	Le
CO - 2	understand the problems and measures in their contextual perspective	7	Kn
CO - 3	identify and analyse current issues	1	Le
CO - 4	analyse economic behaviour in practice	4	Ap
CO - 5	understand the economic way of thinking.	6	Kn
CO - 6	analyse historical and current events from an economic perspective.	3	Kn
CO - 7	write clearly expressing an economic point of view.	5	Kn
CO-8	create students ability to suggest of the various economic problems	7	Le

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:

Ruddar Datt & K.P.M. Sundaram. *Indian Economy*. New Delhi: R.Chand& Co.2008

Books for Referance:

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. Misra, S.K. and V.K.Puri.*Indian Economy*.Dhingra: Himalaya Publishing House, 16thedition 2005

Semester – III			
Core - XIII	**RURAL DEVELOPMENT**		
Course Code: 21PECC33	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits : 4**

Objectives:

- To get employment in the department of rural development and Panchyatraj of both State and Central.
- The objective of this course is to provide a detailed treatment of issues pertaining to rural development to those intending to specialize in this area.
- To familiarize students with the theory of rural development issues those are relevant to Indian countryside and enable them to understand and analyze the problems of rural development.

CO. No	Upon Completion of this course, students will Be able to	PSO addressed	CL
CO - 1	help in prediction, formulating suitable policies, simplify mass of figures, facilitate comparison ofdata ,learn software programmes to analyze the statistical techniques.	7	Le
CO - 2	understand different categories of rural development policies and programmes and itsimpact on rural poverty and unemployment.	2	Un
CO - 3	inculcate about the scope, importance and sources of micro finance, SHGS and womenempowerment.	8	Un
CO - 4	know the importance, structure, significance, resources of Indian rural economy.	3	Ap
CO - 5	learn basic mathematics to analyze and understand economic problem to estimate Marginal value, rate of change, maxima and minima value, profit maximization and cost minimization, consumer and producer surplus, etc..	7	Kn
CO - 6	know different theories of international trade and finance and its impact on Indianeconomy.	6	Le
CO - 7	understand the problem of rural sector, backwardness, income inequalities, regional imbalances, gender disparities and remedial measures.	5	Kn
CO - 8	understand the economic behaviour of consumers and producers at micro and macro level.	6	Re

Semester – III			
Core - XII	**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 Programmes15 Hrs

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)-Pradhan Mantri Gram SadakYojana (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*. NewDelhi:Sage publications, 2nd edition 1999

Reference Books:

1. M.J. Moseley. *Rural Development: Principles and Practice.* New Delhi: SagePublications 6th edition 2013
2. K. Sahu. *Rural Development in India*. New Delhi: Anmol Publications, 4th edition 2003
3. Todaro M.P. *Economic Development in III World.* New Delhi: Orient Long Man,3rdedition 1985
4. R. Chambers. Rural development. New Delhi: Putting the Last First, Longman,2ndedition 1983
5. Arora R.C *Integrated Rural Development in India*. New Delhi: S.Chand Publications,1stedition 1980.

Semester - IV			
Core - XVI	**MONETARY ECONOMICS**		
Course Code: 21PECC 41	**Hrs/Week: 6**	**Hrs/ Semester: 90**	**Credits: 4**

Objectives:

- To understand the functioning of the monetary system and the currency markets, and of theoretical basis of monetary and exchange rate policies**.**
- To gain the Knowledge and skills in the field of economic theory and practice of implementing monetary policy.
- The present course is designed to acquaint the students fully with the changing role of financial institutions in the process of growth and development.
- Money and banking constitute important components towards understanding of economics.

CO. No	Upon Completion of this course, students will Be able to	PSO addressed	CL
CO - 1	explain the role of short-term monetary policy, and the key strategies and techniques used	4	Le
CO - 2	describe the dimensions of performance and risk relevant to financial firms.	7	Kn
CO - 3	Calculate contemporary measures of monetary measures of performance and risk.	9	Kn
CO - 4	describe contemporary monetary risk management oversight processes	1	Le
CO - 5	manage cash, marketable securities, accounts receivable andinventory.	14	Kn
CO - 6	identify the major sources of short-term and long term monetary finance available to the firm.	12	Ap
CO - 7	analyse financial statements using standard financial ratios of liquidity, activity, debt, profitability, and market value.	3	Re
CO - 8	apply techniques to project financial statements for forecasting long-term financial needs.	2	Ap

Semester - IV			
Core - XVI	**MONETARY ECONOMICS**		
Course Code: 21PECC 41	**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

Reference Books:

1. Mitra, S. *Money & Banking*.New York: Random House, 2002
2. Chandler, L.V. *The Economics of Money and Banking*.New York : Harper & Row1989
3. S.M. Goldfeld Sayers. *Modern Banking*.New Delhi : Oxford University Press, 2nd edition2000
4. Smith, P.F.*Economics of Financial Institutions & Markets.*New Delhi: Prentice-Hallof Indiapvt. ltd, 3rd edition 2000
5. Gupta, S.B. *Monetary planning for India*.New Delhi: S. Chand & Company, Pvt.Ltd3rd edition 1990

SEMESTER – IV			
Core XIII	**English Language Teaching**		
Code : 17PENC42	**Hrs/Week :6**	**Hrs/Sem :90**	**Credits: 4**

Objectives:

- To train students in pedagogic skills required for teaching English
- To equip students with methods of teaching English at different levels

UNIT I Importance of teaching English as a second Language-English as an international, National language – English in post independence India

UNIT II Methods of Teaching – The grammar translation Method, The Direct Method, Approach, Method and technique- The Structural approach- The bilingual Method and the use of the mother tongue

UNIT III The Teaching of Poetry and Prose: Teaching Prose at the School level, Teaching Poetry at the Secondary and tertiary levels

UNIT IV Tests, Testing and Evaluation, The need for evaluation, Types of tests, Characteristics of a test, Testing the four skills, Technology for testing, Analyzing results

UNIT V Practical, Technology enabled teaching- power Point presentation: LCD&ICT enabled teaching

Prescribed Text : Teaching English, Approach, Methods and Techniques-N. Krishnaswamy, Lalitha Krishnaswamy.M (Reprinted 2007, 2008)

Books for Reference

1. Geetha Nagaraj: English Language teaching Approaches, Methods, Techniques. Regional

   Institute of English, Bangalore, Orient Longman.

2. N.Krishnaswamy, Lalitha Krishnaswamy: Teaching English Approaches, Methods and

   Techniques, (CIEFL Hyderabad) Macmillan.

3. C. Paul Varghese: Teaching English as a Second Language, New Delhi; Sterling

   Publishers, 1989.

4. Edmonton Software (Google Drive)

SEMESTER – IV			
Core XV	**World Literature in Translation**		
Code:17PENC44	**Hrs/Week :6**	**Hrs/Sem:90**	**Credits : 4**

Objectives:

- To enable students to recognize the ideologies and techniques of world's greatest writers
- To acquaint them with the best ideas of various Cultures

Unit I **Poetry**

Dante : Inferno (Cantos 15 & 17)

Baudelaire : Hymn to Beauty

Pablo Neruda : The Statue

Unit II **Prose**

Jean Paul Sartre : Preface to *The Wretched of the Earth*

The Bible (NRSV) : St. Paul's Letters to the Philippians

Unit III **Drama**

Anton Chekhov : The Cherry Orchard

Unit IV **Drama**

Kalidasa : Shakunthala (Trans. Barbara S.Miller)

Unit V **Fiction**

Franz Kafka : Metamorphosis

Leo Tolstoy : What Men Live By?

Books for Reference:

J.R. Brown : Sophocles

Wilke B. & Hurt J. : Literature of the Western World (Volumes I & II)

Willhardt, M. Parker : Who's Who in the Twentieth Century Poetry

U.E. Fermor : Frontiers of Drama

SEMESTER – IV			
Core XV	**World Literature in Translation**		
Code:17PENC44	**Hrs/Week :6**	**Hrs/Sem:90**	**Credits : 4**

Objectives:

- To enable students to recognize the ideologies and techniques of world's greatest writers
- To acquaint them with the best ideas of various Cultures

Unit I **Poetry**

Dante : Inferno (Cantos 15 & 17)

Baudelaire : Hymn to Beauty

Pablo Neruda : The Statue

Unit II **Prose**

Jean Paul Sartre : Preface to *The Wretched of the Earth*

The Bible (NRSV) : St. Paul's Letters to the Philippians

Unit III **Drama**

Anton Chekhov : The Cherry Orchard

Unit IV **Drama**

Kalidasa : Shakunthala (Trans. Barbara S.Miller)

Unit V **Fiction**

Franz Kafka : Metamorphosis

Leo Tolstoy : What Men Live By?

Books for Reference:

J.R. Brown : Sophocles

Wilke B. & Hurt J. : Literature of the Western World (Volumes I & II)

Willhardt, M. Parker : Who's Who in the Twentieth Century Poetry

U.E. Fermor : Frontiers of Drama

SEMESTER – IV			
Elective IV	**Psychology and Literature**		
Code : 17PENE41	**Hrs/Week : 6**	**Hrs/Semester: 90**	**Credits :5**

Objectives:

- To help students explore the relation between life and literature
- To deepen understanding of psychological theories in literary context

Unit I **Introduction**

Basic concept in psychology : Personality, Motivation, Frustration Defence Mechanism Heredity and Environment, Neurotic and Psychotic relations, Schools of Psychology & complexes

Wellek & Warren : Theory of Literature – Literature and Psychology

Unit II **Poetry**

S.T. Coleridge : The Rime of the Ancient Mariner

Robert Frost : Home Burial

Unit III **Prose**

Sigmund Freud : Creative Writers and Day Dreaming

Carl Gustav Jung : Psychology and Literature

Unit IV Fiction

D.H. Lawrence : Sons and Lovers

Unit V Drama

Sophocles : Oedipus Rex

Books for Reference:

Jessie Weston : From Ritual to Romance

James Frazer : The Golden Bough

Jane Gallop : The Daughter's Seduction, Feminism and Psychoanalysis

SEMESTER – I			
Elective I	**Computer Application**		
19PENE12 - A	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 3**

Vision: To equip students of literature with basic computer operational skills.

Mission : To provide a learning platform through electronic sources.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSOs addressed	Cognitive Level
CO-1	demonstrate basic computer operational skills	7	Ev, Cr
CO-2	update knowledge through electronic resources	3	Cr
CO-3	design the study material and enhance its effectiveness through presentation programme	10	Ap, Cr
CO-4	utilize their operational skills through the e- platform	10	Ev, Cr
CO-5	adapt the application skills in their career in future	9	Cr, Ev
CO-6	gain a working knowledge of computer	8, 10	Re
CO-7	transfer the manuscript into power point presentation mode	9, 10	Ev, Re
CO-8	use the resources of internet in a constructive way	10	U, Ap

SEMESTER – I			
Elective I	**Computer Application**		
Code : 19PENE11-A	**Hrs/week : 4**	**Hrs/sem : 60**	**Credits : 3**

Unit I Fundamentals of Computers – Characteristic Features of Computers – Classification of Computers

Unit II MS-WORD

Unit III MS-EXCEL – Entering Data – Essential Formulae and Functions
MS-POWERPOINT: Creating and Formatting Slides – Inserting Graphics, Film Clips and Sound Clips in Presentations – Printing the Contents of Slide in Presentations.

Unit IV INTERNET – Major Application of Internet: E-mail and Websites – Creating e-mail addresses – Sending and receiving e-mails – Browsing Websites, including multi-lingual-websites – Using Search Engines like GOOGLE – Downloading information

Unit V Creating Website Contents – Online Journalism and Online Newspapers – WEB as a Teaching- learning platform, Trends in e-Books and e-Readers

Book for Reference:

Norton, Peter. *Introduction to Computer 2nd Edition.* New Delhi: Tata McGraw-Hill Publishing Company Ltd., 1997. Print.

Beskeen, David. *Microsoft Office PowerPoint* 2007, *Illustrated Introductory*. June 26, 2007.
Print.

SEMESTER – II	
Elective IV	**English Language Teaching**

Code:19PENE22-A	Hrs/Week :4	Hrs/Sem :60	Credits: 3

Vision : To train students in pedagogic skills required for teaching English

Mission :To equip students with methods of teaching English at different levels

Course Outcome:

CO-No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	compare and contrast language structures and explain relationships between language and literature	1	An
CO-2	originate a uniquely practical and creative grasp of the English language	5	Cr
CO-3	develop pedagogic skills required for teaching English	8	Ap
CO-4	adapt methods of teaching English for different levels	5	Ap
CO-5	appraise the ways in which the content could be taught through whole class activities, pair work and small group or individual activities	3	An
CO-6	prepare themselves for a career	6	Ev
CO-7	develop artistic and innovative use of language	6	Ap
CO-8	enhance their literary and linguistic competence	8	Cr

SEMESTER – II

Elective IV	English Language Teaching		
Code 19PENE22- A	**Hrs/Week :4**	**Hrs/Sem :60**	**Credits: 3**

Unit I Importance of teaching English as a second Language, The Structural Approach, The Bilingual Method and the use of mother tongue.

Unit II Methods of Teaching – The Grammar Translation Method, The Direct Method

Unit III The Teaching of Poetry and Prose: Teaching Prose at the School level, Teaching Poetry at the Secondary and tertiary levels.

Unit IV Tests, Testing and Evaluation, The need for evaluation, Types of tests

Unit V Characteristics of a test, Testing the four skills, Technology for testing, Analyzing results.

Prescribed Text: Krishnaswamy.N., Lalitha Krishnaswamy.M., *Teaching English, Approaches, Methods and Techniques*, (CIEFL Hyderabad) Macmillan. (Reprinted 2007, 2008)

Books for Reference:

Nagaraj, Geetha., *English Language Teaching Approaches, Methods, Techniques*. Regional Institute of English, Bangalore, Orient Longman. Print.

Paul Varghese Paul.C., *Teaching English as a Second Language*, New Delhi: Sterling Publishers, 1989. Print.

SEMESTER III			
Core XI	**Study of the English Language**		
Code : 19PENC33	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Vision: To enable the students know about language that deals with the structure and word order of sentences.

Mission: To familiarize students with the basic goals and assumptions of Phonology.
To equip them with a sound knowledge of the phonological system.

Course Outcome:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	understand the phonological aspects of English Language	2	Un
CO-2	evaluate the relationship between phonetics and phonology.	5	Ev
CO-3	construct grammatically correct sentences	6	Cr
CO-4	imbibe an in depth knowledge of the phonology of the English language	3	Ap
CO-5	enhance writing competency	6	Cr
CO-6	categorise the different types of phonemes.	4	An
CO-7	identify the basic units of phonology.	4	An
CO-8	explain distinctive feature theory.	2	Un

SEMESTER III			
Core XI	**Study of the English Language**		
Code : 19PENC33	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I

Phoneme: Concept and definition. Different aspects of the phoneme, Phonetic, Phonological, psychological, etc.Principles of phonemic analysis, the concepts of opposition, Contrast, minimal pair, distribution (Complementary, Free variation), Phonetic similarity, neatness of pattern (or pattern congruity of symmetry), and economy.Discovery procedures.

Unit II

The distinction between phone, phoneme and allophone: relation between Phonetics and Phonology. Types of phonemes, Types of phonological systems.Problems in phonology and phonological analysis; vowel and consonant systems, suprasegmental system, under lying representation, phonological rules.

Unit III

Phonemic premises and procedures: (a) Modification of sound by environments analogous, identical and mutually exclusive. (b) Phonetic symmetry of sound systems; (c) Fluctuation of sounds and (d) Structural pressure on the interpretation of segments and/or sequences of segments. Alternative solutions in Phonemic analysis. Distinctive feature theory: binary vs. non-binary features, articulatory vs. acoustic features; Universal set of phonetic features.

Unit IV

Basic units of Phonology: Syllable, vowel and consonant. Macro segment and Micro segment, syllable peak, coda, onset and interlude, problems of demarcation of syllable boundary.

Unit V

Phonological system (as set of items, phonemes) and structure (the permissible arrangement of consonant and vowel phonemes, constraints on combinations, etc.) The concept of redundancy.

Text Book : Roach, Peter*, English Phonetics and Phonology: A Practical Course. n*.p: Routledge Publication, 2008. Print.

Books for Reference:

1. Fudge, Eric. C. *Phonology; Selected Readings.* London: Penguin, 1973. Print.
2. Hocket, C.F. *A Course in Modern Linguistics*. New York: Macmillan and Co., 1958.Print.
3. Hymn, Larry. M. *Phonology: Theory and Analysis*. New York: Holt Rinehart and Winston, 1975. Print.
4. Lass, Roger. *Phonology: An introduction to Basic Concept*. London: Cambridge University Press,1991. Print.

Pike, K.L.*Phonemes: A Technique for Reducing Language to Writing*. n.p: University of Michigan Press, 1947.Pri

SEMESTER - I			
Elective I A	**Computer Literacy**		
19PENE11	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 3**

Vision: To equip students of literature with basic computer operational skills.

Mission : To provide a learning platform through electronic sources.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	demonstrate basic computer operational skills.	7	Un
CO-2	update knowledge through electronic resources.	8	Un, Ap
CO-3	design the study material and enhance its effectiveness through presentation programme.	6	Ap, Cr
CO-4	utilize their operational skills through e-platform.	10	Ev, Cr
CO-5	adapt the application skills in their career in future.	9	Ap, Cr,
CO-6	carry out computer-oriented projects.	5, 6	Cr
CO-7	acquire knowledge of the latest trends in Information Technology and assessment techniques.	6, 7	Un
CO-8	design teaching modules using multimedia	6	Ap, Cr

SEMESTER – I			
Elective I	**A**	**Computer Literacy**	
Code : 19PENE11	**Hrs/week : 4**	**Hrs/Sem : 60**	**Credits : 3**

Unit I Fundamentals of Computers – Input and output technologies- Software fundamentals-Programming Languages

Unit II Word Processing- Word environment-opening and creating a new document-proofing features- formatting text- working with shapes and lists-working with tables- working with pictures- working with headers and footers- using mail merge

Unit III HTML generations-line breaks- formatting tags-use of external style sheet-defining styles-use relative sizing- use numbered value for colour- Prezi

Unit IV Learning Tools- Learnerly – Writerly – Grammerely- Mendeley- Graphic representation of statistical data- social networking- mobile computing- big data and analytics- cloud computing

Unit V List of cyber crimes- cyber ethics-unethical behaviour-securing information privacy and confidentiality- internet ethics-advantages of cyber laws-electronic fund transfer – Plagiarism check tools.

Text Books:

1. Leon Alexis. I*ntroduction to Computers.* New Delhi: Vikas Publishing House Pvt.Ltd 2008. Print
2. Norton, Peter. *Introduction to Computer 2nd Edition.* New Delhi: Tata McGraw-Hill Publishing Company Ltd., 1997. Print.

Books for Reference:

1. Wendy, Willard. *HTML: A Beginners' Guide*, 4thed. New York: McGraw Hill,2009.
2. https://owl.english.edu.

SEMESTER - I			
Elective I B English Literature for Career Advancement			
19PENE11	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 3**

Vision: To give a bird's eye view of English Literature to students

Mission : To equip them with an in-depth knowledge required for NET/SET

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	demonstrate a broad knowledge of major and minor authors, major texts and contexts.	7	Un, Ap
CO -2	formulate an excellent foundation for a very wide range of careers.	8	Cr
CO -3	develop expertise ideally suited to a range of careers in the age of information.	6	An, Cr
CO -4	improve the objective knowledge of the subject required for the career paths.	10	An, Ev
CO -5	modify competencies necessary for success in the job market, or in furthering their academic career.	9	Ev, Cr
CO – 6	prepare themselves for a career.	5, 6	Cr
CO – 7	face NET/SET and other competitive examinations.	6, 7	Re, Ap
CO - 8	Appreciate and enjoy the rich cultural background and grandeur of English Literary trends.	6	Un, An

SEMESTER – I			
Elective I B	**English Literature for Career Advancement**		
19PENE11	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 3**

Unit I - The Anglo Norman Period (1066-1340)

Introduction to the Anglo Norman Period, Literature of the Anglo Norman Period, Anglo Norman Latin Chroniclers and Historians, Anglo Norman Brutt, Religious and Didactive Writing in the Anglo – Norman Period, Anglo Norman Poets, Anglo Norman Poetry, Anglo Norman Period, Anglo Norman Drama, Major Anglo Norman Romances

The Age of Chaucer (1340-1400)

Introduction to the age of Chaucer, Economic Background of the age, Religious Background of the age, Important Events of the age of Chaucer, Portrait of the Pilgrims in the Canterbury Tales, The Tales, The Miller's Tale: A Fabliau, The Clerk's Tale: A Folk Tale, William Langland, John Wycliff

Unit II - The Age of Revival (1400-1550)

Historical Introduction to the age of Revival, Literature of the age of Revival, Poetry in the age of Revival, New Court Poets, Prose Writings in the age of Revival, Other Writers and their Works, The Educationists of the age of Revival, Important Figures associated with the English Bible, Drama in the age of Revival, Important Dramatists, Other Writers of the age of Revival.

The Age of Elizabeth (1550-1625)

Historical Introduction of the Elizabethan Age, Influential Astronomers of the Elizabethan Age, Literature of the Elizabethan Age, Literary Trends of the Elizabethan Age, Main Poets of the Elizabethan Age, Main Dramatists of the Elizabethan Age, The Bard of Avon, Other Elizabethan Dramatists, Elizabethan Chroniclers and Antiquaries, Other Writers of Elizabethan Age, Works of Literary Criticism in Elizabethan Age

Unit III - The Puritan and Restoration Age (1625-1660)

Introduction to the Puritan Age, Historical Chronology of the English Civil War, Main poets of the Puritan Age , Cavalier Poets, Metaphysical Poets, Pre-Augustan Poets, Prose Writers of the Puritan Age, Restoration Age, Literary Trends of the Age, Other Writers of the Restoration Age, Diarists of the Restoration Age

Neo-Classical/Augustan Age (1700-1798)

Historical Introduction to the Neo-Classical Age, Social and Economic Background to the Augustan Age, Literature of the Augustan Age, Literary Trends of the Augustan Age, Important Periodicals of the Augustan Age, Literature of Sensibility, Major Poets and Novelists and Prose Writers of the Augustan Age, Late 18th century Writers of the Augustan Age, Major Philosophers of the Augustan Age.

Unit IV - The Romantic Age (1798-1837)

Historical Introduction to the Romantic Age, Major Poets of the Romantic Age, Second generation Romantics, Rise of the Gothic Novel in the Romantic Age, Jacobean Novel in the Romantic Age, Jacobean Novelists, Major Novelists of the Romantic Age, Prose Writers of the Romantic Age

The Victorian Age (1837-1901)

Historical Introduction to the Victorian Age, Conflict between Science and Religion in the

Victorian Age, Literary Movements of the Victorian Age, Prose Writers of the Victorian Age.

Unit V - Modern Age (1910-1945)

Introduction to the Modern Age, Social and Historical Background of the Modern Age, Literary Trends/Movements of the Age, Major Poets, Playwrights, Novelists and Writers of the Modern Age.

Contemporary English Literature (Post 1945)

Introduction- Contemporary Dramatists, Novelists and Poets

Text Books:

1. Masih K. Ivan, *et al. An Objective Approach to English Literature for NET, JRT, SLET and Pre-Ph.D.* New Delhi: Atlantic Publishers, 2007. Print.
2. Sukriti Sobti & Premlata Dhanker : UGC NET/SET (JRF&LS) English Literature Paper II & III Arihant Publications. Print.

Books for Reference:

1. Abrams, M.H. and Geoffrey Galt Harphan. *A Handbook of Literary Terms.* New Delhi: Cengage Learning, 2009. Print
2. Anderson, Robert and John Malcolm Brinnin. ed. *Elements of Literature.* New York: Holt, Rinehart and Winston Inc., 1952. Print.
3. Lodge, David. ed. *Modern Criticism and Theory*: *A Reader*. New Delhi: Pearson Education Ltd., 2004. Print.
4. Prasad, Hari Mohan and Uma Rani Sinha. *Objective English for Competitive Examination.* New Delhi: Tata MCGraw Hill Education Pvt.Ltd., 2011. Print.

Websites for reference:

1. www.merriam-webster.com
2. www.english-for-students.com
3. www.wordssmith.org
4. www.majortests.com

SEMESTER – I			
Elective II B	**Journalism and Mass Communication**		
Code:19PENE12	**Hrs/week : 4**	**Hrs/Sem : 60**	**Credits : 3**

Vision: To create a dynamic and working environment which nurtures new ideas, creativity, research and develops leaders and innovators in the domain of media

Mission: To help students enhance their writing and editing skills

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	acquire knowledge in the theories and principles of Journalism.	5	Un
CO-2	acquire hands-on experience in reporting, editing and other aspects of journalism.	6, 8	Ap, Cr
CO-3	develop their communicative skills in print media with emphasis on writing, interviewing, observing, reacting and synthesizing.	5, 6	Ap, Cr
CO-4	acquire experience in written analysis, reporting and data collection.	5, 7	Ap, Cr
CO-5	contribute to journals and magazines.	7, 8	Cr
CO-6	understand the legal, moral and ethical responsibilities inherent in a free press.	3, 4	Un
CO-7	acquire an awareness of the world around him, both social and political.	2, 3	Un
CO-8	create and design emerging media products, including blogs, digital audio, digital video, social media, digital photography, and multimedia.	5, 6, 8	Ap, Cr

SEMESTER - I			
Elective II B	**Journalism and Mass Communication**		
19PENE12	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 3**

Unit I - Introduction to Journalism

Introduction – Nature and Scope – Principles of Journalism – Definition – Career aspects of Journalism – Theories of Mass Communication – Kinds and effects of different media

Unit II - Reporting

Responsibilities and aptitudes of a reporter – Diversities in reporting – Interviews – News Features

Unit III - Editing

Duties – responsibilities and qualification of an editor – importance of editing- and techniques of editing – principles of editing – sources of copy – proof reading – page making- newspaper glossary

Unit IV - Writing

News Writing – tools and techniques – types of writing – feature writing – editorial writing – review writing – profile writing – comic strips - writing

Unit V - Technical Communication

Science and its public audience – Television and radio scripts – scripts for national developmental and scientific programmes – advertising – standards of technical communication – rules of technical writing

Textbook:

1. Kamath, M.V. *Professional Journalism*. New Delhi: Vikas Publishing House, 1980.
Print.

Books for Reference:

1. Ahuja, B.N. & S.S. Chabra, *Principles and Techniques of Journalism.* New Delhi: Surjee Publications, 1995. Print.
2. Gupta, O.M. & Ajay S. Jasra, *Internet Journalism in India*. New Delhi: Kankshka
Publishers, 2002. Print.
3. Hough, George A., *News Writing*. Boston: Houghtron Mifflin Co., 1991. Print.
4. Parthasarathy, Rangaswami. *Basic Journalism*. Madras: Macmillan,1984. Print.
5. Ravindran, R.K. ed., *Handbook of Mass Media*. New Delhi: Arnold Publications Pvt. Ltd., 1999. Print.

SEMESTER – II			
Elective III B	**Communication Skills**		
Code 19PENE21	**Hrs/Week :4**	**Hrs/Sem :60**	**Credits: 3**

Vision : To train students in pedagogic skills required for teaching English
Mission : To equip students to communicate effectively in various settings and contexts

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	display competence in oral, written and visual communication	2	Ap
CO-2	originate a uniquely practical and creative grasp of the English language	3	An
CO-3	demonstrate appropriate and professional ethical behaviour	2	Ap
CO-4	expose themselves to various forms of personal and professional communication	4	Un
CO-5	hone effective communication skills in a modern, globalised context	5	Cr
CO-6	prepare themselves for a career	6	Cr
CO-7	develop artistic and innovative use of language	8	Cr
CO-8	enhance their literary and linguistic competence	6	Cr

SEMESTER – II			
Elective III B	**Communication Skills**		
Code 19PENE21	**Hrs/Week :4**	**Hrs/Sem :60**	**Credits: 3**

Unit I The Process of Communication- Different Types of Communication- Oral Communication- different types- Barriers to Communication

Unit II Study Skills- Differences between technical and literary style –Developing effective listening skills-Improving comprehension skills

Unit III Written Communication- Report Writing- Different types of Report Writing- Job application

Unit IV Non – verbal communication and Body Language- Group discussion- Interview Techniques- Types of interviews – Appropriate use of non - verbal communication - Telephonic Conversation

Unit V Presentation Skills- e- skills - Power point presentation, Electronic presentation – Effective e-mail messages – Enhancing editing skills using computer software

Text Book:

1. Kumar, Keval., *Mass Communication in India*, Mumbai: Jaico Publishing House, 1994. Print.

Books for Reference:

1. Book I *Communication Skills*- CIEFL OVP, 1995. Print.
2. Book II *Academic Skills*- CIEFL OVP,1995. Print.
3. Freeman, Sarah., *Written Communication in English*, Chennai: Orient Longman, 1997. Print.
4. Swan, Michael., *Practical English Usage* ECBS OUS, 1983. Print.

SEMESTER III			
Elective V A	**Translation: Theory and Practice**		
Code : 19PENE31	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Vision : To introduce various theories of translation evolved worldwide besides giving a brief history of translation.

Mission : To make the students better translators and facilitate employability.

Course Outcome:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	C L
CO-1	evaluate the history of translation of works	4	Un
CO-2	apply the various theories and techniques of translation while translating a literary piece.	6	Ap
CO-3	locate and synthesise cultural complexities involved in translation.	8	Co
CO-4	evaluate the resultant change of meaning evolved in the process of translation.	2	Ev
CO-5	develop their ability to translate.	6	Re
CO-6	compile new terms of expression from different fields.	3	Re
CO-7	interpret the difficulties involved in translation.	5	Un
CO-8	evaluate personal language skills.	4	Ev

SEMESTER III			
Elective V A	**Translation: Theory and Practice**		
Code : 19PENE31	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Unit I - A Brief History of Translation

History of translation of works since early times - Development of translation as an art and science - Definition of translation - need and scope of translation - Types of translation - word to word, phrase to phrase and sentence to sentence level of translation, Bible Translation.

Unit II - Theories of Translation

Historical survey of the development of theories of translation – techniques and methods of translation of creative literature –translation of literature.

Unit III - Cultural Complexities in Translation

Change of Meaning – Subramania Bharathi's poems, Thirukkural.

Unit IV - Translation Directory

Terms – Science and Art – Dictionary of Administrative terms.

Unit V - Translation Practice

Passages from Literary Texts, skill components - Recipes,

Compeering, Master of ceremonies, Blurb (book), Film Reviews.

Text Book:

1.Venuti, Lawrence. The Translator's Invisibility: A History of Translation.

Routledge Publication, 2008. Print.

Books for Reference:

1. Catford, J.C. A Linguistics theory of Translation. London: Oxford University Press, 1967. Print.

2. Karunakaran, K and Jeyakumar, M. Translation as Synthesis New Delhi: Bahri Publication, 1987. Print.
3. Rekha Sharma.Translation Theory and Practice.Authors Press, 2015. Print.
4. Nida, Eugene. A and Charles R. Taber. The Theory and Practice. Boston:

Rominklijke Brill Leiden Publishers, 2003. Print.

SEMESTER – I			
Core I - British Poetry			
Course Code: 21PENC11	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

To familiarise students with significant poets of the British Literature.

To orient students with the moral and the cultural aesthetics of British Poetry.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO- 1	understand the unique features of British Poetry.	3	Un
CO- 2	comprehend the moral and aesthetic sensibility of British poetry.	1,8	Un
CO-3	discuss British poetry from the earliest era to the 20th century.	1,2	An
CO-4	critically analyse poems from the social, political and cultural perspectives.	1,2	An
CO-5	analyse the influence of varied cultures on the development of early British Literature.	3	An
CO-6	discuss literary texts in their social, political, historical and cultural contexts	2	An
CO-7	analyse the wide range of themes and styles of the representative poets.	1, 2	An
CO-8	develop their ability to interpret, analyse and evaluate poems.	2	Ev

SEMESTER – I			
Core I- British Poetry			
Course Code: 21PENC11	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits : 4**

Unit I

Geoffrey Chaucer (1343-1400)	:	The Prologue to 'The Canterbury Tales'
Edmund Spenser (1552-1599)	:	Amoretti- Sonnets (22 & 75)

Unit II

John Donne (1572-1631)	:	A Valediction: Forbidding Mourning
John Milton (1608-1674)	:	*Paradise Lost –Book I*
John Dryden (1631-1700)	:	Mac Flecknoe

Unit III

William Wordsworth (1770-1850)	:	Michael
Samuel Taylor Coleridge (1772-1834):		Dejection: An Ode
Percy Bysshe Shelley (1792-1822)	:	Ode to the West Wind

Unit IV

Matthew Arnold (1822-1888)	:	The Scholar Gypsy
D.G. Rossetti (1828-1882)	:	The Blessed Damozel
Robert Bridges (1844-1930)	:	Eros

Unit V

T.S. Eliot (1888-1965)	:	The Waste Land (Part I – The Burial of the Dead)
Wilfred Owen (1893-1918)	:	The Parable of the Old Man and the Young
W. H. Auden (1907-1973)	:	The Unknown Citizen

Text Books:

1. Lynch, Jack, ed. *The Oxford Handbook of British Poetry*. London: Oxford University Press, 2016.
2. Sen, Sudeep, ed. *The Harper Collins Book of English Poetry*. New Delhi: Harper Collins India, 2012.

Books for Reference:

1. Gardiner, Helen. *The Metaphysical Poets.* Michigan: Penguin Book, 1967.
2. Morris, Helen. *Elizabethan Literature*. London: Oxford UP, 1956.
3. Saintsbury, George. *Elizabethan Literature*. London: Macmillan and Co. 1887.
4. Stephen Meyer Howard Abrams, eds. *The Norton Anthology of English Literature. Vol.2.*New York: W.W. Norton, 2006.

E-Learning Resources:

1. Shires, Linda M. "Victorian' Poetry at the Present Time." *Victorian Literature and Culture*,vol.36, no.1, 2008, pp. 269–281. *JSTOR*, www.jstor.org/stable/40347606.26 Feb. 2021.
2. Green, Eugene. "The Voices of the Pilgrims in the General Prologue to the Canterbury Tales." *Style*, vol. 9, no. 1, 1975, pp. 55–81. *JSTOR*. www.jstor.org/stable/45108348. 15 Jan. 2021.

SEMESTER - I			
Core II	**British Prose**		
Course Code: 21PENC12	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

To facilitate students to gain insight into some of the unique contributions of Britishprose writers.

To enable students acquire analytical and critical ideas of the representative writers ofthe age.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO- 1	acquire a comprehensive knowledge of British prose.	1,3	Re
CO-2	gain a deeper understanding of the historical and cultural contexts of British prose pieces.	4,1	Un
CO-3	identify and describe the distinct literary characteristics of British prose.	2	Ap
CO-4	relate the greatness of major prose writers with significant literary traditions of their age.	1,4	An
CO-5	classify the dimensions of British literature in the universal context.	6	An
CO-6	evaluate the specific features of prose texts.	3, 4	Ev
CO- 7	communicate ideas related to the distinct characteristics of British prose.	8	Ev
CO- 8	get necessary impetus to study more representative prose writers.	1,2	Cr

SEMESTER – I			
Core II - British Prose			
Course Code: 21PENC12	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits : 4**

Unit I

Francis Bacon (1561-1626) : Of Marriage and Single Life
Of Simulation and Dissimulation

Jonathan Swift (1667-1745) : Tale of a Tub (Section II)

Unit II

Oliver Goldsmith (1728-1774) : Citizen of the World (The Tibbses)

Thomas De Quincey (1775-859) : On the Knocking at the gate in Macbeth

Unit III

Charles Lamb (1775-1834) : A Dissertation Upon Roast Pig

William Hazlitt (1778-1830) : On the Ignorance of the Learned

Thomas Carlyle (1795-1881) : Past and Present (Book I Proem: Chapters 5 & 6)

Unit IV

John Henry Newman (1801-1890) : Literature

John Ruskin (1819-1900) : Of Queen's Gardens (Sesame and Lilies)

Bertrand Russell (1872-1970) : Proposed Roads to Freedom (Chapter 8)

Unit V

L. P. Jacks (1860-1955) : On a Much Neglected Virtue (The Human End)

E. M. Forster (1879-1970) : What I Believe

Aldous Huxley (1894-1963) : Work and Leisure

Text Books:

1. Hazlitt, William. *Essays of William Hazlitt*. New Delhi: Nabu Press, 2008.
2. Lamb, Charles. *Charles Lamb's Essays*. New Delhi: Nabu Press, 2008.
3. Nayar. M.G. ed. *A Galaxy of English Essayists From Bacon to Beerbohm*. New Delhi: Macmillan India Ltd., 1986.

Books for Reference:

1. Greenblatt, Stephen, Meyer Howard Abrams, eds. *The Norton Anthology of English Literature*.Vol. 2. New York: Norton, 2006.
2. Muthaiah, V.S. *Modern Prose Selections.* Chennai: B.I. Publications, 1976.
3. Peppiatt, Michael. *Francis Bacon: Anatomy of an Enigma.* New York: Farrar, Straus and Giroux, 1997.
4. Sinha, Susantha. K. ed. *English Essayists*. Bangalore: Oxford University Press, 1987.
5. William, Haydn Noore. *English Prose Down the Ages.* Madras: Blackie & Son Ltd. 1973.

E- Resources:

1. Adams, Robert Martin. “Jonathan Swift, Thomas Swift, and the Authorship of ‘A Tale of a Tub.’ *Modern Philology*, vol. 64, no. 3, 1967, pp. 198–232. *JSTOR*, www.jstor.org/stable/436718.12 Dec. 2020.
2. Brooks, Christopher. “Goldsmith's Citizen of the World: Knowledge and the Imposture of ‘Orientalism.’ *Texas Studies in Literature and Language*, vol. 35, no. 1, 1993, pp. 124–144. *JSTOR*, www.jstor.org/stable/40755003. 23 Nov. 2020.
3. Dike, Clarence S. “The Humor of ‘Roast Pig.’” *The English Journal*, vol. 11, no. 5, 1922, pp. 288-292. *JSTOR*, www.jstor.org/stable/801881. 15 Jan. 2021.
4. Ulrich, John. “The Re-Inscription of Labor in Carlyle's ‘Past and Present.’” *Criticism*, vol. 37, no. 3, 1995, pp. 443–468. *JSTOR*, www.jstor.org/stable/23116609. 11 Feb. 2021.

SEMESTER – I			
Core III	**Indian Writing in English**		
Course Code: 21PENC13	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

To enable students to widen their knowledge of Indian Writing in English.

To acquaint the students with a wide spectrum of Indian writers in English.

Course Outcome:

CO. No.	Upon completion of this course, students will beable to	PSO addressed	Cognitive Level
CO- 1	perceive the values and human concern inherent in the Indian cultural context.	1,5	Re
CO- 2	acquire the philosophy of Indian theorists and intellectuals.	3,2	Un
CO- 3	analyse the major movements and writers of Indian Literature in English.	1	Un
CO- 4	learn the meaning of 'Indianness' through the study of the representative works.	1,2	Un
CO- 5	explore Indian identity, values and morals.	4	An
CO- 6	appraise the wide spectrum of Indian writing in English.	4	An
CO- 7	modify Indian sensibility and contrive new vistas to the issues at hand.	8	Ev
CO- 8	create literary sensibility and generate emotional response by reading Indian literary texts.	2,5	Cr

SEMESTER – I			
Core III	**Indian Writing in English**		
Course Code: 21PENC13	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Unit I - Poetry

Nissim Ezekiel (1924-2004) : Background Casually
Dom Moraes (1938-2004) : Letter to the Mother
Gieve Patel (b1940) : Nariyal Purnima
Vikram Seth (b1952) : From California

Unit II – Prose

Bhabani Bhattacharya (1906-1988) : Vivekananda's World Mission
Nirad. C. Chaudri (1925-1999) : The World's Knowledge of India since 1947
A.P.J. Abdul Kalam (1931-2015) : Patriotism beyond Politics and Religion

Unit III - Drama

Mahesh Dattani (b.1958-) : *Final Solutions*
Badal Sircar (1925 – 2011) : *Evam Indrajit*

Unit IV – Fiction

Gita Mehta (b.1943-) : *A River Sudra*
Deepak Unnikrishnan (b.1980-) : *Temporary People*

Unit V - Short Story

Mahasweta Devi (b1926) : Draupadhi
Jhumpa Lahiri (b1967) : When Mr. Pirzada Came to Dine (Self Study)
Aravind Adiga (b1974) : Last Christmas in Bandra

Text Books:

1. Bruce, King. *Modern Indian Poetry in English*. New Delhi: Oxford University Press, 2001.
2. Dattani, Mahesh. *Final Solutions*. New Delhi: Penguin India, 2005.
3. Mehta, Gita. *A River Sudra*. New Delhi: Penguin India, 2000.
3. Sircar, Badal. *Evam Indrajit*. New Delhi: Surjeet Publications, 2018.
4. Unnikrishnan, Deepak. *Temporary People.* New Delhi : Penguin India, 2017.

Books for Reference:

1. De Souza, Eunice, ed. *Nine Indian Women Poets – An Anthology*.OUP, 1997.
2. Iyengar, K.R. Srinivasa. *Indian Writing in English*. New Delhi: Sterling Publishers, 1994.
3. Naik, M.K. *Aspects of Indian Writing in English*. Delhi: Macmillan, 1979.
4. Naik, M. K. et al., eds. *Critical Essays on Indian Writing in English*. Dharwar, 1968.
5. Naik, M. K. *History of Indian English Literature.* New Delhi: Sahitya Akademi,1982.
6. Peeradina, Saleem. *Contemporary Indian Poetry in English- An Assessment and Selection*. Macmillan Co. of India, 1972.

7. Sinha, Krishna Nandan. *Indian Writing in English*. New Delhi: Heritage Publishers, 1979.
8. Walsh, William. *Indian Literature*. London: Longman Group Ltd., 1990.

E-Learning Resources:

1. Amalendu, Bose. "Modern Indian Poetry in English". vol. 13, no. 1, JSTOR, 1970, pp. 51-59, www. jstor.org/ 21 Jan. 2021.

2. Parmar, Diren. (2019). "Mahesh Dattani's *Final Solutions:* an Analytical Study". vol. 8 no. 8, 2019, *IJHSSI,* www.ijhssi.org./ 12 Dec. 2021.

3. Sowmya, T.G. "Feminist Outlook in *That Long Silence* of Shashi Deshpande" vol. II, no. XIX, August 2016, Ashvamegh, www.ashvamegh.net/ 10 Jan. 2021.

SEMESTER – I			
Core IV	**American Literature**		
Course Code : 21PENC14	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Objectives:

To widen the knowledge of the students on the perceptions of the American writers about the social, cultural and the intellectual climate of the nation.

To study primary texts of American Literature with broader investigations into the conceptual, theoretical and cultural parameters of the literary history of the United States.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	locate the significance of the American literary tradition.	1,4,7	Re
CO-2	examine the works of the representative writers of American Literature.	1,2	Un
CO-3	articulate the historical and the socio-cultural background of American Literature.	3	Ap
CO-4	appraise the historical and literary contexts, genres, themes and ethical dimensions of the representative works of American literature.	4	An
CO-5	distinguish a diverse group of authors and reveal the evolving American experience and character.	1,3	An
CO-6	analyse the major movements and works of American Literature.	4	An
CO-7	evaluate the strengths and limitations of the major trends in American Literature.	5,7	Ev
CO-8	review the roles of gender, race, age, class, ethnicity and geography in creating American ethnic literature.	6,8	Ev

SEMESTER – I			
Core IV	**American Literature**		
Course Code: 21PENC14	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Unit I – Poetry

Walt Whitman (1819-1892) : As I Ebb'd with the Ocean of Life
Emily Dickinson (1830-1886) : I Measure Every Grief I Meet
Robert Frost (1874-1963) : Directive
Langston Hughes (1902-1967) : Afro-American Fragment
Sylvia Plath (1932-1963) : Colossus

Unit II - Prose

Ralph Waldo Emerson (1803-1882) : Self Reliance
Alain Locke (1886-1954) : The New Negro

Unit III - Drama

Amiri Baraka (1934-2014) : *A Black Mass*
Arthur Miller (1915-2005) : *Death of a Salesman*

Unit IV - Fiction

F. Scott Fitzgerald(1896-1940) : *The Great Gatsby*
Colson Whitehead (b.1969-) : *The Underground Railroad*

Unit V - Short Story

Edgar Allan Poe (1809- 1849) : The Black Cat
Herman Melville (1819-1891) : Bartleby the Scrivener (Self Study)
Flannery O' Connor (1925-1964) : A Late Encounter with the Enemy

Text Books:

1. Baraka, Amiri. *A Black Mass*. US: Marion Boyars, 2000.
2. Miller, Arthur. *Death of a Salesman*. London: Penguin Books, 1948.
3. Whitehead, Coleson. *The Underground Railroad*. New York: Penguin Random House LLC, 2016.
4. Fitzgerald, F. Scott. *The Great Gatsby*. London: Charles Scribner's Sons, 1925.

Books for Reference:

1. Baym, Nina, Wayne Franklin, Philip F. Gura, et al.eds. *The Norton Anthology of American Literature*. Shorter 7th ed. UK: W. W. Norton & Company, 2007.
2. Gray, Richard. *A History of American Literature*. West Sussex: Blackwell Publishing Ltd., 2012.
3. Oliver, Egbert S, ed. *American Literature: An Anthology (Vols. 1 & 2)*. Chennai: S. Chand & Company, 1967.
4. Parrington, Jr. Vernon L. *American Dreams: A Study of American Utopias*. Providence: Brown University, 1947.

E- Resources:

1. Kane, Joseph, and Joe Kane. *The Arthur Miller Journal*, vol. 4, no. 1, 2009, pp. 48–53. *JSTOR*, www.jstor.org/stable/42908974. 23. Feb. 2021.
2. Kelly, Adam. (2018). *Freedom to Struggle : The Ironies of Colson Whitehead. Open Library of Humanities.* 4. 10.16995/olh.332. 29 Nov. 2020.

SEMESTER – I			
Core V	**Eco Literature**		
Course Code: 21PENC15	**Hrs/week : 6**	**Hrs/Sem : 90**	**Credits : 4**

Objectives:

To provide students with the fundamental aspects of Eco Literature.

To create ecological perspective and eco-consciousness among students.

Course Outcome:

CO. No.	Upon completion of this course, studentswill be able to	PSO addressed	Cognitive Level
CO-1	understand the recent trends and theories in Eco Literature.	2,3	Un
CO-2	acquire an in-depth knowledge of the relationship between literature and the physical environment.	1,4	Un
CO-3	relate life and environment through literature.	1	Ap
CO-4	appreciate the literary value of Eco Literature.	2,3	Ap
CO-5	analyse Literature in its universal context of the environment.	4,6	An
CO-6	analyse and evaluate any work of art in eco-conscious perspective.	8,9	Ev
CO-7	explore the themes of Eco Literature.	1	An
CO-8	apply the current theories and analyse their impact on literature.	3	An

SEMESTER – I			
Core V	**Eco Literature**		
Course Code: 21PENC15	**Hrs/week : 6**	**Hrs/Sem : 90**	**Credits : 4**

Unit I Introduction to Ecological Studies

Cheryl Glotfelty (b 1958) : Introduction- *The Ecocriticism Reader*

Greg Garrard (b 1953) : *Ecocriticism* (Positions)

Unit II Poetry

Saint Francis of Assissi (1I81-1226) : Canticle of the Sun
W.B. Yeats (1865-1939) : Lake Isle of Innisfree
Sri Aurobindo (1872-1950) : To a Hero Worshipper
Khalil Gibran (1883-1931) : Song of the Rain

Unit III Drama

Henrik Ibsen : *An enemy of the people*

Samuel Beckett (1906-1989) : *End Game*

Unit IV Fiction & Short Stories

Ernest Hemingway (1899-1961) : *The Old Man and the Sea*
Sinclair Ross (1908-1996) : The Lamp at Noon
Jean Ryan (b 1955) : Survival Skills

Unit V Films

James Cameroon : Avatar

Ron Clements & John Musker : Moana

Text Books:

1. Beckett, Samuel. *End Game.* UK: Faber & Faber Publishers*,* 2009.
2. Hemingway, Ernest. *The Old Man and The Sea.* US: Scribner Book Company, 1952.
3. Synge, J. M. *The Aran Islands*. Illinois: Northwestern University Press, 1999.
4. *Avatar* Dir.by Cameroon, James. Twentieth Century Fox, 2009.
5. *Moana* Dir.by Clements.R and John Musker,.Walt Disney Studios, Motion Pictures, 2016.

Books for Reference:

1. Glotfelty, Cheryl& Fromm, Harold, eds. *The Ecocriticism Reader*. London: The University of Georgia Press, 1996.
2. Garrard, Greg. *Ecocriticism.* London: Routledge, 2004.
3. Synge, J. M. *The Aran Islands*. Illinois: Northwestern University Press, 1999.

E- Resources:

1. Adamson, Joni, et al., editors. *Keywords for Environmental Studies*. NYU Press, 2016. *JSTOR*, www.jstor.org/stable/j.ctt15zc5kw.
2. Gurko, Leo. "The Heroic Impulse in '*The Old Man and the Sea*.'" *The English Journal*, vol. 44, no. 7, 1955, pp. 377–382. *JSTOR*, www.jstor.org/stable/808247. 18 Feb. 2021.
3. Hopper, Keith. "A Sense of Place: W. B. Yeats and 'The Lake Isle of Innisfree'." *Geography*, vol. 93, no. 3, 2008, pp. 176–180. *JSTOR*, www.jstor.org/stable/40574283. 11 Jan. 2021.
4. Olk, Claudia. "'A Matter of Fundamental Sounds' — The Music of Beckett's Endgame.' *Poetica*, vol. 43, no.3/4, 2011, pp. 391–410. *JSTOR*, www.jstor.org/stable/43028518.09.Oct.2020.
5. Mambrol, Nasrullah. "Analysis of John Millington Synge's Plays" https://literariness.org/2019/05/09/analysis-of-john-millington-synges-plays/ 30567860. 12 Jan. 2020.
6. Kelsall, Malcolm. Synge in Aran. Pub. by Edinburgh University Press. Vol. 5, No.2 (Autumn 1975), pp. 250-270 *JSTOR*.https://www.jstor.org/stable/23477073

SEMESTER – II			
Core VI	**British Drama**		
Course Code : 21PENC21	**Hrs/week :5**	**Hrs/Sem : 75**	**Credits : 4**

Objectives:

To enable the students relish the taste of British Drama.

To enhance critical outlook on the representative dramatists.

Course Outcome:

CO.No.	Upon completion of this course, students will beable to	PSO Addressed	Cognitive Level
CO-1	get a comprehensive picture of the contemporary age.	3,4	Un
CO- 2	apply the concepts of British Drama in drafting a play.	3,8	Ap
CO- 3	analyse the representative plays in British Literature.	4	An
CO- 4	discuss the aesthetic, cultural and historical aspects of British Drama.	3,4	An
CO- 5	analyse the unique differences pertaining to the theme and stylistic features of British Drama.	5	An
CO- 6	evaluate the artistic and innovative use of language employed by the representative dramatists.	6,8	Ev
CO- 7	improve the skills of critical thinking, elucidation and effective writing.	3	Cr
CO-8	develop a critical outlook in analysing the plays.	2	Cr

SEMESTER – II			
Core VI	**British Drama**		
Course Code : 21PENC21	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I

Ben Jonson (1572-1637) : *The Alchemist*

Unit II

R. B. Sheridan (1751 – 1816) : *The Rivals*

Unit III

George Bernard Shaw (1856 – 1950) : *Pygmalion*

Unit IV

T. S. Eliot (1888 – 1965) : *Murder in the Cathedral*

Unit V

John Osborne (1929 – 1994) : *Look Back in Anger*

Text Books:

1. Eliot, T. S. *Murder in the Cathedral*. New York: Faber & Faber, 1938.
2. Jonson, Ben. *The Alchemist*. Glasgow: Good Press, 2019.
3. Osborne, John. *Look Back in Anger: A Drama*. New York: Penguin Books, 1982.
4. Shaw, Bernard. *Pygmalion*. Clayton: Prestwick House, 2005.
5. Sheridan, Richard Brinsley. *The Rivals: A Comedy*. UK: Bloomsbury Publications, 1823.

Books for Reference:

1. Gardner, Helen. *The Art of T.S. Eliot*. US: Faber Paperbacks, 1968.
2. Shaw, Bernard. *Androcles and the Lion: Overruled*: *Pygmalion*. HardPress Publishing, 2013.
3. Sheridan, Richard Brinsley, and Joseph night. *The Dramatic Works of Richard Brinsley Sheridan with an Introduction by Joseph Knight.* Oxford University Press, 1930.

E- Resources:

1. Avery, Helen P. "The Family Reunion' Reconsidered." *Educational Theatre Journal*, vol. 17, no. 1, 1965, pp. 10–18. *JSTOR*, www.jstor.org/stable/3204921. 12 Sep. 2020.
2. Reynolds, Jean. "Shaw's *Pygmalion*: The Play's the Thing." *Shaw*, vol. 36, no. 2, 2016, pp. 238– 255. *JSTOR*, www.jstor.org/stable/10.5325/shaw.36.2.0238. 01 Oct. 2020.
3. Shanahan, John. "Ben Jonson's 'Alchemist' and Early Modern Laboratory Space." *Journal for Early Modern Cultural Studies*, vol. 8, no. 1, 2008, pp. 35–66. *JSTOR*, www.jstor.org/. 15 Nov. 2020.
4. Thompson, William R. "Identifying Rivals and Rivalries in World Politics." *International Studies Quarterly*, vol. 45, no. 4, 2001, pp. 557–586. *JSTOR*, www.jstor.org/stable/3096060. 21 Feb. 2021.

SEMESTER II			
Core VII	**Approaches to Literary Criticism**		
Course Code: 21PENC22	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To introduce students to the diverse approaches of criticism.

To sharpen their critical perspectives of various trends.

Course Outcome:

CO. No.	Upon completion of this course, students will beable to	PSO addressed	Cognitive Level
CO-1	apply literary approaches for narrative, poetic and dramatic genres.	2,5	Ap
CO-2	develop critical perspectives of various trends.	2,5	Ap
CO-3	make use of critical approaches to interpret literary texts.	2,8	Ap
CO-4	apply approaches of criticism to literary analysis.	6	Ap
CO-5	analyse theories of various early approaches of criticism.	4	An
CO- 6	modify their perspectives of various trends in criticism.	4	Ev
CO- 7	assess the functioning of rhetoric and psychology in literature.	3	Ev
CO-8	interpret literary texts using literary theories.	2,5	Cr

SEMESTER II			
Core VII	**Approaches to Literary Criticism**		
Course Code: 21PENC22	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I Moral Approach

Introduction : Literature and Moral Ideals

Irving Babbitt (1865-1633) : "Genius and Taste"

Unit II Psychological Approach

Introduction : Literature in the Light of Psychological Theory

Geoffrey Gorer (1905-1985) : "Myth in Jane Austen"

Unit III Sociological Approach

Introduction : Literature and Social Ideals

Joseph Wood Krutch (1893-1970) : "The Tragic Fallacy"

Unit IV Formalistic Approach

Introduction : Literature as Aesthetic Structure

Cleanth Brooks (1906-1994) : "Keats' Sylvan Historian: History without Footnotes"

Unit V Archetypal Approach

Introduction : Literature in the Light of Myth

Gilbert Murray (1866-1957) : "Hamlet and Orestes"

Text Book:

1. Scott, Wilbur. *Five Approaches to Literary Criticism.* USA: Macmillan, 1966.

Books for Reference:

1. Bressler, Charles. *Literary Criticism: An Introduction to Theory and Practice*, London. Prentice Hall,1999.
2. Guerin, Wilfred , Labor, Earle et al. eds. *A Handbook of Critical Approaches to Literature.* New York: Oxford University Press, 2011.

E-Learning Resources:

1. Chabot, C. Larry, and C. Barry Chabot. "Jane Austen's Novels: The Vicissitudes of Desire." *American Imago*, vol. 32, no. 3, 1975, pp. 288–308. *JSTOR*, www.jstor.org/stable/ 26303124. 20 Feb. 2021.
2. Fiet, Lowell A. "'The Tragic Fallacy' Revisited." *Journal of Aesthetic Education*, vol. 10, no. 1, 1976, pp. 61–74. *JSTOR*, www.jstor.org/stable/3332009. 20 Feb. 2021.

Semester – II			
Core VIII	**Women's Writing**		
Course Code: 21PENC23	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To familiarise students with the nuances of women's writings in English.

To explore the ideologies of women writers across cultures.

Course Outcome:

CO. No.	Upon completion of this course, students will beable to	PSO addressed	Cognitive Level
CO-1	know the range of feminist perspectives on literature.	1,8	Re
CO-2	analyse women writers who wrote about womanhood and authorship, from the 16th to the 20th Century	2,7	An
CO-3	discuss the issues pertaining to social conflicts in women's writings.	4	An
CO-4	discuss the women writers who challenged gender stereotypes and questioned the patriarchal status quo.	4,6	An
CO- 5	explore the writers' philosophy, aesthetics and techniques.	4	Ev
CO-6	classify the changing role women have experienced culturally, sexually, and psychologically .	3	Ev
CO-7	explore the ideologies and nuances of women writers and their works.	1,2	Ev
CO- 8	explore the ideals of women writers across cultures.	1,6	Cr

SEMESTER – II			
Core VIII	**Women's Writing**		
Course Code: 21PENC23	**Hrs / Week: 5**	**Hrs / Sem: 75**	**Credits: 4**

Unit I - Poetry

Edith Sitwell (1887-1964)	:	A Mother to her Dead Child
Judith Wright (1915-2000)	:	Woman to Man
Gwendolyn Brooks (1917-2000)	:	A Sunset of the City
Carolyn Kizer (1925-2014)	:	Fearful Woman
Rita Dove (b 1952)	:	The Fish in the Stone

Unit II - Prose

Ruth Jhabvala (1927-2013)	:	Myself in India
Simone De Beauvoir	:	The Independent Woman (Chapter XIV)

Unit III -Short Stories

Eudora Welty (1909-2001)	:	Livvie is Back
Florence King (1936-2016)	:	Junior High

Unit IV -Drama

Lorraine Hansberry (1930-1965)	:	*A Raisin in the Sun*

Unit V -Fiction

Buchi Emecheta (1944-2017)	:	*The Joys of Motherhood*

Text Books:

1. De Beauvoir, Simone. *The Second Sex.* London. Vintage Publishers, 2011.
2. Emecheta, Buchi. *The Joys of Motherhood.* London. Alison and Busby, 1979.
3. Hansberry, Lorraine. *A Raisin in the Sun*. New York: Vintage Publications, 2004.

Books for Reference:

1. Prasad, Amar Nath. *Indian Writing in English: Past and Present.* New Delhi: Sarup & Sons, 2004.
2. Radhakrishan Pillai .G. *An Anthology of English Prose*. England: Cambridge University Press India, 2006.
3. Finke, Laurie A. *Feminist Theory, Women's Writing.* Ithaca: Cornell University Press.
4. Joannou, Maroula, ed. *The History of British Women's Writing, 1920-1945* Vol. 8. Hampshire: Palgrave Macmillan, 2013.

E- Resources:

1. Helaly, Mohamed. (2016). *Cultural collision and women victimization: A study of Buchi Emecheta's the joys of motherhood* (1979). 7. 70-80. 10.7813/jll.2016/7-1/10. 21 Jan 2021.

2. Prior, Pauline M. “The Death of a Child.” *The British Journal of Social Work*, vol. 11, no.3, 1981, pp. 315–327. *JSTOR*, www.jstor.org/stable/23698604. 12 Dec. 2020. Web Robolin, Stéphane. “Gendered Hauntings: ‘The Joys of Motherhood," Interpretive Acts, and Postcolonial Theory.” *Research in African Literatures*, vol. 35, no. 3, 2004, pp. 76 – 92. *JSTOR*, www.jstor.org/stable/3821295. 11 Nov. 2020.

Semester – II			
Core IX	**Religion and Literature**		
Course Code: 21PENC24	**Hrs /Week : 5**	**Hrs / Sem : 75**	**Credits :4**

Objectives:

To enable students understand the values of religion.

To impart ethical and didactic principles expounded in literary pieces.

Course Outcome:

CO. No.	Upon completion of this course, students will beable to	PSO addressed	Cognitive Level
CO-1	apprehend and accept all religions as traditional and cultural phenomena.	3,4	Un
CO- 2	focus on the plurality of religious voices and expressions.	1,2	Un
CO- 3	critically analyse the religious components in literature.	4	Ap
CO- 4	analyse the spiritual dynamics of interpersonal relationship between God and humans.	3	An
CO- 5	explore and interpret philosophical, psychological and cognitive dynamics of religion.	1,2	Ev
CO- 6	spot out the essential values of mankind.	4,5	Ev
CO- 7	evaluate the significance of literary works in shaping the society.	3,6	Ev
CO- 8	demonstrate how religious contexts influence the creation of literary works.	4	Cr

Semester – II			
Core IX	**Religion and Literature**		
Course Code: 21PENC24	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I Poetry

George Herbert (1593-1633) : The Collar
Francis Thompson (1859-1907) : Hound of Heaven
Mahmoud Darwish (1941 -2008) : In Jerusalem

Unit II Prose

Sri Aurobindo (1872-1950) : The Divine Teacher
The Bible : Book of Jonah
Quran : Surah Al – Hujurat (The Dwellings)
Surah Al- Isra (The Journey by Night)

Unit III Drama

John Milton (1608-1674) : *Samson Agonistes*

Unit IV Fiction

Hermann Hesse (1877 -1962) : *Siddhartha*

Unit V Short Stories

Anatole France (1844-1924) : Our Lady's Juggler
Sean O'Faolain (1900-1991) : Sinners
Sharla Guenther : Parable of the Talents (Self Study)

Text Books:

1. Hesse, Hermann. *Siddhartha*. India: Fingerprint, 2012.
2. Milton, John. ed. Verity A.W. *Samson Agonistes*. Cambridge: Cambridge University Press, 1893.
3. *Holy Bible*. New International Version, New York, Biblica, 2011.
4. *Holy Quran*. Translated by Talal Itani, Beirut.Clear Quran Dallas, 2001.

Books for Reference:

1. Detweiler, Robert. *Religion and Literature: A Reader.* Westminster: John Knox Press, 2000.
2. Gabel, John. *The Bible as Literature: An Introduction*. Oxford: Oxford University Press, 2005.
3. Sri Aurobindo, *Essays on the Gita*, Sri Aurobindo Ashram Press, Pondicherry, 1997.

4. Knight, Mark. *An Introduction to Religion and Literature*. New York: Continuum International Publishing Group, 2009.
5. Nandakumar, Prema. *Sri Aurobindo: A Critical Introduction.* New Delhi: Sterling Publishers Private Ltd., 1988.

E- Resources:

1. Buchen, Irving H. "Source-Hunting versus Tradition: Thompson's 'The Hound of Heaven.'" *Victorian Poetry*, vol. 2, no. 2, 1964, pp. 111–115. *JSTOR*, www.jstor.org/stable/40001255. 23 Feb. 2021.
2. Gordon, David J., and Barbara Leah Harman. "Herbert's 'The Collar.'" *PMLA*, vol. 94, no. 2, 1979, pp. 324–326. *JSTOR*, www.jstor.org/stable/461898. 18 Feb. 2021.
3. Mohamed, Feisal G. "Confronting Religious Violence: Milton's 'Samson Agonistes.'" *PMLA*, vol. 120, no. 2, 2005, pp. 327–340. *JSTOR*, www.jstor.org/stable/25486163. 25 Sep. 2020.
4. Scott, David Randall. "The Book of Jonah: Fore shadowing of Jesus as the Christ." *BYU Studies Quarterly*, vol. 53, no. 3, 2014, pp. 160–180. www.jstor.org/stable/43040012. 21 Oct. 2020.
5. Von Molnár, Géza. "The Ideological Framework of Hermann Hesse's 'Siddhartha.'" *Die Unterrichtspraxis / Teaching German*, vol. 4, no. 2, 1971, pp. 82–87. *JSTOR*, www.jstor.org/stable/3529722. 12 Jan. 2021.

SEMESTER – II			
Core X	**Psychology and Literature**		
Course Code : 21PENC25	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To help students explore the relation between life and literature.

To deepen the understanding of psychological theories in literary context.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	understand the depth and range of psychological theories.	1,3	Un
CO-2	understand the various types of development that an individual experiences in life.	1,6	Un
CO-3	demonstrate the understanding of human experiences through the study of literature.	5	Ap
CO-4	appraise how race, gender, class and sexuality influence the consciousness of human beings.	4	An
CO-5	analyse the texts based on psychological and literary theories.	1,3	An
CO-6	critically examine the relationship between life and literature.	3	Ev
CO-7	assess the ways in which various aspects of identity, subject positions and affiliations influence literary traditions.	4	Ev
CO-8	evaluate literary writings in the psychological perspective.	3,4	Ev

SEMESTER - II			
Core X	**Psychology and Literature**		
Course Code : 21PENC25	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit - I Introduction

Basic concepts in Psychology : Trauma, Defence Mechanism, Neurotic and Psychotic Relations

Carl Jung (1875-1961) : Psychology and Literature

Unit - II Poetry

Robert Browning (1812-1889) : My Last Duchess

Robert Frost (1874-1963) : Home Burial

Kamala Das (1928-2016) : The Dance of the Eunuchs

Unit - III Prose

Wellek & Warren : Theory of Literature – Literature and Psychology

Sigmund Freud (1856-1939) : Creative Writers and Day Dreaming

Unit - IV Drama

Edward Albee (1928-2016) : *Who's Afraid of Virginia Woolf?*

Unit - V Fiction

Sylvia Plath (1932-1963) : *The Bell Jar*

Text Books:

1. Albee, Edward. *Who's Afraid of Virginia Woolf*? New York, Pocket Books, 1963.
2. Ghiselin, Brewster. *The Creative Process: A Symposium.* New American Library, New York, University of California Press, 1952.
3. Plath, Sylvia, Fran McCullough, and Lois Ames. *The Bell Jar*: *Novel*. New York, Harper Perennial, 2006.

Books for Reference:

1. Frazer, James. *The Golden Bough*. London: Macmillan Publishers, 1980.
2. Gallop, Jane. *The Daughter's Seduction: Feminism and Psychoanalysis*. New York: Cornell University Press, 1982.
3. Weston, Jessie. *From Ritual to Romance*. New Jersey: Princeton Univ. Press, 1920.
4. Vijayarani S, Deva Prasanna D, eds. *An Introduction to Psychology and Literature.* Chennai: Emerald Publishers, 2014.

E- Resources:

1. Budick, E. Miller. “The Feminist Discourse of Sylvia Plath's the Bell Jar.” *College English*, vol. 49, no. 8, 1987, pp. 872–885. *JSTOR*, www.jstor.org/stable/378115. 20 Jan. 2021.
2. Holtan, Orley I. “‘Who's Afraid of Virginia Woolf?" and the Patterns of History.” *Educational Theatre Journal*, vol. 25, no. 1, 1973, pp. 46–52. *JSTOR*, www.jstor.org/stable/3205834. 15 Dec. 2020.
3. Person, Ethel Spector, et al., editors. *On Freud's "Creative Writers and Day-Dreaming"*. Yale University Press, 1995. *JSTOR*, www.jstor.org/stable/j.ctt2250vrw. 22 Jan. 2021.
4. Stone, Marjorie. “Constructing the Archive and the Nation in: ‘Italy! World's Italy!", ‘My Last Duchess," Aurora Leigh, and an Unpublished Manuscript by Elizabeth Barrett Browning.” *Victorian Review*, vol. 33, no. 2, 2007, pp. 35–57. *JSTOR*, www.jstor.org/stable/ 27793645. 02 Jan. 2021.

Semester III			
Core XI	**British Fiction**		
Course Code : 21PENC31	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To enable students to view and experience the world of British Literary Fiction.
To help students comprehend the varied dimensions and aesthetics of British fiction.

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	understand the social and cultural background of the British writers.	1	Un
CO-2	analyse the socio-cultural problems reflected in the novels	4	An
CO-3	acquire a comprehensive knowledge of the characteristic features of British fiction.	3	Un , Ev
CO-4	relate how the British language and ideology shape human understanding.	5	Un, Ap
CO-5	distinguish the uniqueness of British fiction from other literatures	3	Ap, Ev
CO-6	develop critical thinking and review of British writing.	2	Ev
CO-7 CO-7	analyse and evaluate the theme and the nuances of narrative techniques employed in British fiction.	1	An, Ev
CO-8	formulate creative and research writing.	7	Cr, An, Ap

Semester III			
Core XI	**British Fiction**		
Course Code : 21PENC31	**Hrs / Week :5**	**Hrs / Sem :75**	**Credits : 4**

Unit I

Thomas Hardy (1840 to 1928) : *A Pair of Blue Eyes*

Unit II

John Buchan (1875-1940) : *Prester John*

Unit III

Julian Barnes (b 1946) : *The Sense of an Ending*

Martin Amis (1949-2010) : *Night Train*

Unit IV

Rose Tremain (b 1943) : *The Road Home*

Unit V

Ken Follett (b 1974) : *The Pillars of the Earth*

Text Book:

Amis, Martin. *Night Train.* Random House, 2010.
Barnes, Julian. *The Sense of an Ending.* Jonathan Cape, 2011.
Buchan, John. *Prester John*. William Blackwood, 1910.
Follett, Ken. *The Pillars of the Earth*. Macmillan, 1989.
Hardy, Thomas. *A Pair of Blue Eyes*. Leipzig Bernhard Tauchnitz,1884.
Tremain, Rose. *The Road Home.* Little Brown & Company, 2011.

Books for Reference:

Bar-Ilan, Meir. "Prester John Fiction and History". *History of European Ideas*. Vol. 20, 2005, pp. 291–98.
Walezak, Emilie. *Rose Tremain: A Critical Introduction.* Palgrave Macmillan, 2017.
Harrer, Elizabeth Vamado. *A Study of Thomas Hardy's A Pair of Blue Eyes.*1949.

E Resources

https://esearch.sc4.edu/britishlit/web
https://guides.library.queensu.ca/english/websites/british-literature-by-period
https://www.britannica.com/art/English-literature

Semester III			
Core XII	**Recent Trends in Critical Theory**		
Course Code : 21PENC32	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives :

To introduce students to the recent trends in literary criticism.

To enhance the critical acumen of students towards the understanding of literary texts.

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO Addressed	Cognitive Level
CO-1	understand the theoretical implications of recent critics	1	Un
CO-2	comprehend criticism based on structural analysis	2, 3	Un, Ev
CO-3	analyze the critical standpoint of feminist critics	8	An
CO-4	explore new knowledge of cultural space and identity in literary texts	1	An
CO-5	apply the theories and approach to reading of literary texts with a different critical outlook.	1, 2	Ap
CO-6	analyze the role of the reader and responses to texts	3, 6	An
CO-7	interpret attitudes and prevalent notions of national and socio-cultural consciousness	4	Ev, Ap
CO-8	develop the faculty of analytical thinking and research for higher learning	8	An, Un

Semester III			
Core XII	**Recent Trends in Critical Theory**		
Course Code : 21PENC32	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I

Ferdinand de Saussure (1857-1913) : Nature of The Linguistic Sign
T.S. Eliot (1888-1965) : Function of Criticism

Unit II

F.R. Leavis (1895-1978) : Literary Criticism and Philosophy
Michel Foucault (1926-1984) : What is an Author?

Unit III

Edward Said (1935-2003) : Selections from Crisis in Orientalism
Stanley Fish (b 1938) : Save the World on Your Own Time

Unit IV

Helen Cixous (b 1937) : Sorties
Elaine Showalter (b 1941) : Criticism in Wilderness

Unit V

Frantz Fanon (1925 – 1961) : On National Culture
Homi K. Bhabha (b 1949) : Of Mimicry and Man

Text Book:

Bhaba, Homi K. *The Location of Culture*. Routledge Classics, 2017.

Lodge, David. *Modern Criticism and Theory*. Longman, 1988.

Books for Reference:

Barry, Peter. *Beginning Theory: An Introduction to Literary and Cultural Theory*.

Manchester University Press, 2002.

Rainbow, Paul. *Essential Works of Foucault (1954-1984)*. Oxford University Press, 1998.

E-Resources

https://warwick.ac.uk
https://interestingliterature.com

Semester III			
Core XIII	**Research Methodology**		
Course Code : 21PENC33	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To acquaint students with the fundamentals and mechanics of Research Methodology
To enable students to implement appropriate and competent methods of research writing

Course Outcome:

CO. No.	Upon Completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	define and compile the features of Research Writing	1	Un, Ap
CO-2	relate the aspects of creating documentation of a research paper	9	Ap, An
CO-3	develop the ability to identify the different forms of plagiarism and avoid them in research writing.	2, 9	Un, Ap
CO-4	practise and relate the mechanics of MLA style	1, 6	Ap, Ev
CO-5	organise the research paper coherently	8	Ap, Un
CO-6	classify the principles of documentation	9	An, Ev
CO-7	edit and proof read research articles	8,3	Ap, Un
CO-8	distinguish the overall knowledge on the techniques of documentation	6, 2	An, Ev

Semester III			
Core XIII	**Research Methodology**		
Course Code : 21PENC33	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit – I Formatting Your Research Project: (1.1 – 1.6, 1.13 – 1.16)

Margins-Text Formatting-Title-Running Head and Page Numbers-Internal Headings and Subheadings-Placement of the List of works Cited.

Unit – II Mechanics of Prose: (2.1 – 2.139)

Spelling (2.1- 3)-Punctuation (2.4 -59) Italics in Prose (2.60 - 63) Capitalization of Terms (2.64 -70) –Names of Persons in your Prose (2.71- 88) –Titles of Works in Your Prose (2.89-125) -Numbers (2.126 - 139)

Unit – III Documenting Sources: An Overview: (4.1 – 4.16)

Why Plagiarism is a Serious Matter -Avoiding Plagiarism-Careful Research- Giving Credit-When Documentation is Not Needed-Common Knowledge- Passing Mentions-Allusions-Epigraphs.

Unit – IV The List of Works Cited: (5.1 – 5.132)

Creating and Formatting Entries: An Overview -The MLA Core Elements-Author (5.3- 2) Title of Source (5.23-37) -Contributor (5.38-47) Version (5.48- 50) Number (5.51- 53) - Publisher (5.54- 67) - Publication Date (5.68- 83) Location (5.84- 99) -Ordering the List of Work Cited (5.123- 130) -Cross Reference (5.131)

Unit – V Citing Sources in the Text & Notes: (6.1 – 6. 62 & 6.78 – 7.4)

In-Text Citations (6.1-30) - Quoting and Paraphrasing Sources (6.31) -Integrating Quotations into Prose (6.32-42) -Placement of Parenthetical Citations (6.43-46) -Omitting Citations for Repeated Quotations and Terms (6.47)-Punctuation with Quotations (6.48- 53)-Capitalization with Quotations (6.54-57)-Using an Ellipsis to Mark Material Omitted from Quotations (6.58-62) -Citations in Forms Other Than Print (6.78- 82) -Notes(7.1-4)

Text Book:

MLA Hand Book Ninth Edition. The Modern Language Association of America, 2021.

Books for Reference:

1. Barzun, Jacques. *Simple and Direct: Rhetoric for Writers*. 4th ed. Harper, 2001.
2. Baskerville, R. *Risk Analysis as a source of Professional Knowledge*. Maxwell Publication, 2008.
3. *MLA Style Manual and Guide to Scholarly Publishing*. 3rd ed. MLA, 2008.
4. Smith, Charles K. *Styles and Structures: Alternative Approaches to College Writing*. Nortan, 1974.

Semester III			
Core XIV	**Canadian Literature**		
Course Code : 21PENC34	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To make students understand the avenues of Canadian Literature.
To help students understand the complexities of Canadian Multicultural Literature.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	demonstrate mastery of the history and background of Canadian Literature.	1, 4	Ap, Un
CO-2	develop comprehensive knowledge by combining theory with practical application	2,6	Ap, Cr
CO-3	develop an ability to recognize and identify the uniqueness of Canadian Literature	6	Cr, Ev, An
CO-4	analyse the themes of cultural identity with the socio-economic conditions of Canada.	4	An, Ev
CO-5	perceive, categorise, interpret and dramatise the characters, dramatic situations and devices used.	9	Un, An, Ap, Ev
CO-6	Appraise and distinguish the magnitude of Canadian literary genres with other Literatures.	2	Un, An, Ev
CO-7	make use of theory as a lens critically analysing the central aspects of Canadian culture and the complexities of Canadian society.	5	Un, Ap, An
CO-8	modify high-level applied, active learning experiences to bring out the new avenues for future research work.	8	An, Ap

Semester III			
Core XIV	**Canadian Literature**		
Course Code : 21PENC34	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I - Poetry

Standish O' Grady (1766-1840) : Winter in Lower Canada
Alexander McLachlan (1818–1896) : Song
Sir Charles G.D. Roberts (1860 –1943) : The Solitary Woodsman.
A.J.M. Smith (1902 –1980) : The Lonely Land
A.M. Klein (1909 –1972) : The Rocking Chair

Unit II -Prose

Margaret Laurence (1926 –1987) : Where the World Began
Margaret Atwood (1939 -) : *Survival*: Chapter Two 'Nature The Monster'

Unit III -Drama

Judith Thompson (1954 -) : *Lion in the Streets*

Unit IV- Fiction

Mitchell, W. O (1914 - 1998) : *Who Has Seen the Wind*

Unit V - Short Story

Alice Munro (1931 -) : Boys and Girls
Alison Mac Leod (1940 -) : The Thaw
Leon Rooke (b.1984 -) : The Woman Who Talked to Horses (Self Study)

Text Books:

Atwood, Margaret. *Survival: A Thematic Guide to Canadian Literature*. McClelland & Stewart Inc, 1996.
Dudek, Louis. *Twentieth Century Canadian Poetry*. Trikha Pencraft International, 1982.
Frye, Northrop. *The Bush Garden: Essays on the Canadian Imagination*. House of Anansi Press Incorporated, 1971.
MacLeod, Alison. *All the Beloved Ghosts*. Penguin, 2017.
Munro, Alice. "Boys and Girls". *Dance of the Happy Shades*. Ryerson Press, 1968.

Books for Reference:

Balachandran, K. *Critical Responses to Canadian Literature*. Sarup& Sons, 2004.
Begum, Jameela. Ed. *Canadian Literature: Perspectives*. Macmillan, 1994.
Naikar, Basavaraj. *Perspectives on Commonwealth Literature*. Sarup & Sons, 2004

E Resources

https://www.thecanadianencyclopedia.ca/en/article/literature-in-english
https://www.britannica.com/art/Canadian-literature/Modern-period-1900-60
https://www.bartleby.com/essay/Themes-In-Contemporary-Canadian-Literature-

Semester III			
Core XV	**South Asian Writings in English**		
Course Code : 21PENC35	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To explore the South Asian national literatures as a unique discipline.
To enable the students to gain insight into the socio-cultural issues of the nations

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO - 1	understand South Asian texts in the historical and cultural contexts.	1	Un
CO - 2	discuss various South Asian Literatures and their traditions.	3	Un, Ap
CO -3	report critically and creatively about the cultural politics of South Asian writings in English	7,8	Un, An
CO - 4	identify the linguistic, cultural, religious, racial and other differences among South Asian writers.	4, 5	Un, Ev
CO - 5	examine themes of colonialism, identity, assimilation and resistance in literary texts.	9	An, Ev
CO - 6	demonstrate an awareness of British imperialism and the experiences of immigration as reflected in South Asian writings.	2, 9	Ap, Cr
CO - 7	define different geographical and social aspects of South Asian countries.	4	Un
CO - 8	develop their critical responses to the reading of multicultural literatures.	3	Cr

Semester III			
Core XV South Asian Writings in English			
Course Code : 21PENC35	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I: Poetry

Mewlana Jalaluddin Rumi (1207-1273) : The Guest House
Kazi Nazrul Islam (1899-1976) : I Sing of Heroes
Kishwar Naheed (1940) : We Sinful Women
Imtiaz Dharker (b. 1954) : Choice

Unit II: Prose

Homi K. Bhabha (b.1949) : The Ambivalence of Colonial Discourse
Madhurima Chakraborty (b.1991) : South Asian Literature and the World: An Introduction (pp: 217-225)

Unit III: Drama

Ayad Akhtar (b. 1970) : *Disgraced*

Unit IV: Fiction:

Khaled Hosseini (b. 1965) : *The Kite Runner*
Shyam Selvadurai (1965) : *The Hungry Ghosts*

Unit V: Short Story

Thaslima Nasrin (b. 1962) : Exile: A Memoir Book
Fatima Bhutto (b. 1982) : Democracy

Text Books:

Akhtar, Ayad. *Disgraced.* 1st edition, Back Bay Books, 2012.

Bhabha, Homi. K. *The Location of Culture*. Routledge, 2012.

Hosseini, Khaled. *The Kite Runner.* Riverhead Books, 2003.

Selvaraj Shyam. *The Hungry Ghosts*. Viking, 2013.

Books for Reference:

Brass, Paul R. Ed. *Routledge Handbook of South Asian Politics: India, Pakistan, Bangladesh, Sri Lanka, and Nepal*. Routledge, 2010.

Brians, Paul. *Modern South Asian* Literature *in English*. Greenwood Press, 2003.

Bose, Sugata and Ayesha Jalal. *Modern South Asia: History, Culture, Political Economy.* 2nd ed. Oxford University Press, 1997.

Mookerjea- Leonard, Debali. *Literature, Gender, and the Trauma of Partition: The Paradox of Independence.* Routledge, 2017.

E-Resources

https://www.britannica.com/art/South-Asian-arts/Literature
https://hdomingocom.wordpress.com/2020/12/13/literary-themes-from-different-parts-of-the-world/

Semester IV			
Core XVI	**Shakespeare**		
Course Code : 21PENC41	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives:

To help students comprehend Shakespeare's unique vision and universality.
To equip students with the wide range of Shakespearean diction and literary forms.

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	demonstrate mastery of the discipline by understanding the social and intellectual background of Shakespeare.	1,2	Un
CO-2	analyse the cultural problems that reflect an insight into the relevant, historical, traditional and social contexts.	5	An
CO-3	infer a comprehensive knowledge of the dramatic and the poetic structures in Shakespeare's works.	2	Un, An,
CO-4	relate how language shapes human values, understanding and human identity.	4	An
CO-5	implement Shakespeare's works in the modern context– involving the structuralist, existentialist and linguistic approaches.	4,5	Ap
CO-6	dramatise Shakespeare's unique vision with special reference to the immortal characters he has created intuitively in the modern perspective.	5	An, Ap
CO-7	teach Shakespearean philosophy, aesthetics and techniques	7,8	Ap
CO-8	create an ability to reconstruct the dramatic and theatrical conventions of his craftsmanship and extend textual analysis to journalistic, commercial, technical, and web-based writing	6,7,8 ,10	Cr

Semester IV			
Core XVI	**Shakespeare**		
Course Code : 21PENC41	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I: Comedy

The Taming of the Shrew

Feminism in Shakespeare's Plays

Unit II: Historical play

Henry IV Part I

Politics in Shakespeare's Plays

Unit III: Problem Play

Troilus and Cressida

Problem Plays of Shakespeare

Unit IV: Tragedy

Othello

Antagonism in Shakespeare's Plays

Unit V: Dramatic Romances

Cymbeline

Songs and Music in Shakespeare's Plays

Text Books:

Bloom, Allan and Harry V. Jaffa. Shakespeare's Politics.1964 3rd Edition. Chicago University Press, 1981.

Novy, Marianne. *Shakespeare and Feminist Theory*. The Arden Shakespeare, Bloomsbury Publication, 2017.

Shakespeare, William. *The Complete Works of William Shakespeare*. Wordsworth Editions Ltd., 1997.

Books for Reference:

Bradley, A. C. *Shakespearean Tragedy*. Meridian Books,1955.

Brown, Russell John. *Shakespeare and his Comedies*. Routledge, 2014.

Margreta de Grazia and Stanley Wells. Ed. *The Cambridge Companion to Shakespeare*. Cambridge University Press, 2001.

Smith, Nichol. *Shakespeare Criticism: A Selection, 1623-1840*. Oxford University Press.1946.

Tillyard, E. M. W. *Shakespeare's Last Plays*. 3rd Impression Ed. Chatto and Windus, 1954.

Trevelyan, G.M. *English Social History*. Longmans Green and Company,1942.

E Resources

https://www.folger.edu/shakespeares-works
https://www.historic-uk.com/HistoryUK/HistoryofEngland/William-Shakespeare/
https://www.opensourceshakespeare.org/

Semester IV			
Core XVII	**Study of the English Language**		
Course Code : 21PENC42	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives

To enable students to know about the origin of English language and its evolution.

To familiarize students with the basic knowledge of theory and practice of forms and sounds in English language

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO s addressed	CL
CO-1	understand the influence of other languages in English	7	Un
CO-2	discuss in detail the change of meaning of words over a period of time	3,9	Un
CO-3	construct the vowel and consonant sounds using Phonetic symbols.	7	Ap
CO-4	use correct Stress and Intonation to speak English with good pronunciation.	3,7	Ap
CO-5	articulate words from different languages with the help of phonetic transcription	1, 7	Ap
CO-6	imbibe an in-depth knowledge of the phonology of the English language	3	Ap
CO-7	designate the place and manner of articulation of phonemes in the English language and categorize speech sounds into various types.	6, 3	An
CO-8	critically evaluate the significant contributions to the growth of the English language	9	Ev

Semester IV			
Core XVII	**Study of the English Language**		
Course Code : 21PENC42	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I

Place of English in the Indo-European Family of Languages
Middle English

Unit II

Spelling and Spelling Reform
Evolution of Standard English
Makers of English – Bible, Milton, Shakespeare

Unit III

Change of Meaning
Foreign Influences on English – Latin, French, Scandinavian

Unit IV

Basic units of Phonology: Syllable, vowel and consonant. Macro segment and Micro segment, syllable peak, coda, onset and interlude, distinction between phone, phoneme and allophone: relation between Phonetics and Phonology.

Unit V

Phonetics – Classification of Sounds – Vowels, Consonants, Cardinal Vowel, Pure Vowels – Diphthong- Transcription

Text Books :

Roach, Peter, *English Phonetics and Phonology: A Practical Course*. Routledge Publication, 2008.

Wood, F.T. *An Outline History of the English Language.* Laxmi Publications, 2014.

Books for Reference:

Baugh, A.C. *History of the English Language.* 6th ed. Routledge, 2012.
Daniel, Jones. *An English Pronouncing Dictionary.* 18th ed. Cambridge University Press, 2011.
Gimson, A.C. *An Introduction to Pronunciation of English.* 4th ed. Hodder Arnold,1989.

E - Resource

https://www.britannica.com/topic/Grimms-law
https://www.britannica.com/topic/Verners-law
https://www.britannica.com/science/phonetics

Semester IV			
Core XVIII	**Post-Colonial Writings in English**		
Course Code : 21PENC43	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives:

To help students explore the generic significance and concerns of Postcolonial writings.
To enable students, discern the psycho-social deliberations of Postcolonial writers

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyse the postcolonial texts in their historical and cultural contexts.	1, 4	An
CO-2	investigate the problems related to colonization and the challenges faced by early settlers.	4	Un, An
CO3	appraise and distinguish Postcolonial Literatures on the concepts of ambivalence, mimicry and hybridity.	9	Un, Ev
CO-4	develop a critical understanding of how literature can both uphold and resist the existing structures of power.	5	Un, Ap, An
CO-5	interpret the questions of human identity and values with a sense of intellectual independence.	5	Ap, An
CO-6	evaluate and locate the available resources for research works.	9	Ap, Ev
CO-7	analytically teach Postcolonial Literature in its relationship with culture, racism, migration and diaspora colonialism, nationalism, citizenship and cosmopolitanism.	8,9	Cr, An
CO-8	synthesize multiple sources of postcolonial research and extend a textual analysis	9, 10	Ev, An

Semester IV			
Core XVIII	**Post-Colonial Writings in English**		
Course Code : 21PENC43	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I - Poetry

David Diop (1927-1960) : Africa
Chinua Achebe (1930-2013) : Answer
Edwin Thumboo (1933 -) : Ulysses by the Merlion
Yasmine Gooneratne (1935-) : Big Match – 1983

Unit II – Prose

Ania Loomba (1955-) : *Colonialism/Postcolonialism*: Chapter One: Situating Colonial and Postcolonial Studies (7-24)
Frantz Fanon (1925-1961) : The Negro and Psychopathology

Unit III - Drama

Derek Walcott (1930 -2017) : *Dream on Monkey Mountain*

Unit IV - Fiction

Jean Rhys (1890 - 1979) : *Wide Sargasso Sea*
Yann Martel (1963-) : *Life of Pi*

Unit V - Short story

Nadine Gordimer (1923- 2014) : Once Upon a Time
Samuel Selvon (1923 –1994) : Johnson and the Cascadura
Rohinton Mistry (1952 -) : Auspicious Occasion (Self study)

Text Books:

Fanon, Frantz. "The Negro and Psychopathology," *Black Skin, White Masks*. Trans. C. L. Markmann, Pluto Press, 2008.
Gordimer, Nadine. *Once Upon a Time*. JUMP and other stories. Bloomsbury, 2003.
Narasimhaiah. C.D. *An Anthology of Commonwealth Poetry*. Macmillan India Press, 1990.
Selvon, Samuel. *Ways of Sunlight*. St. Martin's Press, 1957. Print.

Books for Reference:

Loomba, Ania. "Chapter One: Situating Colonial and Postcolonial Studies," *Colonialism/ Postcolonialism*. Routledge, 2004.
Margaret J.O' Donnell. *An Anthology of Commonwealth Verse*. Blackie & Son Ltd., 1963.
William, Walsh, Ed. *Readings in Commonwealth Literature*. Oxford University Press, 2015.

E- Resources

https://www.thebritishacademy.ac.uk/blog/what-is-postcolonial-literature/
https://blog.bookstellyouwhy.com/a-brief-history-of-postcolonial-literature-part-i
https://literariness.org/2016/04/06/postcolonialism/

Semester IV			
Core XIX	**Subaltern Literature**		
Course Code : 21PENC44	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives:

To familiarise students with the voices of oppression in literature

To orient and sensitize students on marginalization and the crisis of subalternity.

CO. No.	Upon Completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	comprehend the unique features of subaltern literature	1	Un
CO-2	discuss the contemporary subaltern writers and their key concepts.	2	Un, An
CO-3	identify the conflicting issues in Dalit movement.	4	Un, An
CO-4	analyse the cultural aspects of the marginalized people	1, 4	An
CO-5	examine the economic problems and oppression of the exploited.	5	An, Ev
CO-6	investigate the issues of gender, race, and identity crisis of the outcast.	5, 4	Ap, An, Ev
CO-7	develop their ability to recognize the psychic problems of the oppressed.	5	An, Un, Cr
CO-8	create an awareness about the social and political problems of the oppressed.	4, 10	Cr

Semester IV			
Core XIX	**Subaltern Literature**		
Course Code : 21PENC44	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I: Poetry

Langston Hughes (1901-1967)	:	The Negro Speaks of Rivers
Henry Kendall (1926-1999)	:	The Last of His Tribe
Kath Walker (1920 – 1993)	:	Song of Hope
Maya Angelou (1929 – 2014)	:	Still I Rise
Meena Kandasamy (1984 -)	:	One-Eyed

Unit II: Prose

Ngugi WaThiango (b. 1938)	:	*Decolonising the Mind*- The Quest for Relevance
Gayatri Spivak (b.1942)	:	Can the Subaltern Speak?
Chimamanda Ngozi Adichie (1977)	:	We Should All Be Feminists

Unit III: Drama

Ama Ata Aidoo (b. 1942)	:	*The Dilemma of a Ghost*

Unit IV: Fiction

E. R. Braithwaite (1912-2016)	:	*Honorary White*
Bama (b.1958)	:	*Sangati*

Unit V: Short Story

Prem Chand (1880 -1936)	:	The Thakur's Well
Saadat Hasan Manto (1912-1955)	:	A Tale of 1947
Chinua Achebe (1930-2013)	:	The Mad Ma

Text Books:

Aidoo, Ama Ata. *The Dilemma of a Ghost and Anowa*. 2nd edition, Longman, 1965.
Bama. *Sangati*. Oxford University Press, 2009.
Braithwaite, E. R. *Honorary White.* Open Road Media, Reprint Edition, 2014.
Thiango, Ngugi wa. *Decolonising the Mind: The Politics of Language in African Literature*. East
African Educational Publishers Ltd., 1986.

Books for Reference:

Ambedkar, B.R. "Annihilation of Caste." Dr. Babasaheb Ambedkar: Writings and Speeches. Vol. 1. Education Department, Government of Maharashtra, 1979. Chapters: 4, 6, and 14.

Bharathi, Thummapudi. Ed. *Telugu Dalit Poetry Today*. Sahitya Akademi, 2016.

Chaturvedi, Vinayak, ed., *Mapping Subaltern Studies and the Postcolonial*. Np, 2000.

Dipesh Chakrabarty, A Small history of Subaltern studies:2000. Habitation of Modernity: Essays in the Wake of Subaltern Studies. Chicago p, 2002.

Spivak, Gayatri Chakraborti. "Subaltern Studies: Deconstructing Historiography."

Ed. Ranjith Guha, *Writings on South Asian History and Society*. Vol IV. OUP, 1985.

E-Resources

https://searchworks.stanfor.edu/view/853370

https://mgkvp.ac.in.Lectures

SEMESTER – II			
Core Elective 1 English Language Teaching: Methods and Practices			
Course Code: 21PENE21	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Objectives:

To train students in pedagogical skills required for teaching English.

To equip students with methods of teaching English at different levels.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO- 1	perceive the pedagogical skills and the various approaches in learning English language.	3,7	Ap
CO- 2	adapt to different methods of teaching English .	6	Ap
CO- 3	develop the artistic and innovative use of language.	3,7	Ap
CO- 4	appraise the ways in which the content could be taught through whole class, small group and pair work or individual activities.	3	An
CO- 5	to assess the various teaching methods.	6	Ev
CO- 6	compare and contrast language structures and explain the relationship between language and literature.	7	Ev
CO- 7	design a practical and creative method of teaching the English language.	9,7	Cr
CO- 8	enhance their literary and linguistic competence.	6,8	Cr

SEMESTER – II			
Core Elective 1	**English Language Teaching: Methods and Practice**		
Course Code: 21PENE21	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Unit I

Origin of Language- Theories of language learning-The bow-wow theory, The ding-dong theory, The pooh-pooh theory and The gesture theory- Grimm's law – Verner's law.

Unit II

Methods and Approaches to English language Teaching: Direct method, The Situational Approach, Audio-lingual method.

Unit-III

Communicative approach, The Natural way, Suggestopedia, Total Physical Response, Functional-Notional approach.

Unit IV

The Teaching of Poetry and Prose: Teaching Prose at the School Primary, Secondary and Tertiary levels.

Tests, Testing and Evaluation: The need for evaluation, Types of tests, Characteristics of a test, Testing the four skills, Technology for testing, Analysing results.

Unit V

Technology enabled teaching, LCD & IT, Edmodo, CALL, MALL & Moodle Microteaching Method

Text Books:

1. Krishnaswamy.N., Lalitha Krishnaswamy.M., Teaching English, *Approaches, Methods and Techniques*, Hyderabad: Macmillan, 2008.
2. Wood, F.T. *An Outline History of the English Language*, Delhi, Macmillan India Limited, 1992.

Books for Reference:

1. Mowla, Shakila. *Techniques of Teaching English*, Hyderabad: Neelkamal Publishers, 2005.
2. Nagaraj, Geetha. *English Language Teaching Approaches, Methods, Techniques.* Bangalore: Orient Longman, 2008.
3. Varghese, Paul. C. *Teaching English as a Second Language*, New Delhi: Sterling Publishers, 1989

E- Resources:

1. Lin, Chih-Chung, et al. "Development and Usability Test of an e-Learning Tool for Engineering Graduates to Develop Academic Writing in English: A Case Study." *Journal of Educational Technology & Society*, vol. 20, no. 4, 2017, pp. 148–161. *JSTOR*, www.jstor.org/stable/26229213. 15 Dec. 2021.

2. Richards, Jack C., and Ted Rodgers. "Method: Approach, Design, and Procedure." *TESOL Quarterly*, vol. 16, no. 2, 1982, pp. 153–168. *JSTOR*, www.jstor.org/stable/3586789. 26 Feb. 2021

SEMESTER II			
Core Elective I	**Comparative Literature: Theory and Practice**		
Course Code 21PENE22	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits: 4**

Objectives:

To make students understand the nuances of comparing the literature of two different cultures.

To equip students with the techniques of Comparative Literature.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO- 1	learn the basics of Comparative Literature.	1,3	Un
CO- 2	understand different literatures of varied interests.	8	Un
CO- 3	apply the concepts learned in their day today life.	6,7	Ap
CO- 4	do research work on comparative literature.	8	Ap
CO- 5	analyse literary texts based on the theories learnt.	3,4	An
CO- 6	evaluate the significant features of different literatures.	1,2	Ev
CO- 7	develop a critical outlook towards the reading of books.	3	Ev
CO- 8	evaluate the relationship between Literature and other forms of cultural expression.	3	Ev

SEMESTER II			
Core Elective I	**Comparative Literature: Theory and Practice**		
Course Code 21PENE22	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits: 4**

Unit I

Definitions and History of Comparative Literature - Study of Influences – Study of Receptions- Schools of Comparative Literature

Unit II

Theories and Methods of comparative literary study – Principles of comparative literature

Unit III

Oriental and Occidental Literature – comparative study –Bharathiar's 'Kuil Pattu' and Shelley's 'Cuckoo'

Unit IV

Aesthetics-Eastern and Western

Unit V

Anita Desai's *Fire on the Mountain* and Toni Morrison's *Beloved*

Text Books:

1. Desai, Anita. *Fire on the Mountain*. London: Heinemann Publishers, 1977. Print.
2. Morrison, Toni. *Beloved*. New York: Knopf Publishers, 1987. Print.

Books for Reference:

1. Bassnett, Susan. *Comparative Literature: A Critical Introduction,* Oxford: Blackwell, 1993.Print.
2. Das, Sisir Kumar. *Comparative Literature in India: A Historical Perspective. Fundamentals ofComparative Literature*- ENNES Publications. Print.
3. Beebee, Thomas. *Comparative Literature Studies*. United States: Penn State University Press,1963. Print.

E- Resources:

1. Mix, Debbie. "Toni Morrison: A Selected Bibliography. *Modern Fiction Studies*, vol.39, no.3,1993, pp. 795-817. JSTOR, www.jstor.org/stable/26283479. 24 Feb. 2021. Web.
2. Khawaja, Mabel, et al. "Toni Morrison's Beloved." PMLA, vol. 112, no. 1, 1997, pp. 115–118. JSTOR, www.jstor.org/stable/463060. 26 Feb. 2021. Web.
3. Krishna, Francine E. "Anita Desai: Fire on the Mountain." Indian Literature, vol. 25, no. 5,1982, pp. 158–169. JSTOR, www.jstor.org/stable/23331120. 26 Feb. 2021. Web.

Semester III			
Core Elective II	**Translation: Theory and Practice**		
Course Code : 21PENE31	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

To introduce various theories of translation evolved worldwide
To make the students better translators and facilitate employability.

Course Outcome:

CO. No	Upon Completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the history of translation of works	4	Un
CO-2	apply various theories and techniques of translation while translating a literary piece.	6	Ap
CO-3	locate and synthesize cultural complexities involved in translation.	8	An
CO-4	analyse the resultant change of meaning evolved in the process of translation.	2	Ev
CO-5	develop the ability to translate.	6	Ap
CO-6	compile new terms of expression from different fields.	3	Cr
CO-7	interpret the difficulties involved in translation.	5	An
CO-8	Critically review the thematic and technical aspects of translated texts.	4	Ev

Semester III			
Core Elective II	**Translation: Theory and Practice**		
Course Code : 21PENE31	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I – What is translation?

Definition of translation - need and scope of translation

Types of translation - word to word, phrase to phrase and sentence to sentence level

Unit II - History of Translation

From Bible translation to Modern Age History

Unit III – Translation Theories and Theorists

Theories

Theorists: J.C. Catford, Eugene A. Nida and other theorists

Unit IV – Techniques and Methods of Translation

Lexical- Semantic - Syntactic

Unit V - Translation Practice

Passages from Literary Texts – Bharathiyar Poems, Thirukural, Short Stories, Haiku Poems

Skill components - Recipes, Compeering, Blurb (book), Film Songs and Reviews, Subtitles of films, Documentaries

Text Book:

Venuti, Lawrence. *The Translator's Invisibility: A History of Translation.* Routledge, 2008.

Books for Reference:

Baker, Mona. *In Other Words: A Course Book on Translation*. Routledge, 2018.

Hema, K. *Theory and Practice of Translation*. Shanlax Publications, 2019.

Malmkjaer, Kristen and Kevin Windle, eds. *The Oxford Handbook of Translation Studies*. Oxford UP, 2011.

Munday, Jeremy. *Introducing Translation Studies: Theories and Applications*. Routledge, 2001.

E-Resources

https://www.euppublishing.com/loi/tal

https://www.britannica.com/art/translation-literature

https://benjamins.com/catalog/hts.1

Semester III			
Core Elective II	**Basic Linguistics**		
Course Code : 21PENE32	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:
To develop a scientific approach to the study of English language.
To provide theoretical and practical basis for communicative competency.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	comprehend the basic nature and history of linguistics.	1	Un
CO-2	comprehend the properties of language and types of linguistics.	1	Un
CO-3	distinguish, evaluate and interpret Morphemes and Morphology.	4, 7	Un
CO-4	use methods of logical analysis in analyzing a wide variety of languages and dialects.	1	Un
CO-5	analyze human language in the context of linguistics, syntax, semantics, pragmatics, phonetics and phonology.	1	An
CO-6	able to transcribe speech from language.	4	Ev
CO-7	correlate sentences with syntactic and lexical structures of sentences of natural language.	7	Ev
CO-8	provide a broad interdisciplinary perspective on work in language to emphasize the connectedness and relevance of work to other fields.	3	Cr

Semester III			
Core Elective II	**Basic Linguistics**		
Course Code : 21PENE32	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I

Origin of Language
Properties of Language
Animals and Human Language
Language Varieties

Unit II - Morphemes & Morphology

Free and bound morphemes – derivational vs inflectional – morphological problems in description – morphs and allomorphs – word formation process

Unit III - Syntax & Semantics

Generative grammar – deep and surface structure – transformational rule –conceptual vs associative meaning – semantic features – lexical relations

Unit IV - Pragmatics

Speech acts – invisible meaning – context – deixis – reference – anaphora – presupposition

Unit V - Language and Society

Sociolinguistics –Applied Linguistics – Comparative Linguistics – Computational Linguistics - Stylistics

Text Books:

Fromkin, Victoria A. *Linguistics: An Introduction to Linguistic Theory*. Blackwell Publishing, 2000.
Yule, George. *The Study of Language*. Cambridge UP, 1985.

Books for Reference:

Gut, Ulrike. *Introduction to English Phonetics and Phonology*. Peter Lang, 2009.
Lieber, Rochelle. *Morphology and Lexical Semantics*. Cambridge UP, 2004.
Rogers, Henry. *The Sounds of Language: An Introduction to Phonetics.* Taylor & Francis, 2014.
Trudgill, Peter. *Sociolinguistics: An Introduction to Language and Society*. 4th edition. Penguin Books, 2000.

Semester III		
Self Study Course/MOOC (Compulsory) Travel Literature		
Course Code : 21PENSS31		**Credits : 2**

Objectives:

To enable students to an explorative self-study of travel literature.

To discover and experience the uniqueness of world culture and space.

Course Outcome:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	Cognitive Level
CO-1	comprehend the richness of travel literature.	4	Un
CO-2	locate and differentiate the socio-cultural spaces between texts.	8	Ap
CO-3	develop critical thinking and subjectivity of an observer.	6	An
CO-4	analyse the theoretical issues involved in using colonial and travel literature as a source.	2	An
CO-5	evaluate the concepts and issues such as race, gender, resistance and identity.	2	Ev
CO-6	interpret different historical methodologies and travel texts	5	Ap
CO-7	explore new avenues of travel literature.	8	Ap
CO-8	disseminate the acquired knowledge of the uniqueness of other cultures worldwide.	4	An

Semester III		
Self Study Course/MOOC (Compulsory) Travel Literature		
Course Code : 21PENSS31		**Credits : 2**

Unit I

George Orwell (1903-1950) – *Burmese Days*

Unit II

Wilfred Thesiger (1910-2003) - *Arabian Sands*

Unit III

Heinrich Harrer (1912-2006) - *Seven Years in Tibet*

Unit IV

Alan Booth (1946-1993) - *The Roads to Sata: A 2000 - Mile Walk Through Japan*

Unit V

Samanth Subramaniam - *Following Fish*

Text Books:

1. Booth, Alan. *The Roads to Sata: A 2000 - Mile Walk Through Japan.* The Penguin Group, 1986.
2. Harrer, Heinrich. *Seven Years in Tibet*. Translated by Richard Graves. Penguin Putnam Inc., 1953.
3. Orwell, George. *Burmese Days.* Harper, 1934.
4. Subramaniam, Samanth. *Following Fish*. Penguin India, 2011.
5. Thesiger, Wilfred. *Arabian Sands*. Introduction by Rory Stewart. Penguin Books, 1959.

Books for Reference:

Campbell, Mary Baine. "Travel Writing and Its Theory." *The Cambridge Companion to Travel Writing*. Ed. Peter Hulme. and Tom Youngs. Cambridge UP, 2002, 261-78.

Thompson, Carl. *Travel Writing*. Routledge, 2011.

Semester – I			
Elective – I Human Rights			
Code : 15PHIE11	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives

- To create an awareness about the importance of human rights.
- To orient the students' attitude towards better realization of their rights.
- To enrich the students about the existing exclusive rights for women.

Unit – I

Definition of Human Rights - Kinds of Human Rights –Natural –Political – Social- Economic – Cultural – Legitimacy: Natural – Historical – Moral –Legal.

Unit – II

French Revolution - Chartist Movement - Reform Bills – England.

Unit – III

UN Declaration on Human Rights - Fundamental Rights and Duties - Directive Principles of State Policy.

Unit – IV

Women Rights - Child Rights - Labour Rights - Refugee Rights - Prisoner's Rights.

Unit – V

Threats to Human Rights - Industrialization - Globalization - Consumerism – Terrorism.

Text Book

1. Mohanty, Jagannath, *Teaching of Human Rights*, Deep and Deep Publications, New Delhi, 2005.

Books for Reference

1. Baland, Jean – Marie (ed.), *Inequality, Cooperation And Environmental Sustainability*, Oxford University Press, New Delhi, 2007.
2. Basu, L.N., *Human Rights Practice and Limitations*, Printers Publishers, Jaipur, 2006.
3. Bhumali, Anil, *Globalization and Human Rights*, Serials Publications, New Delhi, 2006.
4. Ishay R. Micheline, *The History of Human Rights*, Orient Longman, Hyderabad, 2004.
5. Sharma, S.K., *World Crisis in Human Rights*, Sublime Publications, Jaipur, 2007.
6. Srivastava, Deep Kumar, *Human Rights in India*, Anubhav Publishing House, Allahabad, 2009.

Semester – IV			
Elective – IV Epigraphy			
Code : 17PHIE41	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 5**

Objectives

- To make the students realize the importance of epigraphical evidence.
- To enable the students to get employment opportunities in the museums.
- To make an awareness about collecting local inscriptions to update history.

Unit – I **Introduction**

Epigraphy : Meaning – Historical Value of Inscriptions – Kinds of Inscriptions – Hero Stones – Copper Plates.

Unit – II **Evolutions of Scripts**

Paleography – Pictogram – Ideogram – Logogram – Graffiti – Scripts in Tamilnadu: Tamil Brahmi – Vatteluthu – Grantha – Evolution of Tamil Script.

Unit – III **Inscriptions Through the Ages**

Estampage - Photocopy – Meykirti – Dating Methods – Eras: Kali Era – Saka Era – Kollam Era – Vikrama Era – Hijira Era – Dual Dating in the Pandya Inscriptions.

Unit – IV **Eminent Epigraphists**

George Buhler – J.F. Fleet – James Burgess – James Princep – H. Krishna Sastri – V.Venkayya – Robert Sewell – Hultzsch Eugen – K.V. Subramania Iyer – T.V. Mahalingam - Iravatam Mahadevan – D. C. Sircar.

Unit – V **Sample Study of Select Tamil Inscriptions**

1. Brahmi Inscription – Mangulam Inscription
2. Kalabhra Period – Poolankurichi Inscription
3. Pallava Period - Mandagapattu Inscription
4. Chola Period – Uttiramerur Inscription
5. Second Pandyan Empire – Tiruparankunram
6. Vijayanagar Period - Tiruengomalai Inscription
7. Pallava Copper Plates – Pallan Koil Copper Plates
8. Pandya Copper Plates – Velvikkudi Copper Plates

Text Book

1. Venkatraman, R., and Subrahmanian N., *Tamil Epigraphy – A Survey,Vol. I*, Ennes Publications, Madurai,1980.

Books for Reference

1.Hultzsch, E., *South Indian Inscriptions, Vol. II, Parts. I to V*, Indian Archaeological Department, New Delhi, 1983.
2.Minakshi, C., *Administration and Social Life under Pallavas*, Madras, 1967.
3.Pandarathar, Sathasiva, T.V., *History of Pandyas*, Madras, 1998.
4.Sircar, D.C., *Indian Epigraphy,* Motilal Banarsidass Publishers Private Limited, New Delhi, 1996.

Semester – II			
Elective III A	**India – The Making of a Colony**		
Sub Code : 19PHIE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Vision: Enhance the resistance of the Indians against the colonialism of the British.
Mission: Learn the ways and means of British Colonialism and its impact.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the factors behind the geographical discoveries.	1,2	Un, Re
CO-2	analyse the importance of geographical discoveries in Indian history.	4	An
CO-3	learn the different phases of the war for supremacy.	1,2	Un, Re
CO-4	evaluate the administration of Governor - Generals.	5	Ev
CO-5	analyse the British imperialist policy.	4	An
CO-6	understand the British revenue settlements.	1,2	Un, Re
CO-7	appreciate the reforms of British period.	1,2	Un, Re
CO-8	trace out the transfer of power from the British crown.	1,2	Un, Re

Semester – II			
Elective III A India – The Making of a Colony			
Sub Code : 19PHIE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Unit I - Sea route – Vasco da Gama – Portuguese Settlements – Dutch – Danish – French British Settlements – Battle of Plassey – Battle of Buxar.

Unit II - Carnatic Wars – Anglo-Maratha Wars – Anglo Mysore Wars.

Unit III - Lord Warren Hastings – Lord Cornwallis – Lord Wellesley – Lord William Bentinc
Lord Dalhousie – Lord Canning.

Unit IV - 1857 Revolt Causes – Course – Results

Unit V - Queen Victoria Proclamation – 1858 Act.

Text Book

1. Mahajan V.D. *History of Medieval India*. S. Chand & Company Ltd, New Delhi. 1986.

Books for Reference:

1. Agarwal, R.C. *Constitutional Development and National Movement*. S. Chand and Company, New Delhi. 1986.
2. Chand Tara. *History of the Freedom Movement in India Vol.II*. Ministry of Information and Broad Casting, New Delhi. 1983.
3. Mahajan V.D. *Constitutional History of India and the Nationalist Movement.* S. Chand and Company, New Delhi 1976.
4. Rao, Hanumantha, B.S.C., and Rao, Basaveswara K., *Indian History and Culture Vol. I* Sri Vignana Manjasha Publication, Gunter. 1976.
5. Sathianathaier R. *Political and Cultural History of India* Vol. *II.* S.Viswanathan Printers and Publishers, Madras. 1998.

Semester – II			
Elective IV A	**Archives Keeping**		
Sub Code : 19PHIE22	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Vision: To develop the skills of data collection.

Mission: To update the recent trends in collection of data.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	update the primary sources of History.	1,2	Un, Re
CO-2	understand the latest micro filming data collections.	1,2	Un, Re
CO-3	know the structure and functions of Archives.	1,2	Un, Re
CO-4	appreciate the work of organisation.	1,2	Un, Re
CO-5	understand the significance of record maintenance.	1,2	Un, Re
CO-6	estimate the History of Archives.	5	Ev
CO-7	learn the pool of resources of history.	1,2	Un, Re
CO-8	know the mending of records.	4	An

Semester – II			
Elective IV A	**Archives Keeping**		
Sub Code : 19PHIE22	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Unit I - Meaning of the term Archives – Origin – Early History – Greece and Rome – Medieval Archives – History of Archives Keeping in France, England, USA and India. – Creation of Archives – Selection of Materials – Collection of Records – Arrangements of records.

Unit II - Organisation of Archives – Meaning of the term – History of Organisation – Principles of Organisation – Organisation of Archives in England, France and India. – Administration of Archives – Technical Administration – General Administration

Unit III - Preservation of Archives – Protection from different insects and creatures – Repairing the damaged records – Re-strengthening of the old materials. – Functions of Archives – Preservation – arrangements of records – Government – impact Archival training – Creation of Archival awareness – Publications.

Unit IV - Uses of Archives – Historical Value – Research Purpose – Reconstruction of the Past – Authenticity in History – Administrative Values – Intellectual Values – Rules Regulating Access to the Archives – India – Europe – Common Rules and Regulations.

Unit V - Private Archives and their Values – Kinds of Private Archives – Tamil Nadu Archives – Formation and Development – Saraswathi Mahal Library – Nehru Museum and Library – Parry and Company – Connemara Library – Macqueen – Dodwell – Tallboys Wheeler – B.S. Baliga – S. Singarajan.

Text Book:

1. Raj Sundar M. *A Manual of Archival Systems and the World of Archives.* Chennai. 1999.

Books of Reference:

1. Baliga B.S. *Madras Record Office. Indian Archives Vol. IV.* New Delhi. 1952.
2. Cook Michael. *Archives Administration: A Manual for Intermediate and Smaller Organisations and for Local Government.* Kent, 1977.
3. Schellenberg, T.R. *Model Archives Principles and Techniques.* Chicago. 1956.

Semester – III			
Elective VI A Indian History for Competitive Examinations			
Sub Code : 19PHIE32	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Vision: To make thorough of Indian History to face competitive exams and interviews.

Mission: Augment with the knowledge of Indian History through the ages.

Course outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	prepare them for various competitive exams	1,2	Un, Re
CO-2	enhance the writing and spoken skills of English language	3	Ap
CO-3	understand the Indian History and administration	1,2	Un, Re
CO-4	train to become an efficient professionalist	6	Cr
CO-5	highlight the Indian history to become a responsible and patriotic citizens of India	1,2	Un, Re
CO-6	update Contemporary Indian history	1,2	Un, Re
CO-7	aware of the Current affairs in India	1,2	Un, Re
CO-8	apply the learning skills in competitive exams	1,2	Un, Re

Semester – III			
Elective VI A	**Indian History for Competitive Examinations**		
Sub Code : 19PHIE32	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 3**

Unit I - Origin of Earth: Origin of Human species - Geographical Formation of Indian Sub- Continent - Approaches in Indian History - Cultural setting: Indus Valley Civilization – Aryan culture - Sangam period.

Unit II - Jainism and Buddhism: Mauryan Empire - Satavahanas - Kushanas - Guptas - Pallavas of Kanchi, Pushyabhutis - Tripartite Struggle in the North: Palas - Prathiharas and Rashtrakutas, Tripartite Struggle in the South - The Imperial Cholas.

Unit III - Sultanate Empire: Mamluks - Khiljis - Tuglaqs - Sayyids and Lodhis - Vijayanagar and Bahmani Empires - Arrival of Western Maritime powers - The Mughals - Rise of the Maratha power.

Unit IV – Decline of the Mughals: Establishment of imperialism - First War of Indian Independence – Socio - religious reform movements - Formation of Indian National Congress and
Freedom movement - Partition of India.

Unit V – Modern Indian Political Thinkers: Gandhiji - Nehru - Periyar – Ambedkar - M.N. Roy – Vinobhaji - Subhas Chandra Bose - R. M. Lohia

Text Book:

1. Basham A. L. *The Wonder That was India.* Pan Macmillan Limited, New Delhi. 2004.

Books for Reference:

1. Chandra Bipan. *India's Struggle for Independence.* New Delhi. 1988.
2. Chandra Satish. *Essays on Medieval Indian History.* Oxford University Press, New Delhi. 2003.
3. Gazetteer of India- Vol. ll, New Delhi.1973.
4. Grover & Grover. *A New Look at Modern Indian History.* S. Chand and Company Limited, New Delhi. 1999.
5. Mehta J.L. *Advanced Study in the History of Medieval India -Vols I, II & III.* New Delhi. 1998.
6. Thapar Romila. *The Penguin History of Early India: From the Origins to 1300 A.D*, New Delhi. 2002.

SEMESTER – I			
Core I	**History of India up to 1206C.E**		
Course Code: 21PHIC11	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits:4**

Objectives:

- To provide the evolution of Indian cultural heritage through the ages.
- To appreciate our cultures of various dynasties and contribute to nation building.
- To take pride of rich cultural heritage.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	widen the knowledge of Ancient History of India.	1	Un
CO-2	understand the geographical features of India and its impact.	1	Un
CO-3	adhere and appreciate the town planning skills of Indus Valley people.	2	Re
CO-4	enhance the legacy of Vedic Civilisations.	2	Re
CO-5	understand the teachings and principles of Buddhism and Jainism to enhance global peace.	1	Un
CO-6	analyse the Persian and Macedonian Invasion.	4	An
CO-7	know the genealogy of various king and their administration.	1	Un
CO-8	analyse the significance of foreign accounts.	4	An

SEMESTER – I			
Core I	**History of India up to 1206 C.E**		
Course Code: 21PHIC11	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits: 4**

Unit - I Sources and Culture

Survey of Sources – Archaeology – Epigraphy – Numismatics – Literary–Foreign Accounts - Influence of Geography on History - Pre-History – Settlements – Pattern of Exchange

Unit - II Proto – History and Historic Period

Chalcolithic Culture - Indus Valley Civilization - Vedic Literature - Early Vedic – Later Vedic– The Epics – Caste System - Rise of Mahajanapadas – Jainism – Buddhism – Rise of Magadha and Nandas - Persian and Macedonian invasion

Unit - III Mauryan and Deccan Kingdoms

Rise of Mauryan Empire – Chandra Gupta Maurya – Ashoka – MauryanAdministration Deccan Kingdoms- Chalukyas, Kanvas, Kalingas, Sungas and Sathavahanas

Unit - IV North Indian Kingdoms

Rise of Kushans – Kanishka -Gandhara School of Art – Mathura School of Art – Gupta Age – Sri Gupta - Chandra Gupta - Samudra Gupta – Chandra Gupta II – Administration- Golden Age - Fahien's Account – Huns Invasions in India – Harsha Vardhana – Hieun–Tsang and Itsing Accounts

Unit-V Rajputs and Foreign Invasions

Origin of Rajputs – Dynasties – Society – Administration – Literature – Art and Architecture – Arab Conquest of Sind – Muhammed of Ghazni – Muhammed of Ghor

Text Book:

1. Mahajan. V.D. *History of Ancient India*. New Delhi: S. Chand & Company, 1986.

Books for Reference:

1. Basham. A.L. *The Wonder that was India. Vol.I*. London: Standard Book Distribution House, 2000.
2. Kosambi. D.D. *The Culture and Civilization of Ancient India.* New Delhi: Vikas Publishing House, 1975.
3. Rajkumar. *Social and Cultural History of Ancient India*. Sumit Enterprises, New Delhi, 2007.
4. Thapar. Romila. *Cultural Pasts: Essays in Early Indian History.* New Delhi: Oxford University Press, 2004.

Journal:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.1064.1156&rank=1&q=History%20of%20India&osm=&ossid=

E-Learning Resources:

1. https://www.youtube.com/watch?v=cEunWb63P8g&feature=youtu.be
2. https://www.youtube.com/watch?v=eyPTC04aDOk&feature=youtu.be

Semester – I			
Core–II	**Ancient World Civilisations (Excluding India)**		
Course Code : 21PHIC12	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives:

- To trace out the genesis of civilisations and the causes for its growth and decline.
- To appraise the legacy of civilisations.
- To promote our present civilisation to live with nature.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the birth of civilisations.	1	Un
CO-2	know the date and extent of the civilisations.	1	Un
CO-3	know the favourable factors of geographical features.	1	Un
CO-4	appreciate the work of great civilisations.	2	Re
CO-5	trace out the river valley civilisations.	2	Re
CO-6	estimate the legacy of civilisations.	5	Ev
CO-7	analyse and compare the ancient civilisations.	4	An
CO-8	evaluate the causes for the decline of the civilisations.	5	Ev

Semester – I			
Core–II	**Ancient World Civilisations (Excluding India)**		
Course Code : 21PHIC12	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I Mesopotamian Civilization

Meaning of Civilization – Difference between civilization and culture – Mesopotamian, Assyrian, Sumerian and Babylonian Civilization – Society – Economy – Literature – Code of Laws – Script – Art and Architecture

Unit II Egyptian Civilization

Society – Economy –Art of Writing - Literature - Science and Technology – Art and Architecture

Unit III Greek Civilization

City States - Rise of Athens and Sparta – Golden Age of Pericles – Spartan hegemony – Polity & Society – Legacy of Hellenistic Culture.

Unit IV Roman Civilization

Roman Civilization – Roman Republic - Julius Caesar – Augustus Caesar – ClassicalAge – Literature – Architecture – Education – Roman Laws – Contributions –Decline of Roman Empire

Unit V Chinese and Arab Civilization

Great Wall – Culture – Literature – Science – Chinese Art - Philosophy - Trade and Commerce - Arab Civilization – Science – Literature – Art and Architecture – Contribution

Text Book:

1. Swain. J. E. *A History of World Civilisation.* New Delhi: S. Chand & Company Pvt.Ltd, 1997.

Books for Reference:

1. Davies. H. A. *An Outline History of the World*. New Delhi: Oxford University Press,1968.
2. Fellipe Fernandez. *Civilisation*. London: 2000.
3. Hermann Schneider. *The History of World Civilisation from pre-historic times to theMiddle Ages*. 1931.
4. Manoj Sharma. *History of World Civilisation*. New Delhi: Anmol Publications Pvt.Limited, 2005.
5. Neil William and Sedlar Jean. *Origin of Civilisation.* New York: 1981.
6. Philip Lee Ralph and others. *World Civilisations.* New York: W. W. Norton &Company, 1997.
7. Pearce. F. G. *An Outline History of Civilisation,* London: Oxford University Press, 1965.

E-Learning Resources:

1. https://dcmp.org/media/11460-the-ancient-world-civilizations-and-ideas#:~:text=Eight%20distinct%20civilizations%20emerged%20in,Rome%2C%20Greece%2C%2 0and%20Persia.
2. https://www.britannica.com/topic/list-of-ancient-civilizations-2079395

Semester – I			
Core – III	**History of Tamil Nadu upto 1336 C.E**		
Course Code : 21PHIC13	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Objectives:

- To make the students understand the historical dynasties of Tamil Nadu and their legacy.
- To develop a better understanding of regional History of Tamil Nadu
- To know the cultural heritage of Tamil Nadu.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand regional history through the ages.	1	Un
CO-2	take pride of rich cultural heritage of the past.	2	Re
CO-3	appreciate the intellectual ideas of the ancestors.	2	Re
CO-4	know the genealogy of the dynasties.	1	Un
CO-5	emphasize on the foreign invasions and its impact.	4	An
CO-6	analyse the contribution of art and architecture.	4	An
CO-7	evaluate the societal and cultural patterns.	5	Ev
CO-8	analyse the development of vernacular literature.	4	An

Semester – I			
Core – III	**History of Tamil Nadu upto 1336 C.E**		
Course Code : 21PHIC13	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I **Sangam Age**

Geographical features - Sources – Archaeology and Literary - Sangam Age: Political – Society– Economy -Religion – Kalabhras

Unit II **Pallavas**

Origin – Mahendra Varman I – Narasimha Varman I- Rajasimha – Aparajitha – Administration - Society – Economy - Art and Architecture

Unit III **Pandyas**

First Pandyan Empire – Second Pandyan Empire – Administration - Society – Economy - Art and Architecture

Unit IV **Cholas**

Parantaka I – Rajaraja I – Rajendra I- Chalukya Cholas – Kulottunga I – Kulottunga II – Administration – Society– Economy - Art and Architecture – Religion and Literature – Nayanmars and Alwars

Unit V **Muslim invasions**

Malik Kafur – Madurai Sultanate – Tamil Nadu under Muslim Rule – Impact of Muslim invasions.

Text Book:

1. Rajayyan. K. *History of Tamil Nadu – A Real History.* Trivandrum: Ratna Publications, 2005.

Books for Reference:

1. Aiyar. Sathyanatha R. *History of the Nayaks of Madura.* Madras: Oxford University Press, 1924.
2. Irschick. Eugene. *Politics and Social Conflicts in South India.* Berkely and Los Angels: University of California Press, 1969.
3. Nambi. Arroran. *Tamil Renaissance and Dravidian Nationalism (1905 -1944).* Madurai: Koodal Publishers, 1980.
4. Yesudhasan .V. and Issac Jaya Dhas. R. *History of Tamil Society and Culture since 1336.* Villukuri: MCL Roy Publications, 2002.

E-Learning Resources:

1. https://www.livehistoryindia.com/history-of-india-2000-years/2020/07/11/sangam-literature
2. https://www.tourmyindia.com/heritage/brihadeeswara-temple.html

SEMESTER – I			
Core V	**Intellectual History of India**		
Course Code: 21PHIC15	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits:4**

Objectives:

- To comprehend the history of Intellectuals and their thoughts and ideas.
- To conceptualize of ideas and its significance.
- To appreciate the intellectual capacity of Indians.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	highlight the intellectual thoughts in different perspectives.	1	Un
CO-2	know the differences between Cultural History and Intellectual History.	1	Un
CO-3	focus on intensive reasoning and deep thinking.	2	Re
CO-4	emphasize intellectual ideas for the promotion of society.	2	Re
CO-5	promote critical thinking.	3	Ap
CO-6	collaborate great minds and ideas.	5	Ev
CO-7	apply and articulate ideas in the past.	3	Ap
CO-8	examine the intersection of several disciplines.	5	Ev

SEMESTER – I			
Core V	**Intellectual History of India**		
Course Code: 21PHIC15	**Hrs / Week:6**	**Hrs / Semester: 90**	**Credits:4**

Unit - I **Intellectual History**

Definition – Nature–Scope and Purpose – Role of Individuals - Significance

Unit - II **Social Thinkers**

Raja Ram Mohan Roy – Ishwar Chandra Vidyasagar – Jyotiba and Savitri Phule- R.G. Bhandarkar - Keshab Chandra Sen – Veerasalingam Pantulu- Pandita Ramabai - D.K.Karve – Ranajit Guha - Romila Thapar

Unit - III **Religious Thinkers**

Debendranath Tagore – Saint Ramalinga Adigal- Dayananda Saraswati – Ramakrishna Paramahamsa – Swami Vivekananda

Unit - IV **Political Thinkers**

Dadabhai Naoroji – M.G. Ranade – S.N. Banerjee – R.C. Dutt – G.K.Gokhale

Unit - V **Litterateurs and Scientists**

Bankim Chandra Chatterjee – J.C.Boss – P.C.Roy – Srinivasa Ramanuja – Amartya Sen – Vandhana Shiva

Text Book:

1. Sen. S. P. *Social and Religious Reform Movements in the Nineteenth and Twentieth Centurys'*. Calcutta: Institute of Historical Studies, 1979.

Books for Reference:

1. Tara Chand. *History of the Freedom Movement in India*. New Delhi: Ministry of Information and Broadcasting Government of India, 1967.
2. Datta. K.K. *A Social History of Modern India*, Macmillan Co. of India, Delhi, 1975.
3. Grover. B.L. and Grover. *A New Look at Modern Indian History.* Delhi: S. Chand & Co. Ltd, 1993.
4. Naravane. V.S. *Modern Indian Thought*. New Delhi: Orient Longman Pvt. Ltd, 1979.

Journal:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.722.1051&rank=10&q=History%20of%20India&osm=&ossid=

E-Learning Resources:

1. https://scholar.harvard.edu/files/pgordon/files/what_is_intell_history_pgordon_mar2012.pdf
2. https://www.jstor.org/stable/20023991?seq=1

SEMESTER – II			
Core VI	**History of India from 1206 to 1707 C.E**		
Course Code: 21PHIC21	**Hrs / Week:5**	**Hrs / Semester: 75**	**Credits:4**

Objectives:

- To impart the knowledge of Medieval and Modern India.
- To evaluate the cultural heritage of Medieval India.
- To analyse the socio-political condition of Medieval India.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand vernacular literary works.	1	Un
CO-2	adhere to the foreign invasions and its impact.	4	An
CO-3	understand Delhi Sultanate rule.	1	Un
CO-4	analyse the contribution of Delhi Sultanate.	4	An
CO-5	appreciate the noble ideals of Bhakti Movement.	2	Re
CO-6	analyse Vijayanagar and Bahmani conflict.	4	An
CO-7	examine the Deccan policy of Mughals.	4	An
CO-8	evaluate the advent of Europeans.	5	Ev

SEMESTER – II			
Core VI	**History of India from 1206 to 1707 C.E**		
Course Code: 21PHIC21	**Hrs / Week:5**	**Hrs / Semester: 75**	**Credits:4**

Unit I Delhi Sultanate - Dynasties

Sources of Medieval Indian History – Slave Dynasty - Khilji Dynasty – Tughlaq Dynasty – Sayyid Dynasty and Lodi Dynasty

Unit II Delhi Sultanate

Administration – Society – Economy – Religious policy - Literature - Art and Architecture

Unit III Vijayanagar and Bahmani Kingdoms

Kingships – Socio - Economic condition – Art and Architecture- Bhakti Cult - Ramanuja, Vallabhachariya, Sankaracharia - Chaitanya, Kabir – Namdev - Guru Nanak

Unit IV Mughal Dynasty

India on the eve of Babur's invasion – Babur – Humayun – Akbar – Jahangir – Shah Jahan – Aurangzeb Administration - Society – Economy – Religious Policy - Art and Architecture –Deccan Policy- Downfall of Mughals

Unit V Advent of Europeans

Vasco da Gama - Portuguese Settlements – Dutch East India Company – English East India Company – French East India Company – Danes Settlements

Text Book:

1. Mahajan. V.D., *History of Medieval India*. New Delhi: S. Chand & Company, 1986.

Books for Reference:

1. Banerjee. Anil Chandra. *A New History of Ancient History.* New Delhi: S. Chand & Company Ltd, 1983.
2. Majumdar. R.C. *History and Culture of the Indian People. Vol. VII*. London: Macmillan Company Ltd,1958.
3. Rajkumar. *Social and Cultural History of Ancient India.* New Delhi: Sumit Enterprises, 2004.
4. Rao. Hanumantha. B.S.C. and Rao. Basaveswara. K. *Indian History and Culture. Vol. I*. Gunter: Sri Vignana Manjasha Publication,1976.
5. Sathianathaier. R. *Political and Cultural History of India. Vol. II*. Madras: S. Viswanathan Printers and Publishers, 1998.

Journal:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.999.3471&rank=30&q=History%20of%20India&osm=&ossid=

E-Learning Resources:

1. https://www.youtube.com/watch?v=FBw2O8mFaBI&feature=youtu.be
2. https://www.youtube.com/watch?v=LYnaYeOunJ4&feature=youtu.be

SEMESTER – II			
Core VII	**History of Tamil Nadu from 1336 to 1806 C.E**		
Course Code: 21PHIC22	**Hrs / Week:5**	**Hrs / Semester: 75**	**Credits:4**

Objectives:

- To appreciate the cultural heritage of Tamil Nadu.
- To analyse the political condition of Tamil Nadu.
- To understand the advent of Europeans.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand Tamil dynasties and their legacy.	1	Un
CO-2	evaluate their problems and interpret to solve it.	5	Ev
CO-3	assess the contribution of the Nayaks to administration and architecture.	5	Ev
CO-4	understand the impact of political parties in Tamil Nadu.	1	Un
CO-5	acquire the knowledge of Tamil Integration movement.	1	Un
CO-6	be aware of the cultural diversity in Tamil Nadu.	2	Re
CO-7	analyse the policy of the British revenue, educational and judiciary system.	4	An
CO-8	estimate the services of Christian missionaries.	4	An

SEMESTER – II			
Core VII	**History of Tamil Nadu from 1336 to 1806 C.E**		
Course Code: 21PHIC22	**Hrs / Week:5**	**Hrs / Semester: 75**	**Credits:4**

Unit I **Vijayanagar Kingdom**

Kumara Kampana's Expedition – Tamil Country under Vijayanagar - Administration –
Socio - Economic and Religious condition – Art and Architecture

Unit II **Nayaks**

Nayaks of Madurai - Gingee - Tanjore – Administration – Art and Architecture - Social Life and Cultural Expansion

Unit III **Rise of Poligars and Marathas**

Sethupatis of Ramnad - Administration – Socio - Economic and Religious condition- Nawab of Arcot – Marathas of Tanjore – Administration – Socio - Economic and Religious condition - Art and Architecture

Unit IV **Advent of the Europeans**

The coming of the Europeans – European settlements in Tamil Nadu –Economic and Religious Activities – Carnatic wars - Hyder Ali and Tipu Sultan in Tamil Nadu

Unit V **Impact of Rebellions**

Administrative Policy British East India Company- Poligar Rebellion – Deeran Chinnamalai – Puli Thevan - Kattabomman – Marudu Brothers –South Indian Rebellion (1801) – Vellore Mutiny (1806)

Text Book:

1. Rajayyan. K. *History of Tamil Nadu 1565 – 1982*. Madurai: Raj Publishers, 1982.

Books for Reference:

1. Hardgrave L. Robert. *The Dravidian Movement*. Bombay: Popular Prakashan, 1965.
2. Kadhirvel. *History of Maravas (1700 – 1802)*. Madurai: Madurai Publishing House, 1977.
3. Mahalingam. T.V. *Administration and Social Life under Vijayanagar*. Madras:University of Madras, 1940.
4. Maria John. B. *Linguistic Reorganisation of Madras Presidency*. Nagercoil: Ajith Publications, 1994.
5. Maria John. B. *Formation of Tamil Nadu*. Nagercoil: Ajith Publications, 2006.

Journals:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.1067.5808&rank=65&q=History%20of%20India&osm=&ossid=
2. https://www.jstor.org/stable/44145374?seq=1
3. https://www.jstor.org/stable/44304481?seq=1

E-Learning Resource:

https://knowindia.gov.in/culture-and-heritage/medieval-history/vijayanagar-empire.php

Semester – II			
Core VIII	**Contemporary World Since 1945 C.E.**		
Course Code : 21PHIC23	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

- To acquaint with the contemporary world events and the role of various countries.
- To create an awareness of International Relations in the present scenario.
- To assess the contemporary world issues.

Course outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the organization and functions of UNO.	1	Un
CO-2	understand decolonization.	1	Un
CO-3	analyse the apartheid policy of South Africa.	4	An
CO-4	assess the role of OPEC in International Politics.	5	Ev
CO-5	acquire the knowledge of Emerging New World Order.	2	Re
CO-6	analyse the nature of Cold War.	4	An
CO-7	estimate regional organizations.	5	Ev
CO-8	analyse civil rights, labour and feminist movements.	4	An

Semester – II			
Core VIII	**Contemporary World Since1945 C.E.**		
Course Code : 21PHIC23	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I Cold War

U.N.O. – Organization – Specialized Agencies – Achievements - Cold War - BerlinCrisis – Korean War – Vietnam War – Cuban Crisis – Suez Crisis

Unit II Middle East and Europe

Arab - Israel War - Oil Crisis - OPEC – Gulf war - Iran - Iraq War - EuropeanUnion- European Common Market - Decolonization

Unit III Aftermath of Cold War

Disarmament – Disintegration of U.S.S.R. – Emerging New World Order – Multi-Polar, Bi – Polar and Uni - Polar - World Terrorism

Unit IV Regional Organizations

NATO, SEATO, CENTO, Warsaw Pact - Common Wealth of Nations – Non-Alignment - SAARC, OAU, ASEAN, G-8, G-15, G-77

Unit V Movements

Apartheid - Civil Rights Movement in U.S.A. – Labour Movement – FeministMovement – African Diaspora

Text Book:

1. Sen. A.K. *International Relations since 1919.* New Delhi: S. Chand & Co., Ltd, 1993.

Books for Reference:

1. Philip Parker. *Word History: From the Ancient World to the Information Age*.
2. New Delhi, D.K. Publishers,2017.
3. Burton. J.W. *International Relations.* Bombay: George Allen and Unwin Pvt. Ltd, 1971.
4. Frankel. Joseph. *International Relations*. New Delhi: Oxford University Press, 1967.
5. Holsti. *International Politics.* New Delhi: Prentice Hall of India Pvt. Ltd,1978.
6. Palmer and Perkins. *International Relations.* New Delhi: Publishers and Distributors,2000.

E-Learning Resources:

1. https://www.youtube.com/watch?v=MWYjNUAqvvU&feature=youtu.be
2. https://www.youtube.com/watch?v=jCRzkW1c2dQ&feature=youtu.be

Semester – II			
Core IX	**Intellectual History of Tamil Nadu**		
Course Code : 21PHIC24	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

- To appreciate the role of Intellectuals and their ideas through the ages.
- To promote intellectual ideas in various disciplines.
- To assess the growth of intellectual thoughts in Tamil Nadu.

Course outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand political ideas and its impact.	1	Un
CO-2	understand the philosophical ideas of the religions.	1	Un
CO-3	promote social conscious and rights.	2	Re
CO-4	analyse cultural deep insights and its impact	4	An
CO-5	focus on the development of science and technology.	2	Re
CO-6	estimate the role of intellectuals in history.	5	Ev
CO-7	evaluate the intellectual ideas in different perspectives.	5	Ev
CO-8	analysis of ideas in various disciplines.	4	An

Semester – II			
Core IX	**Intellectual History of Tamil Nadu**		
Course Code : 21PHIC24	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I **Political Intellectuals**

G.Subramania Iyer - Rettamalai Srinivasan - C.Rajagopalachari - E.V.Ramasamy - M.C Raja - Thillaiyadi Valliyammai - Pasumpon Muthuramalinga Thevar – Kalaingar Karunanidhi

Unit II **Social Intellectuals**

Ayodhya Das Pandithar - Amy Carmichael - Ida Scudder - Arcot Brothers – Bharathidasan – Vallal Azagappar - Jamal Mahammed

Unit III **Religious Intellectuals**

Umaru Pulavar - Joseph Constantine Beschi – Vaikunda Swamigal – Annie Besant – Swami Sahajananda - Kirubananda Variyar

Unit IV **Cultural Icons**

C.Subramania Bharathiyar – M.S.Subbulakshmi – Kannadasan - Pattukottai Kalyana Sundaram – Padma Subramaniam

Unit V **Litterateurs and Scientists**

G.D.Naidu –Santappa - M.S.Swaminathan – A.P.J.Abdul Kalam– Rangarajan (Sujatha) - K. Sivan

Text Book:

1. Rajayyan. K. *History of Tamil Nadu (1585-1982).* Madurai: Raj Publishers, 1982.

Book for Reference:

1. Parmarthalingam. C. *Religion Social Reform in Tamil Nadu.* Madurai: Rajkumari Publication, 1997.
2. Sen. S.P.(Ed.). *Social and Religious Reform Movements in the 19th and 20th Centuries.* Calcutta: Calcutta Institute of Historical Studies,1979.
3. Pillai. K.K. *Tamilaga Varalaru, Makkalum Panpadum (Tamil).*Chennai: International Institute of Tamil Studies, 2004.
4. Viswanathan. E.Sa. *The Political Career of E.V.R.* Madras: Ravi and Vasanth Publication, 1983.

Journal:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.1067.5808&rank=65&q=History%20of%20India&osm=&ossid=

E-Learning Resources:

1. https://www.tamildigitallibrary.in/
2. https://www.mids.ac.in/
3. https://rmrl.in/?page_id=12

Semester – II			
Core X	**Indian Art**		
Course Code : 21PHIC25	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objectives:

- To preserve and maintain the heritage of arts.
- To appreciate the contribution of prominent artists.
- To understand the historical significance of Indian art.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the legacy of our ancestors to art	1	Un
CO-2	assess the architectural styles of different dynasties	5	Ev
CO-3	appreciate the sculptors work	2	Re
CO-4	evaluate the materials of sculpture	5	Ev
CO-5	know the nature of different paintings	1	Un
CO-6	learn the various types of dances	2	Re
CO-7	analyse the work of eminent artists	4	An
CO-8	draw inspiration from eminent artists	4	An

Semester – II			
Core X	**Indian Art**		
Course Code : 21PHIC25	**Hrs / Week :5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I Architecture

Pre - historic Architecture – Indus Valley Architecture – Vedic Architecture - Buddhist Architecture – Gupta Architecture – Hoysalas – Pallavas – Cholas – Pandyas – Vijayanagar – Nayaks – Mughals

Unit II Iconography

Mauryas – Kushanas – Gandhara and Mathura Art – Hoysalas – Pallavas – Cholas – Pandyas – Vijayanagar and Nayaks

Unit III Paintings

Mural paintings – Ajantha – Bagh – Sittanavasal – Tanjavur – Miniature – Mughal – Pahari paintings

Unit IV Visual Arts

Dances: Folk Dances – Bharathanatiyam – Kuchupudi – Kathakali – Disco – Fusion Jazz

Unit V Eminent Artists

Rukmani Devi – Ravi Varma – Padma Subrahmaniam - Asha Bhonsle – Lata Mangeshkar – K. Balachander – Sivaji Ganesan – A.R. Rahman

Textbook:

1. Singhania Nitin. Indian Art and Culture. Chennai:Mc Graw Hill Education Pvt. Ltd.,2020.

Books for Reference:

1. Beach. M.C. *The New Cambridge History of India.* London: Cambridge University Press, 1992.
2. Bharadwaj Manohar. *Cultural and Traditional History of India.* New Delhi: Cyber Tech Publications, 2008.
3. Partha Mitter. *Indian Art.* Oxford History of Art Series. New Delhi: Oxford University Press, 2001.
4. Ray Niharranjan. *An Approach to Indian Art.* Calcutta: University of Calcutta, 1970.
5. Tomory Edith. *A History of Fine Arts in India and the West.* New Delhi: Orient Longman,1982.

Journals:

1. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.732.988&rank=80&q=History%20of%20India&osm=&ossid=
2. http://citeseerx.ist.psu.edu/viewdoc/summary;jsessionid=84BC561CAD034E544EFCAEBE2D452EE1?doi=10.1.1.544.7209&rank=78&q=History%20of%20India&osm=&ossid=

E-Learning Resources:

1. https://knowindia.gov.in/culture-and-heritage/folk-and-tribal-art.php
2. https://www.culturalindia.net/indian-architecture/

SEMESTER – III			
Core XI	**History of India from 1707 to 1858 C.E**		
Course Code: 21PHIC31	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits:4**

Objectives:

- To offer the heroic resistance of native Indians to the company's rule.
- To understand the administration of company and national spirit of Indians.
- To appreciate the early resistance of Indians against British.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appreciate the uprisings of native Indians in the context of British rule.	1,2	Un, Re
CO-2	understand Lord Warren Hastings reign.	1,2	Un, Re
CO-3	analyse Permanent Revenue settlement of Bengal.	4	An
CO-4	critically analyse Subsidiary Alliance of Lord Wellesley.	4	An
CO-5	appreciate the tactics of Tippu Sultan of Mysore.	1,2	Un, Re
CO-6	enhance the social reforms of Lord William Bentinck.	1,2	Un, Re
CO-7	elevate Great Revolt of 1857 as the First War of Indian Independence.	1,2	Un, Re
CO-8	enhance the leaders of Great Revolt of 1857.	1,2	Un, Re

SEMESTER – III			
Core XI	**History of India from 1707 to 1858 C.E**		
Course Code: 21PHIC31	**Hrs / Week: 5**	**Hrs / Semester: 75**	**Credits: 4**

Unit - I India on the Eve of the British Rule

Battle of Plassey – Battle of Buxar – Robert Clive – Warren Hastings – First Maratha War– First and Second Mysore Wars – First Rohilla War– Second Rohilla War– Impeachment.

Unit - II Revenue System

Lord Cornwallis – Reforms – Permanent Revenue Settlement of Bengal – Third Mysore War – Charter Act of 1813.

Unit - III Expansion Policy

Lord Wellesley – Subsidiary Alliance – Fourth Mysore War – Second Maratha War – Lord Marquess of Hastings – Third Maratha War – First Anglo-Burmese War.

Unit - IV Reforms & Aggressive Policy

Lord William Bentinck – Reforms – First Anglo-Sikh War - Charter Act of 1833 – Lord Ripon – Reforms - Lord Dalhousie – Doctrine of Lapse – Reforms – Second Anglo-Burmese War.

Unit - V First War of Independence

Lord Canning -Sepoy Mutiny of 1857 – Cause – Course – Consequences – Queen Victoria's Proclamation.

Text Book:

1. Khurana. K.L. *History of India from 1526 to 1967.* Agra: Lakshmi Narain Agarwal, 2020.

Books for References:

1. Ayer Sathianatha. S. *A Political and Cultural History of India (Vol. III)*. Madras: Viswanathan Private Limited, 1982.
2. Grover. B.L. *A New Look on Modern India History*. New Delhi: S.Chand and Company, 1984.
3. Banerjee Chandra Anil. *New History of Medieval India.* New Delhi: S. Chand & Company Pvt.Ltd,1983.
4. Khurana. K. L. *History of India from 1526 to 1967.* Agra: Lakshmi Narain Agarwal, 1995
5. Majumdar. R.C. *An Advanced History of India.* London: Macmillan Company Ltd, 1983.

Journals:

1. https://journals.sagepub.com/home/ihr
2. https://journals.sagepub.com/home/ier

E-Learning Resources:

1. https://youtu.be/WroucvLpRiw
2. https://youtu.be/fSKkzPw6Vwc

Semester–III			
Core XII	**History of Tamil Nadu from 1806 to 2001C.E**		
Course Code:21PHIC32	**Hrs/Week:5**	**Hrs/Sem: 75**	**Credits:4**

Objectives:

- To appreciate the cultural heritage of Tamil Nadu.
- To analyse the political condition of Tamil Nadu.
- To evaluate the legacy of Tamil Nadu.

Course Outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand Tamil dynasties and their legacy.	1,2	Un,Re
CO-2	evaluate their problems and interpret to solve it.	5	Ev
CO-3	assess the contribution of the Nayaks to administration and architecture.	5	Ev
CO-4	analyze the services of Christian missionaries.	4	An
CO-5	acquire the knowledge of Tamil Integration movement.	1,2	Un,Re
CO-6	make aware of the cultural diversity in Tamil Nadu.	1,2	Un,Re
CO-7	analyze the policy of the British revenue, educational and judiciary system.	4	An
CO-8	understand the impact of political parties in Tamil Nadu.	1,2	Un, Re

Semester–III			
Core XII	**History of Tamil Nadu from 1806 to 2001C.E**		
Course Code:21PHIC32	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Unit -I Marathas of Thanjavur

Raja Serfoji – Social and Economic Condition Art and Architecture - Vellore Mutiny – Cause – Course– Effect.

Unit - II British in the Madras Presidency

Social Life of Tamils under the British Rule–Land Revenue – Education–Judiciary– Services of Missionaries - Socio-Religious Reform Movements in Tamil Nadu –Temple Entry Movement.

Unit - III Justice Party

Early Associations – EVR and Self - Respect Movement – D.K.Movement.

Unit - IV Tamil Nadu after Independence

Tamil Integration Movement–Rajaji–Kamaraj – M. Baktavatsalam - Formation of DMK – C.N. Annadurai –Kalaignar Karunanidhi – Welfare Schemes – Socio-Economic and Educational achievements during DMK regime.

Unit - V AIADMK

Formation of AIADMK: M.G. Ramachandran – Administration and Achievements – J.Jayalalitha – Developmental Schemes – Social, Economic and Educational Achievements.

Text Book:

1.Rajayyan. K. *A Real History of Tamil Nadu.* Trivandrum: Ratna Publications, 2005.

Books for Reference:

1. Hardgrave. L.Robert. *The Dravidian Movement.* Bombay: Popular Prakasham, 1965.
2. Rajayyan. K. *History of Tamil Nadu 1565–1982.* Madurai: Raj Publishers,1982.
3. Rajayyan. K. South Indian Rebellion. Mysore: Rao and Raghavan Paublications,1971.
4. Maria John. B. *Linguistic Re-organisation of Madras Presidency.* Nagercoil: Ajith Publications, 1994.
5. Maria John. B. *Formation of Tamil Nadu,* Nagercoil: 2006.
6. Baliga. B.S. *Studies in Madras Administration (Vol.I & Vol.II).* New Delhi: India Press, 1960.

Journals:

1. https://journals.asianresassoc.org/index.php/ijot/article/view/103
2. https://irjt.iorpress.org/index.php/irjt

E-Learning Resources:

1. https://youtu.be/xxmEPZiDkwc

Semester–III			
Core – XIII	**History of USA upto 1865 C.E**		
Course Code:21PHIC33	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Objectives:

- To update the role of USA in International relations.
- To understand the policy of progression in USA.
- To analyse the domestic and foreign policy of USA.

Course Outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	apply the acquired knowledge of colonization and the war of Independence.	1,2	Un,Re
CO-2	analyze sectional conflict and interpret civil war in USA.	4	An
CO-3	understand the dynamics of multi-cultural society.	1,2	Un,Re
CO-4	become aware of important land marks in the History of USA.	1,2	Un,Re
CO-5	highlight Westward expansion and its issues.	1,2	Un,Re
CO–6	appreciate the service of Abraham Lincoln.	1,2	Un,Re
CO-7	understand the life style of Indian tribes in USA.	1,2	Un,Re
CO-8	make aware of the Foreign Policy of USA towards Latin America.	1,2	Un,Re

Semester–III			
Core – XIII	**History of USA upto 1865 C.E**		
Course Code: 21PHIC33	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Unit - I **Colonisation & Independence**

Discovery of America: Colonisation–American War of Independence– Confederation – George Washington.

Unit – II **Red Indians**

Thomas Jefferson – Red Indians Struggle–Tecumseh–War of 1812–Monroe Doctrine – Andrew Jackson.

Unit – III **Westward Expansion**

Louisiana purchase– Acquisition of Florida– Settlements of Texas andOregon– Manifest Destiny–Mexican War of 1846.

Unit – IV **Slavery & Native Tribes**

Issue of Slavery: Sectional Conflict – Natives of America –Struggle for Survival of the Native Tribes.

Unit – V **Civil War**

Compromise of 1820 and 1850 – Kansas – Nebraska Act–Civil War–Abraham Lincoln–Results of the Civil War.

Text Book:

1. Rajayyan. K. *History of the United States.* Madurai: Ratna Publication,1998.

Books for Reference:

1. Bolt Christian. *A History of the U.S.A.* New Delhi: Macmillan, 1974.
2. Hill. C.P. *A History of the United States.* London: Edward Arnold Publishers, 1966.
3. Khurana and Gupta. *History of America.* Agra: Lakshmi Narain Publishers, 2006.
4. Pratt. Julius. *A History of United States.* New Jersey: Prentice Hill,1965.

Journals:

1.https://academic.oup.com/jah
2.https://academic.oup.com/ahr
3.https://www.press.jhu.edu/journals/reviews-american-history

E-Learning Resource:

1.https://youtu.be/XmR4-fW-x_o

SEMESTER – IV			
Core XVI	**History of India from 1858 to 1950 C.E**		
Course Code: 21PHIC41	**Hrs / Week: 6**	**Hrs / Semester: 90**	**Credits:4**

Objectives:

- To respect and take pride of noble ideals of freedom fighters.
- To enhance the patriotic fervor among the youth.
- To understand the values of Independence of India.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	outline the freedom movement and the role of freedom fighters to achieve Independence.	1,2	Un, Re
CO-2	assess the foreign rule and interpret their colonial and imperialist policy.	1,2	Un, Re
CO-3	inculcate the value of patriotism and nationalism.	1,2	Un, Re
CO-4	appreciate and respect National leaders sacrifice.	1,2	Un, Re
CO-5	widen thorough knowledge of Indian Freedom Struggle.	1,2	Un, Re
CO-6	evaluate the British colonial policy in India.	4	An
CO-7	apply the noble ideals of freedom fighters.	5	Ap
CO-8	understand the values of Independence of India.	1,2	Un, Re

SEMESTER – IV			
Core XVI	**History of India from 1858 to 1950 C.E**		
Course Code: 21PHIC41	**Hrs / Week: 6**	**Hrs / Semester:**	**Credits: 4**

Unit - I Genesis of Indian National Congress

Emergence of Indian Nationalism-Indian National Association - A.O. Hume – Indian National Congress (I.N.C.) –Aims.

Unit - II Growth of I.N.C (1885-1919)

Surat Split –Moderates and Extremists–Aligarh Movement–Home Rule League– Lucknow Pact

Unit - III Gandhian Era

Satyagraha - Champaran, Kheda, Ahamedabad – Rowlatt Act– Jallianwala Bagh Massacre – Non Co-operation Movement - Swaraj Party –Simon Commission– Nehru Report–Fourteen Points of Jinnah

Unit - IV Phases of Freedom Struggle

Civil Disobedience Movement-The Round Table conferences - Gandhi-Irwin Pact – Communal award – Poona Pact

Unit-V Towards Independence

World War II–Demand for Pakistan–August offer – Cripp's Proposal–Quit India Movement–Indian National Army (I.N.A) – Wavell Plan – Simla Conference – Cabinet Mission Plan–Mountbatten Plan–The Indian Independence Act – Constituent Assembly – Drafting Committee – Republic India

Text Book:

1. Agarwal. R.C. *Constitutional Development and National Movement.* New Delhi : S.ChandandCompany,1986.

Books for Reference:

1. Chand Tara. *History o f the Freedom Movement in India Vol.II.* New Delhi: Ministry of Information and Broadcasting,1983.
2. Chandra. Bipin. *India's Struggle for Independence.* New Delhi: Penguin Books, 1989.
3. Jeyapalan. N. *History of the Freedom Movement1857to1947.*New Delhi: AshishPublishingHouse,1988.
4. Mahajan. V.D. *Constitutional History of India and the Nationalist Movement*, New Delhi: S.Chand and Company,1976.
5. Sumit Sarkar. Modern India from 1885 to 1947, New Delhi :Laxmi Publications.2008.

Journal:

1. https://www.tribuneindia.com/news/features/the-ghadarite-journals-chronicle-of-indias-freedom- struggle-121003
2. https://journals.sagepub.com/home/ihr
3. https://journals.sagepub.com/home/ier

E-Learning Resources:

1. https://youtu.be/6XpEImUPlcI
2. https://youtu.be/PitP1ZYfdgo

Semester–IV			
Core XVII	**Contemporary History of India from 1947 to 2019. C.E**		
Course Code: 21PHIC42	**Hrs/Week:6**	**Hrs/Sem: 90**	**Credits:4**

Objectives:

- To update the recent History of India.
- To highlight the post Independent India's important events.
- To highlight the role of various political parties in India.

Course Outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire the knowledge of Contemporary Indian History and the rule of various Prime Ministers	1,2	Un,Re
CO-2	evaluate the foreign policy of India after Independence	5	Ev
CO-3	assess the contemporary political scenario in India	5	Ev
CO-4	understand the impact of changing political priorities on social life of the people	1,2	Un,Re
CO-5	evaluate the foreign policy and domestic policy in historical context	5	Ev
CO-6	analyse the educational policy of Post Independent India	4	An
CO-7	highlight the role of various political parties in India	1,2	Un,Re
CO-8	make aware of communal issues and their solutions	1,2	Un,Re

Semester–IV			
Core XVII	**Contemporary History of India from 1947 to 2019C.E**		
Course Code: 21PHIC42	**Hrs/Week:6**	**Hrs/Sem:90**	**Credits:4**

Unit-I Domestic & Foreign Policy

Making of the Indian Constitution – Language policy – Linguistic states –Jawaharlal Nehru– Foreign policy – Five Year plan = Pancha sheel

Unit-II Lal Bahadur Sastri & Indira Gandhi Reign

Lal Bahadur Sastri – Indo-Pak war – Tashkent agreement – Anti-Hindi agitation– Indira Gandhi era–Bangladesh crisis–Indo-Russian Friendship Treaty of 1971= Proclamation of Emergency.

Unit-III Janata and Congress Ministry

Jeya Prakash Narayan and Kissan movement-Janata Government– Second Ministry of Indra Gandhi–1979 Pokaran Test–Nationalisation of Bank–Operation Blue Star–Assassination.

Unit-IV Congress and Janata Ministry

Rajiv Gandhi – New Educational Policy – Bofors Scandal – Foreign policy - Indo-Sri Lanka Accord – V.P Singh – Mandal commission – P.V. Narasimha Rao – New Economic policy–Demolition of Babri Masjid – Foreign policy.

Unit-V United Front Government, BJP & Congress Ministry

Deva Gowda – I. K. Gujaral – BJP Government –Vajpaye– Kargil war- Operation Vijay– National Democratic Alliance Government1999 - 2004 – Terrorist attack on Parliament – Red Fort attack – Godhra tragedy –POTA – Suffronisation of Education – SSA – Manmohan Singh Government – Foreign policy – Demonitisation – Jammu Kashmir Re-organisation Act 2019.

Text Book:

1. Venkatesan. G. *Contemporary History of India.* Rajapalayam: VCPublications,2007.

Books for Reference:

1. Dube. S.C. *Contemporary India and its Modernisation*. New Delhi: Vikas Publishing House,1974.
2. Gilbert. John. G. *Contemporary History of India.* New Delhi: Anmol Publications Pvt.Ltd,1990.
3. Kamal. K.L. *Contemporary Indian Politics.*Jaipur: R.B.S.A. Publishers,1987.
4. Menon. V.P. *Integration of the Indian States.* Madras: OrientLongman,1985.

Journal:

1. https://journals.sagepub.com/doi/abs/10.1177/097492848203800112
2. http://www.worldcat.org/issn/0972-8465
3. https://ir.lib.hiroshima-u.ac.jp/en/list/HU_journals/hindas

E-Learning Resources:

1. https://youtu.be/84S5HTdWUtY
2. https://youtu.be/1yu53SeKHcw
3. https://youtu.be/qiRwd_6nJYs

SEMESTER–IV			
Core XVIII	**Dravidian Movement upto 1969 C.E**		
Course Code: 21PHIC43	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits:4**

Objectives:

- To analyse politics and society in Madras Presidency.
- To understand the phases of Dravidian Movement to build and empower a strong Tamil Nadu.
- To unearth the past of Tamils and their career to uplift Dravidian culture.

Course Outcome:

CO.NO.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the contribution of Tamil scholars.	1,2	Un,Re
CO-2	know the rich heritage of Tamils and promote their antiquity.	1,2	Un,Re
CO-3	analyse politics and society in Madras Presidency.	4	An
CO-4	evolve various associations of Non-Brahmin Movement.	1,2	Un,Re
CO-5	analyse the legislations passed.	4	An
CO-6	appreciate the work of Justice Party.	1,2	Un,Re
CO-7	enhance the role of EVR and Self-Respect Movement.	1,2	Un,Re
CO-8	understand the emergence of DMK.	1	Un,Re
CO-9	analyse social welfare schemes.	4	An

SEMESTER–IV			
Core XVIII	**Dravidian Movement upto 1969 C.E**		
Course Code: 21PHIC43	**Hrs/Week:6**	**Hrs/Semester: 90**	**Credits:4**

Unit-I Unearthing Tamil Past

Contributions of Robert de Nobili– Robert Caldwell - G.U.Pope - Prof. SundaramPillai– Maraimalai Adigal – Pure Tamil Movement – Modernization of Tamil.

Unit–II Politics and Society in Madras Presidency

Non-Brahmin Association – Madras Dravidian Association – Madras Native Association–Home Rule Movement–Non-Brahmin Movement - South Indian Liberal Federation – Madras Presidency Association.

Unit-III Dyarchy

General Elections – Justice Party - Legislations – Communal GOs – Achievements – Electoral defeats –Salem Conference–Decline.

Unit-IV EVR and Congress

Vaikam Satygraha –Cheranmahadevi Gurukulam Controversy – Kanchipuram Conference - Self - Respect movement - E.V. R. and his ideology – Anti Hindi - Agitations – Dravidar Kazaham– Contribution.

Unit-V Split in DK

Emergence of DMK – Ideology – General Elections - C.N. Annadurai = World Tamil Conference –Rajamannar Committee.

Text Book:

1. Arroran. Nambi. *Tamil Renaissance and Dravidian Nationalism (1905-1944)*. Madurai: KoodalPublishers,.1980.

Books for Reference:

1. Hardgrave. L.Robert. *The Dravidian Movement Bombay*. Bombay :Popular Prakasham, 1965.
2. Irschick. Eugene. *Politics and Social Conflicts in South India*. Los Angels: University of California Press, 1969.
3. Saraswathi. S. *Towards Self–Respect: Periyar Eve on a New World.* Madras: Institute of South Asian Studies,1994.
4. Rajayyan. K. *A Real History of Tamil Nadu*, Trivandrum: Ratna Publication,2005.

Journal:

1. https://journals.asianresassoc.org/index.php/ijot/article/view/103
2. https://irjt.iorpress.org/index.php/irjt

E-Learning Resources:

1. https://youtu.be/xxmEPZiDkwc

Semester–IV			
Core XIX	**History of USA from 1865 to 2020 C.E**		
Course Code: 21PHIC44	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits:4**

Objectives:

- To appreciate the role of American Presidents in International affairs.
- To enhance the shaping of foreign policy of USA.
- To understand the emergence of USA as a super power in the world.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	outline the history of USA under various Presidents.	1,2	Un, Re
CO-2	examine the New Deal measures of FDR.	4	An
CO-3	trace out awareness about the Civil Rights movement.	1,2	Un, Re
CO-4	assess the impact of US foreign policy since the First World War.	5	Ev
CO-5	understand the emergence of USA as a super power in the world.	1,2	Un, Re
CO-6	aware of Pan–American movement.	1,2	Un, Re
CO-7	analyse the historical background of Twin Tower attack.	4	An
CO-8	assess the role of USA in International politics.	5	Ev

Semester–IV			
Core XIX	**History of USA from 1865 to 2020 C.E**		
Course Code: 21PHIC44	**Hrs/Week:6**	**Hrs/Sem: 90**	**Credits:4**

Unit-I Post-war reconstruction

Lincoln's plan – Johnson's plan – Congressional plan – Ulysses Grant – Mc Kinley and Spanish American war.

Unit-II Industrial Development

Transport – Labour – Agriculture – Progressivism – Theodore Roosevelt – Big Stick diplomacy – Roosevelt Corollary – William Howard Taft –Dollar diplomacy.

Unit-III USA and First World War

Woodrow Wilson – Fourteen - points The Great Economic Depression.

Unit-IV Franklin D. Roosevelt

New Deal–Good Neighbour policy–Second World war–U.S.A. and Peace conferences–Pan American movement–Harry S. Truman – Truman Doctrine –Cold war – Marshal plan –Vietnam war and Korean war.

Unit-V U.S.A in Contemporary Scenario

Eisenhower – John F. Kennedy – Civil Rights movement – Richard Nixon – Jimmy Carter – Gerald Ford – Reagan – George Bush (Sr)–Bill Clinton–George Bush (Jr) - Twin Tower attack – Barrack Obama – Economic Policy - Donald Trump – Immigration Policy.

Text Book:

1. Rajayyan. K. *A History of the United States.* Madurai : Ratna Publications,1992.

Books for References:

1. Hofstadter Richard Miller. William and Aaron. Daniel. *The American Republic Since 1865. Vol.II* .New Jersey: Prentice Hall Inc,1959.
2. Majumdar. R.K. Srivastava. *History of the United States of America from 1845 to Present Day.* Delhi: SBD Publishers and Distributors, 1994.
3. Nambi Arroran . *History of the United States of America*. Madras: Government of Tamil Nadu, Metro Printers,1977.
4. Pratt W.Jullus. *A History of United States Foreign Policy.* New Jersey:Prentice-Hall,1965.

Journals:

1.https://academic.oup.com/jah
2.https://academic.oup.com/ahr
3.https://www.press.jhu.edu/journals/reviews-american-history

E-Learning Resources:

1.https://youtu.be/SBWUrnDr4MQ
2.https://youtu.be/MWYjNUAqvvU

Semester – II			
Core Elective I A	**Archives Keeping**		
Course Code : 21PHIE21	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 3**

Objectives:

- To develop the skills of data collection.
- To update the recent trends in collection of data.
- To appreciate the importance of Archives in historical writing.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the latest micro filming data collections.	1	Un
CO-2	update the primary sources of History.	7	Ap
CO-3	know the structure and functions of Archives.	1	Un
CO-4	appreciate the work of organisation.	2	Re
CO-5	understand the significance of record maintenance.	1	Un
CO-6	estimate the History of Archives.	5	Ev
CO-7	examine the pool of resources of history.	4	An
CO-8	analyse the mending of records.	4	An

Semester – II			
Core Elective I A	**Archives Keeping**		
Course Code : 21PHIE21	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 3**

Unit I **Archives**

Origin – Early History – Greece and Rome – Medieval Archives – Creation of Archives

Unit II **Organisation**

Administration of Archives – General Administration

Unit III **Preservation of Archives**

Functions of Archives – Creation of Archives awareness

Unit IV **Uses of Archives**

Authenticity in History – Administrative Values – Intellectual Values – Rules Regulating Access to the Archives – India – Common Rules and Regulations

Unit V **Public and Private Archives**

Kinds – Tamil Nadu Archives – Formation and Development – Saraswathi Mahal Library – Nehru Museum and Library – Parry and Company – Connemara Library – Macqueen – Dodwell

Textbook:

1. Dr. Thiyagarajan J. Archives Keeping. Madurai : Prabha Publications, 2007.

Books of Reference:

1. Baliga. B.S. *Madras Record Office. Indian Archives. Vol. IV.* New Delhi:1952.
2. Cook Michael. *Archives Administration: A Manual for Intermediate andSmaller Organisations and for Local Government.* Kent: 1977.
3. Raj Sundar. M. *A Manual of Archival Systems and the World of Archives.* Chennai: 1999.
4. Schellenberg. T.R. *Model Archives Principles and Techniques.* Chicago: Kansas StateHistorical Society,1956.

E-Learning Resources:

1. http://www.tnarchives.tn.gov.in/
2. http://nationalarchives.gov.in/
3. https://www.chennaimuseum.org/
4. http://keralastatearchives.org/

Semester–III			
Core Elective II A	**History of Modern West**		
Course Code: 21PHIE31	**Hrs/Week:5**	**Hrs/Sem: 75**	**Credits:4**

Objectives:

- To appreciate the work of humanist movement and classical works of Greek and Rome.
- To assess the transition period of west from medieval to modernity.
- To adore the legacy of classical ages.

Course Outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the features of Feudalism.	1,2	Un,Re
CO-2	analyse the role of capitalism.	4	An
CO-3	highlight the adventurous voyages.	1,2	Un,Re
CO-4	appreciate the geographical sea routes to the East.	1,2	Un,Re
CO-5	analyse the classical works of Greek and Rome.	4	An
CO-6	learn the significance of Humanist movement.	1,2	Un,Re
CO-7	appreciate the Renaissance and Reformation movement.	1,2	Un,Re
CO-8	assess the Counter Reformation movement.	5	Ev

Semester–III			
Core Elective II A	**History of Modern West**		
Course Code: 21PHIE31	**Hrs/Week:5**	**Hrs/Sem: 75**	**Credits:4**

Unit – I Transition

Feudalism – Capitalism - Problems

Unit – II Geographical Voyages

Exploration of the New World – Motives – Portuguese and Spanish Voyages

Unit – III Renaissance

Renaissance =Humanism– Rediscovery of Classics – Italian Renaissance andIts Impact

Unit – IV Reformation

Martin Luther and Lutheranism –John Calvin and Calvinism – RadicalReformation: Anabaptists and Huguenots– English Reformation

Unit –V Counter Reformation:

Ignatius of Loyola–Society of Jesus – Council of Trent - Implications

Text Book:

1. Rao. B. V. *History of Europe*. Delhi: Sterling Publications, 2018.

Books for Reference:

1. Burke. Peter. *The Renaissance.* US: Humanities Press International,1987. 2.Gilmore. M.P. *The World of Humanism.1453-1517,* New York: Harper,1952.

Journals:

1. https://journals.sagepub.com/home/ehq
2. https://journals.sagepub.com/home/meh
3. https://www.cambridge.org/core/journals/contemporary-european-history

E-Learning Resources:

1. https://youtu.be/DA519OihJTo
2. https://youtu.be/ieDxz0uL5Nk

SEMESTER –IV			
Core XV COMPUTERISED ACCOUNTING PACKAGES – TALLY 9.0 ERP			
Code: 17PCOC44	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Objective:

To provide knowledge on the use and application of computers in accounting.

UNIT I - Introduction to Tally:

New features of Tally 9.0 - Tally screen components – Creating/Setting up of company in Tally – Company features – Creating accounting ledgers – Creating inventory ledgers – Create Stock Items, Stock Groups, Stock Categories, Godowns and units of measure –

UNIT II Cost Centers and vouchers and Final accounts:

Create cost categories - Cost centers – invoice- inventory reports and exception reports. Types of vouchers – POS – reversing journals & Voucher classes – Types of accounting and inventory vouchers – Stock journal – Trial balance primary groups – final accounts. .

UNIT II -Value Added Tax:

Meaning of VAT - General technologies used in VAT – VAT rates – Computation of VAT - VAT classification - Ledger setup for VAT- voucher entry- Input credit adjustments for capital goods – features of composite dealers – VAT composition computation report – VAT composition returns.

UNIT III – TDS & ST:

Features of TDS – Flowchart of TDS – Account classification for TDS – TDS detection entries for advance payment and balance payment – TDS computation report
– TDS pending statement. Features of Service tax – Creation of ledger & input credit adjustments of Service Tax – Service tax reports. Features of TCS – TCS on Contracts, license and leases – Revised forms for E-TCS returns – TCS reports.

UNIT V - Pay Roll:

Features of Tally – Pay roll info – Create pay heads, gratuity pay heads , employee group, employees salary details - units attendance – production types- pay sheet report- pay slip- pay roll statement report – pay roll register – attendance sheet report
– gratuity report – pay roll with PF and ESI –.

References:

1. LP Editional Board , Guide to Tally Law point, Kolkatta
2. A.K. Nadhani and K.K. Nadhani, Implementing Tally, BPB publications
3. P. Mohan, Information Technology for Business, Himalaya Publishing House,Delhi.

SEMESTER –III			
Elective III	**International Business**		
Code: 17PCOE31	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Objective :

- To expose students to the concept, importance and dynamics of international businessand enable them to understand the mechanics of global business.

Unit I International Business:

Introduction to International business– Nature – Necessities of internationalbusiness – Stages of internationalization –Approaches and theories of international business- Favorable conditions and complexities of international business.

Unit II International Business Environment:

International Business - National and Foreign environments and their components – Economic -Cultural -Political - Legal - Technological Environments- Global trading Environment – Recent trends in world trade in goods and services

Unit III International Trade Policies and Economic Integrations

Introduction – Instruments of trade policy-Tariffs – Subsidies – Import quotas

– Non Tariff Barriers -Voluntary Export Restraints –Government interventions in Policy making -International Trade Relations- Economic integration-EEC

– NAFTA – ASEAN – SAARC- ESCAP- Trade Blocks and Business Centers

Unit IV International Finance and Accounting

International Finance - Balance of Payment- Components of Balance of Payments- Disequilibrium in the Balance of Payment- Accounting for international business - Variations in Accounting Systems- Factors influencing the development of Accounting System- Accounting clusters- InternationalFinancial Reporting Standards.

Unit V Multinational Corporations:

Multinational Corporations – Distinctions between International Corporation, Multinational Corporations, Global Corporations and Transnational Corporation – Growth of Multinational Corporations - Organizational structure of Multinational Corporations – Control of MultinationalCorporations –Multinational Corporationsin India.

Text Book

1. SubbaRao,P.(2011) International business - Himalaya Publishing House. Delhi

Reference Books:

1 . Francis Cherunellam(2011) International business, PHI Learning Pvt. Ltd., New Delhi.
2. International Business- Shenkar – Willey- International Students edition-2009.
3. Hill, Chartles,W.L.(2000) Intrnational Business, MCGraw Hill Company, New York
4. Apte, P.G: International Financial Management, Tata McGrawhill, New Delhi.

SEMESTER – II			
Self-Study Course – Corporate Legal Framework			
Code : 17PCOSS1			**Credit : 2**

Objective:

- To familiarise the students with the relevant provisions of various laws influencing business.

Unit I The Companies Act, 1956

The Companies Act, 1956 - Definitions and Types of companies – Memorandum of Association –Clauses - Articles of Association –Contents- Prospectus – Contents.

Unit II The Negotiable Instruments Act, 1881

The Negotiable Instruments Act, 1881-Definition - Types of negotiable instruments – Bill of Exchange, Cheque, Promissory note- Meaning -Essentials.

Unit III Legal Environment for Security Markets

SEBI Act, 1992 – Organisation and objectives of SEBI – Powers under Securities Contract Regulation Act, 1956 transferred to SEBI – Role of SEBI in controlling the security markets.

Unit IV The Consumer Protection Act, 1986

The Consumer Protection Act, 1986 - Salient features - Definition - Rights of consumers – Grievance Redressal Machinery.

Unit V Regulatory Environment for International Business

Regulatory Framework of W.T.O.- Basic principles and charter of W.T.O.- Provisions relating to preferential treatment of developing countries - Regional Groupings - Technical Standards - Anti-dumping duties and other NTBS - Custom valuation.

Text Books:

1.Varshney G.K. ,Corporate Legal Frame Work Sahitya Bhawan Publications, Agra.
2. Kapoor, . N.D. Company Law, Sultan Chand & Sons, New Delhi.

References:

1. Aswathappa. K., Essentials of Business Enviornment, Himalaya Publishing House, Mumbai.

SEMESTER –I			
Core II - Marketing Management			
Code: 19PCOC12	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Vision:

To impart knowledge related to recent issues and developments in marketing.

Mission:

To familiarise the students with the concept of Consumerism, Customer Relationship Management and Marketing research.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO's addressed	Cognitive Level
CO – 1	Understand the prevailing modern marketing techniques.	1,3	Un
CO – 2	Understand the significance of consumer behaviour and problems of Indian Consumers.	1,3	Un
CO – 3	Understand the retailing strategies and retailing scene in India.	1,3,4	Ev
CO – 4	Understand the important strategies for building Customer Relationship Management.	1,3,4	Ev
CO- 5	Apply online marketing in various decision making techniques.	8	Ap
CO – 6	Apply theories to avoid consumer exploitation.	8	Ap
CO – 7	Understand how services can be marketed in an effective way.	1,2,4,6	Ev
CO - 8	Understand and apply Marketing Research in business.	8	Ap

SEMESTER –I			
Core II - Marketing Management			
Code: 19PCOC12	Hrs/Week: 6	Hrs/Sem: 90	Credits : 4

Unit I Modern Marketing:

Customer Relationship Management : Meaning – building and managing customer relationship – strategies for building relationship – customer interaction management - Direct marketing - types – factors – benefits .Online marketing – features -channels– benefits.- components - online marketing in Indian scenario – problems of online marketing . Green marketing -Social marketing –meaning - types -marketing mix in social marketing – process.

Unit II Consumer Behaviour:

Meaning – factors influencing buying behaviour - buyer behaviour models -Marshallian model – Psychological models – Psycho- analytic model – Socio cultural theories - buying characteristics –buying motives -buying decision process . Consumerism – meaning – origin – Consumer exploitation – problems of Indian consumers.

Unit III Retail Management:

The frame work of retailing – functions - reasons for retailing – special characteristics of retailing-large scale retailing institutions - retail management strategy - retail management activities- relationship management – growth of highway retailing - retailing scene in India.

Unit IV Services Marketing :

Meaning – definition – difference between goods and services – characteristics of services – classification of services– marketing mix in service marketing – service quality – consumer behaviour in services - reasons for the growth of the service sector – Marketing strategies for service firms.

Unit V Marketing Research:

Objectives and importance of marketing research – scope of marketing research – characteristics of a good research – marketing research process – role of marketing research in strategic planning and decision making in marketing – emerging issues / problems – limitations of marketing research.

SEMESTER –II			
Core IX - Operations Research			
Code: 19PCOC24	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision:

To enable the students to learn decision making techniques.

Mission:

To acquire working knowledge in taking decisions for optimum use of resources.

Course Outcomes:

CO No.	On completion of this course, students will be able to	PSO's addressed	Cognitive Level
CO – 1	Understand the concept of operations research.	1,3	Un
CO – 2	Understand the decision making techniques which helps to solve management problems.	1,3,6	Un
CO – 3	Know the impact of computers of operations research.	1,3	Un
CO-4	Apply linear programming in business decision.	7,8	Ap
CO-5	Understand the application of various decision making techniques	1,6,7	Ap
CO – 6	Reap the maximum benefit out of the available resources through decision making techniques..	1,6,7	Ap
CO – 7	Apply game theory in business decision.	7,8	Ap
CO – 8	Apply Simulation techniques	7,8	Ap

SEMESTER –II			
Core IX - Operations Research			
Code: 19PCOC24	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I : Basics of Operations Research:

Definition – scope – characteristics – phases-necessity of Operations Research in industry – Operations Research and decision making –impact of computers on operations research - difficulties in operations research.

Unit II : Transportation and Assignment problem:

Definition – formulation and solution of transportation models – Optimality analysis in transportation . Assignment – definition – formulation and solution of assignment models.

Unit III : Linear Programming:

Introduction – requirements for a linear programming problem – formulation of LPP – graphical solution to LPP – simplex method –obtaining the Dual .

Unit IV: Game Theory:

Meaning – useful terminology – rules for game theory – pure strategy – mixed strategy – graphical method -dominance rule.

Unit V : Simulation:

Introduction – steps in simulation process- advantages and disadvantages of simulation techniques – Monte Carlo Method – practical applications of simulation.

Note: Theory 30% problem 70%

Text Book:

Prem Kumar Gupta& Hira D S - Operations research, S Chand & Co Ltd

References:

1. Kapoor V.K. Operations Research – Sultan Chand & Sons, New Delhi.
2. KantiSwarup, Gupta P.K. &Man Mohan Operations research, Sultan Chand & Sons, New Delhi.
3. Sharma J.K Operations Research, Macmillan India Ltd., Delhi.
4. Vohra N.D. Quantitative Techniques in Management, Tata Mc. Graw Hill Publishing Company, Delhi.

SEMESTER –III			
Core XII	**Human Resource Management**		
Code: 19PCOC32	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits : 4**

Vision:

To give a theoretical exposure to the students with regard to various aspects of Human Resource Management.

Mission:

To instill in students the various techniques followed in Recruitment, Selection,Induction and Performance Appraisal.

To familiarise the students with various concepts of WPM, Wage and salary administration, safety and welfare measures, Grievance handling procedure, machinery for settlement of disputes and computer applications in HRM.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand the significance of Human Resource Management.	1,3	Un
CO – 2	understand the process of recruitment, selection, placement and induction.	1,2,3	Un
CO – 3	know the various training methods, executive development programme.	1,7	Ev
CO – 4	understand the various Participative management techniques.	1,7	Ev
CO-5	understand the various compensation plans, reward system and quality of work life.	2,3, 8	Ap
CO – 6	understand the safety and welfare measures.	1,4,8	Ap
CO – 7	understand the procedure for performance appraisal.	1,4,8	Ap
CO – 8	understand and apply grievance handling procedures and machinery for settlement of disputes.	1,4,8	Ap

SEMESTER –III			
Core XII Human Resource Management			
Code: 19PCOC32	Hrs/Week: 6	Hrs/Sem: 90	Credits : 4

Unit I Introduction

Evolution of human resource management – Importance of the human factor- Objectives ofhuman resource management - Scope of HRM - HRM Models-Role of human resource manager
- Skills and qualities of HR manager –Human resource policies.

Unit II Man Power Planning & Selection

Importance of human resource planning – Forecasting human resource requirement -man power planning techniques - Recruitment and Selection -Sources of recruitment -Selection process - Screening tests – Interviews - Placement - Induction – Orientation– Socialisation.

Unit III Training and Development

Objectives of training – Training needs - Training methods – Benefits – Executive development programmes – Common practices – Organisation development – Self development– Knowledgemanagement.

Unit IV Sustaining Employee Interest

Motivation – theories and application – Rewards – Job satisfaction - Job design - Empowerment of employees - Participative Management - Quality of work life - Flexi time - Career management - Development cycle - Need assessment – Protégé relationships – Employee Compensation plans - Employee Benefits - Safety and Welfare.

Unit V Performance Evaluation and Control Process

Job evaluation - Performance Appraisal: process, methods of performance evaluation – feedback– industry practices - Control process: Importance, Methods – Requirement of effective controlsystems – Career planning – Grievance: causes, handling procedure –Types of industrial disputes
- Machinery for settlement of disputes – Computer applications in HRM.

Text Book:

1. Aswathappa K. *Human Resources Management*. New Delhi: Tata McGraw Hill.
2. Khanka S.S. *Human Resources Management*. New Delhi: S.Chand&Co.Ltd.

Books for Reference:

1. Rao V.S.P. *Human Resources Management.*New Delhi: Excel Books.
2. Tripathi P.C. *Human Resources Management.*New Delhi: Sultan Chand.
3. Mamoria, C.B. and Gankar, S.V. *Human Resources Management*.

Mumbai: HimalayaPublishing House.

SEMESTER –III			
Core XIII	E – Commerce		
Code: 19PCOC33	Hrs/Week: 5	Hrs/Sem: 75	Credits : 4

Vision :

Create competent and skilled entrepreneurs with thorough knowledge on the various aspects of E-Commerce**.**

Mission :

Familiarise students with the concepts and various issues of e-Commerce like Internet infrastructure, Security over internet, payment systems and various online strategies for e-Business.

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	understand the concepts, application and models of e-commerce.	1,2,5	Un
CO – 2	learn the importance and application of electronic media for marketing of goods and services.	1, 5	Ap
CO – 3	evaluate the types of e- payment systems and know its operational,credit and legal risks.	1,2,5	Un,Ev
CO – 4	understand the dynamics of internet banking, security mechanism involved in net banking and inherent risks	1,7	Un,Ap
CO - 5	gain knowledge on e-sourcing and e-Trading and its use for generating income	1,7	Un,Ap
CO - 6	understand the types of security threats in e-Commerce transactions	1,5,6	Un, Re
CO - 7	analyse and evaluate e-Commerce Security Solutions for online transactions	1,5,6	An,Ev
CO - 8	identify the security issues and regulatory and legal framework in e-Commerce.	2, 6	Ap

Semester – III			
Core XIII	**E – Commerce**		
Code: 19PCOC33	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I Introduction to e-Commerce:

Meaning and concept, Electronic Commerce Vs. Traditional commerce - Media convergence - e-commerce and e-business - channels of e-commerce - Business application of e-commerce - Need for e-commerce - e-commerce as an electronic trading system - special features. Business models of e-commerce and Infrastructure: e-commerce models -supply chain management - M-Commerce – Teleshopping - Telemarketing - Point of sales system.

Unit II Business to Business e-commerce:

Inter-organisational Transactions – The Credit Transaction Trade Cycle – Electronic Markets – Usage of electronic Markets – Advantages and Disadvantages of Electronic Markets – Future of Electronic Markets. Electronic Data Interchange (EDI):- Introduction –Definition – Benefits - EDI Technology - EDI standards- EDI Communication - EDI implementation - EDI Agreements - EDI security.

Unit III Electronic payment systems:

Special features required in payment systems for e-commerce - Types of e-payment systems - e-Cash and currency servers - e-cheques - credit cards - smart cards - electronic purses and debit cards - Business issues and economic implications - operational credit and legal risks of e-payment systems - Risk management options in e-payment systems - components of an effective electronic payment system.

Unit IV Internet and e-banking:

Evolution of Internet - Growth of Internet - Gateway to digital world - Internet Governance - World wide web - Dynamics of Internet banking - Intranet and Internet portals - e-sourcing - e-Trading -Advertising and Marketing through Internet.

Unit V Security issues in e-commerce:

Need for Security – Security Concepts - Areas of Internet Security - Cyber Crimes: - Deception - Intrusion - Bugs - Encryption - Cryptography - Certificate based Security -- Digital Signature - e-Commerce Security Solutions - Security Precautions in e-Commerce - Transaction Security - PKI - Firewalls - Secure Socket Layer (SSL) - Secure Electronic Transaction (SET) - Advantages of SET - Corporate Digital Library, - Regulatory and legal Framework of e-commerce: Cyber laws, aims and salient provisions; cyber-laws in India and their limitations.

Text Book:

Rayudu C.S. *E-Commerce.*Mumbai: Himalaya Publishing House.

Books for Reference:

1. David Whiteley. E-*commerce, Strategy, Technologies and Applications*. New Delhi: TataMcGraw Hill Publishing Company.
2. Bhashin T.M..*E-commerce in Indian banking*. New Delhi: Authors Press.
3. JaiswalS.. *E-commerce*. New Delhi: Galgotia Publications Pvt. Ltd.

SEMESTER –III			
Core XIV International Business			
Code: 19PCOC34	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision:

Global outlook in trade and finance from students side.

Mission:

Practical, Organizational sittings and Theoretical exposure to the budding womenfolk.

Course Outcome:

	Upon completion of this course, students will be able to	**PSO addressed**	**Cognitive Level**
CO – 1	pursue a career in global business management.	1,2,3	Ap
CO – 2	understand the unique problems of foreign economic, social, political, cultural and legal environment.	4	Ev
CO – 3	expose regional economic and political integration.	1,4	Ev
CO – 4	understand accounting systems of various countries and foreign exchange with balance of payment.	3,7	An
CO-5	familiarise with multinational corporations in India.	1,4	Un
CO – 6	expose towards the dynamics of International Business.	1	Ap
CO – 7	understand the different business centres and blocks.	8	Un
CO - 8	expose on MNC's at International Level.	4	Ev

SEMESTER –III			
Core XIV	**International Business**		
Code: 19PCOC34	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I Basics of International Business

Introduction to International business– Nature – Necessities of international business – Stages of internationalization – Approaches and Theories of internationalbusiness–Favorable conditions and complexities of International Business.

Unit II International Business Environment

International Business Environment - National and Foreign environments and their components– Economic - Cultural - Political - Legal - Technological Environments- Global tradingEnvironment – Recent trends in world trade in goods and services

Unit III International Trade Policies and Economic Integrations

Instruments of Trade policy - Tariffs – Subsidies – Import quotas – Non Tariff Barriers - Voluntary Export Restraints –Government interventions in Policy making - International Trade Relations - Economic integration - EEC – NAFTA – ASEAN – SAARC- ESCAP- Trade Blocksand Business Centers

Unit IV International Finance and Accounting

International Finance - Balance of Payment - Components of Balance of Payments - Disequilibrium in the Balance of Payment- Accounting for international business - Variations in Accounting Systems- Factors influencing the development of Accounting System- Accounting clusters- International Financial Reporting Standards.

Unit V Multinational Corporations

Multinational Corporations – Distinctions between International Corporation, Multinational Corporations, Global Corporations and Transnational Corporation – Growth of Multinational Corporations - Organizational structure of Multinational Corporations – Control of Multinational Corporations – Multinational Corporations in India

Text Book

Subba Rao, P. *International business*. New Delhi: Himalaya Publishing House.

Books for Reference:

1. Francis Cherunilam. *International business*. New Delhi: PHI Learning Pvt. Ltd.
2. Shenkar Willey. *International Business*. New Delhi: International Students edition.
3. Hill, Charles,W.L. *International Business*. New York: McGraw Hill Company.
4. Apte, P.G .*International Financial Management.* New Delhi:Tata McGraw hillCompany.

SEMESTER –IV			
Core XVIII Computerised Accounting Packages – Tally 9.0 Erp			
Code: 19PCOC43	**Hrs/Week: 5**	**Hrs/ Sem: 75**	**Credits : 4**

Vision:

To equip students with skill for employment in companies as data entry operator

Mission:

The course aims to build upon the concept and procedure in entering accounting data in TALLY ERP with TDS and GST.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand Growth of software for accounting entry with technical advantages and fundamental concepts	1,2,4	Un
CO – 2	understand stock items, stock groups, units of measure creation with Godown transfer.	1,2,4	Un
CO – 3	know the procedural Creation of cost categories, types of vouchers with ledger entry for the preparation of final accounts in Tally ERP.9 software.	1,2,4	Un
CO – 4	learn the concept, importance and application of GST	1,4,5	Ap
CO – 5	understand the Registration, Accounts and Returns under GST	4,5	Ap
CO –6	be familiar with the statutory Taxation of Tally like TDS.	1,4,5	Ap
CO – 7	understand the steps in creating Pay roll info in Tally ERP	4,5	An
CO – 8	to apply pay roll info for employee creation, pay heads, attendance in appropriate employee group	4,5	Ap

SEMESTER –IV			
Core XVIII	**Computerised Accounting Packages – Tally 9.0 ERP**		
Code: 19PCOC43	**Hrs/Week: 5**	**Hrs/ Sem: 75**	**Credits : 4**

Unit I - Introduction to Tally:

New features of Tally ERP 9.0 - Tally screen components – Creating and Setting up of company in Tally – Company features – Creating accounting ledgers – Creating inventory ledgers – Create Stock Items - Stock Groups - Stock Categories - Units of measure – Transfer between godown

Unit II - Cost Centres, Vouchers and Final accounts:

Create cost categories - Cost centres– invoice- inventory reports and exception reports. Types of vouchers – Reversing journals & Voucher classes – Types of accounting and inventory vouchers – Stock journal – Trial balance - Primary groups – Final accounts. .

Unit III - Goods and Service Tax in Tally:

GST introduction – Classification of goods and services – IGST – CGST – SGST – supply and its types – Time, value and place of supply – Registration under GST Act – Schemes for registration – ITC – Eligible & Ineligible ITC – ITC carry forward – Reversal of ITC– Availment&Utilisation of ITC –Issue of Invoices – Debit note – Credit note – ISD invoice – E-way Bill – Accounts and Records – Returns under GST.

Unit IV - TDS:

Features of TDS – Flowchart of TDS – Account classification for TDS – TDS detection entries for advance payment and balance payment – TDS computation report – TDS pending statement.

Unit V - Pay Roll:

Features of Tally – Pay roll info – Create pay heads -Gratuity pay heads - Employee group- Employee Salary details –Units of attendances – Production types- Pay sheet report- Pay slip- Pay roll statement report – Pay Roll register – Attendance sheet report – Gratuity report – Pay roll with PF and ESI –.

Text Book:

Narmata Agrawal and Sanjay Kumar. *Comdex Tally 9.* Course Kit, New Delhi:Dream tech press.

Books for Reference:

1. Tutorial Notes. CSC*, Tally ERP 9.*
2. Nadhani A.K. and K.K. Nadhani. *Implementing Tally*,New Delhi: BPB Publications.
3. TALLY Notes , Bombay: TCIL.

SEMESTER –IV			
Core- XIX Computerised Accounting Packages – Tally 9.0 ERP[Practicals]			
Code: 19PCOC44	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Vision:

To provide computerised proficiency in the latest accounting package called Tally 9.ERP

Mission:

Individualised development of concept and procedure in entering accounting data in Tally ERP with TDS and GST

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	imbibe growth of software for accounting entry with technical advantages and fundamental concepts	1,2,4	Un
CO – 2	prepare stock items, stock groups, units of measure creation with Godown transfer.	1,2,4	Ap
CO – 3	create cost categories, vouchers with ledger entry for the preparation of final accounts .	1,2,4	Ap
CO – 4	learn the concept, importance and application of GST	1,4,5	Ap
CO – 5	prepare GST Registration and Returns under GST	1,4,5	Ap
CO –6	be familiar with the statutory TDS Taxation in Tally like TDS.	1,4,5	Ap
CO – 7	create Pay roll info in Tally ERP	4,5	Ap
CO – 8	prepare employee creation, pay heads, attendance, in appropriate employee group	4,5	Ap

SEMESTER –IV			
Core- XIX Computerised Accounting Packages – Tally 9.0 ERP[Practicals]			
Code: 19PCOC44	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

PRACTICAL EXCERCISES

1. Accounting ledgers and vouchers creation
2. Inventory ledgers & vouchers creation
3. Final Accounts with Adjustments
4. Ledgers and vouchers creations with GST
5. Accounts and Records and Return under GST
6. Ledgers and Vouchers creation of TDS
7. Pay roll creation with Pay heads, Attendance, with salary details
8. Ledgers and Vouchers creation of Pay roll
9. Pay slips, Pay Sheets and pay roll report

SCHEME FOR PRACTICAL EXAMINATIONS

Internal Examination marks **40Marks(**Attendance 10 marks and perfo

Record Note	= 10 Marks	
Program/ Procedure writing	= 30 Marks	
Result	= 20 Marks	**60 Marks**
Total		**100 Marks**

SEMESTER –II			
Elective I B	**Green Marketing**		
Code: 19PCOE21	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 3**

Vision:

Increase the consciousness about Green Products**.**

Mission:

Make the students to understand the importance of Green Marketing on consumer satisfaction and environmental safety.

Course Outcome:

Co.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of Green market and Green products.	1,3	Un
CO-2	have a broader understating of Green Marketing and its significance.	2,4	An
CO-3	learn the factors that affect purchase decision of consumers.	3,6	Un
CO-4	learn the laws that promote Green Marketing.	1,8	Ev
CO-5	manage e waste.	1,8	Ap
CO-6	useEco friendly products.	4,6	Un
C0-7	initiateadoption of green initiatives.	5,7	Ap
CO-8	understand the green environment policies.	1,7	An

SEMESTER –II			
Elective I B	**Green Marketing**		
Code: 19PCOE21	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 3**

Unit I Green Marketing and Green Product

Green Product - Green Marketing - Evolution of Green Marketing - Importance of green marketing - Benefits of Green Marketing- Adoption of Green Marketing- Green Marketing Mix – Strategies to Green Marketing

Unit-II Green Marketing Concepts

Green Spinning – Green Selling – Green Harvesting – Enviropreneur Marketing - Compliance Marketing – Green Washing – Climate Performance Leadership Index

Unit-III Green Marketing Initiatives

Green Firms – HCL's Green Management Policy – IBM's Green Solutions – IndusInd Bank's Solar Powered ATMs – ITCs Paperkraft – Maruti's Green Supply Chain – ONCGs Mokshada Green Crematorium – Reva's Electric Car – Samsung's Eco-friendly handsets- Wipro Infotech's Eco-friendly computer peripherals

Unit-IV Purchase Decision

Meaning of Purchase decision – Factors affecting Purchase decision - Steps in the decision making process - Five stages of consumer buying decision process - Models of buyer decision-making

Unit-V Environmental Consciousness

Introduction of Environment - Importance of environmentalism - Environmental movement - Benefits of green environment to the society - e-Waste exchange - Extended Producer Responsibility Plan - Guidelines for Collection and Storage of e-Waste - Guidelines for Transportation of e-Waste - Guidelines for Environmentally Sound Recycling of e-Waste

Text Book:

Esakki and Thangasamy.*Green Marketing and Environmental Responsibility in Modern Corporations.*Pennyslyvania:IGI Global, 2017.

Books for Reference:

1. Robert Dahlstrom, Cengage. *Green Marketing Management*, Learning, 2010.
2. Jacquelyn A. Ottman. *Green Marketing: Challenges and Opportunities for the NewMarketing Age.* NTC Business Books, 1993.
3. Jacquelyn A. Ottman,Berrett. *The New Rules of Green Marketing*. Koehler Publishers, 2011.

SEMESTER – III			
Elective II A	**Corporate Legal Framework**		
Code : 19PCOE31	**Hrs / Week 4**	**Hrs/Sem 60**	**Credit : 3**

Vision:

To familiarise the students with the relevant provisions of various laws influencing business.

Mission:

To acquaint the students with the provisions of various laws**.**

Course Outcome:

CO No.	Upon completion of this course,students will be able to	PSO addressed	Cognitive Level
CO – 1	understand the provisions of various laws.	1,3,6	Un
CO – 2	understand the role of SEBI	1,8	Un
CO - 3	be familiar with the Regulatory Environment for International Business.	4	Ap
CO-4	understand and identify the problems of consumers and redress the grievance.	1,8	Ap
CO-5	understand the Negotiable Instruments	1,3,8	Ap
CO - 6	know about consumer rights	1,8	Ap
CO – 7	understand about the operations of grievance redressalforum.	1,8	Un
CO – 8	be familiar with the regulations of SEBI	1,8	Un

SEMESTER – III			
Elective II A	**Corporate Legal Framework**		
Code : 19PCOE31	**Hrs/week: 4**	**Hrs/Sem 60**	**Credit : 3**

Unit I The Companies Act, 1956

The Companies Act, 1956 - Definitions and Types of companies – Memorandum of Association
–Clauses - Articles of Association –Contents- Prospectus– Contents.

Unit IIThe Negotiable Instruments Act, 1881

The Negotiable Instruments Act, 1881-Definition - Types of negotiable instruments –Bill ofExchange, Cheque, Promissory note- Meaning -Essentials.

Unit III Legal Environment for Security Markets

SEBI Act, 1992 – Organisation and objectives of SEBI – Powers under Securities ContractRegulation Act, 1956 transferred to SEBI – Role of SEBI in controlling the security markets.

Unit IV The Consumer Protection Act, 1986

The Consumer Protection Act, 1986 - Salient features - Definition - Rights of consumers –Grievance Redressal Machinery.

Unit V Regulatory Environment for International Business

Regulatory Frame work of W.T.O.- Basic principles and charter of W.T.O.- Provisions relating to preferential treatment of developing countries - Regional Groupings -Technical Standards - Anti- dumping duties and other NTBS - Custom valuation.

Text Books:

1. VarshneyG.K. *Corporate Legal Frame Work.* Agra: SahityaBhawan Publications.2.Kapoor,N.D. *Company Law.* New Delhi: Sultan Chand & Sons.

Books for Reference:

1. Aswathappa. K. *Essentials of Business Enviornment.* Mumbai:Himalaya Publishing House.

SEMESTER –II			
Core VIII	**Business Environment**		
Course Code: 21PCOC23	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Objectives

- To educate the students on Indian environmental aspects of business
- To enrich the students with various types of business environment

Course Outcomes:

CO No.	On completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand the significance of Business Environment	1,4	Un
CO – 2	assess the various Policies and Economic reforms.	1,2	An
CO – 3	identify the various roles of Small Finance and Development Banks in Industrial Development.	3,5	Un
CO – 4	identify the various Political and Legal Environment of Business.	3,5	Un
CO- 5	discuss the Social Environment	1,7	Ev
CO-6	discuss the Cultural Environment	1,8	Un
CO – 7	recognize the Technological Environment	1,8	Un
CO – 8	identify the impact of Technological Environment on Globalisation	1,8	Un

SEMESTER –II			
Core VIII	**Business Environment**		
Course Code: 21PCOC23	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I - Business Environment **12 Hrs**

Concepts - Significance and Nature of Business Environments - Elements of Environment - Internal and External - Environmental Analysis-.Techniques –Advantages-Limitations.

Unit II - Economic Environment of Business **20 Hrs**

Significance and elements of Economic Environment - Economic Planning-Economic Systems and Business Environment- Policies- Industrial policy - Fiscal policy - Monetary policy –Industries Development and Regulation Act- Small Finance and Development banks - Relevance to Indian business - Economic reforms.

Unit III - Political and Legal Environment of Business **15 Hrs**

Critical elements of Political Environment - Government and Business- Roles of Government in Business- Political Institutions- Legislature-Executive-Judiciary

Unit IV – Socio and Cultural Environment of Business **15 Hrs**

Critical elements of Socio-Cultural Environment - Social Institutions and Systems- Social Values and Attitudes - Social Groups-Social Responsibility of Business – Culture- Nature-Types-Impact of Cultural Environment on Business

Unit V – Technological Environment of Business **13 Hrs**

Technology-Features - Innovation-Product and Process-Technological Leadership and Followership-Technology and Economy-Sources of Technology Dynamics-Appropriate Technology-Impact of Technology on Globalisation - Transfer of Technology

Text Book:

1. Francis Cherunilam. *Business Environment* .Mumbai: Himalaya Publishing House, 29th 2021.

Books for Reference:

1.Adhikary M. *Economic Environment of Business.* New Delhi: Sultan Chand & Sons,15th edition 2019

2. Aswathappa.K.*Essentials of Business Environment.* New Delhi: Himalaya Publishing.House, 12th edition 2016.

SEMESTER –III			
Core XIV	**International Business**		
Course Code: 21PCOC34	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Objective:

Global outlook in trade and finance from the budding women folk.

Course Outcomes:

	Upon completion of this course, students will be able to	**PSO addressed**	**Cognitive Level**
CO – 1	pursue a career in global business management.	1,2,3	Ap
CO – 2	identify the unique problems of foreign economic, social, political, cultural and legal environment.	4	Un
CO – 3	examine regional economic and political integration.	1,4	Ap
CO – 4	appraise accounting systems of various countries and foreign exchange with balance of payment.	3,7	An
CO-5	familiarise with multinational corporations in India.	1,4	Un
CO – 6	expose towards the dynamics of International Business.	1	Ap
CO – 7	understand the different business centres and blocks.	8	Un
CO - 8	expose on MNC's at International Level.	4	Ev

SEMESTER –III			
Core XIV	**International Business**		
Course Code: 21PCOC34	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I Basics of International Business [15 Hrs]

Introduction to International business– Nature – Necessities of international business – Stages of internationalization – Approaches and Theories of International Business–Favorable Conditions and Complexities of International Business.

Unit II International Business Environment [15 Hrs]

International Business Environment - National and Foreign environments and their components – Economic - Cultural - Political - Legal - Technological Environments- Global tradingEnvironment

Unit III International Trade Policies and Economic Integrations [15 Hrs]

Instruments of Trade policy - Tariffs – Subsidies – Import quotas – Non Tariff Barriers - Voluntary Export Restraints –Government interventions in Policy making - International Trade Relations - Economic integration - EEC – NAFTA – ASEAN – SAARC- ESCAP- Trade Blocks and Business Centers

Unit IV International Finance and Accounting [15 Hrs]

International Finance - Balance of Payment - Components of Balance of Payments - Disequilibrium in the Balance of Payment- Accounting for international business - Variations in Accounting Systems- Factors influencing the development of Accounting System- Accounting Clusters- International Financial Reporting Standards.

Unit V Multinational Corporations [15 Hrs]

Multinational Corporations – Distinctions between International Corporation, Multinational Corporations, Global Corporations and Transnational Corporation – Growth of Multinational Corporations - Organizational structure of Multinational Corporations – Control of Multinational Corporations – Multinational Corporations in India

Text Book

Subba Rao P. *International business*. New Delhi: Himalaya Publishing House,4th revised edition 2016.

Books for Reference:

1. Francis Cherunilam. *International Business*. New Delhi: PHI Learning Pvt. Ltd., 6th edition 2020.
2. Shenkar Willey. *International Business*. New Delhi: International Students edition, 5th edition 2014
3. Hill Charles W.L. *International Business*. New York: McGraw Hill Company, 11th edition 2018

SEMESTER –IV			
Core XIX	**Retail Marketing**		
Course Code: 21PCOC44	**Hrs/Week: 6**	**Hrs/ Sem: 90**	**Credits : 4**

Objectives:

- To impart knowledge related to recent issues and developments in Retail marketing and Retail formats.

- To enable the students understand the concept of Retail marketing strategy, Merchandising and pricing familiarise them with the concept of Information technology in Retailing and ethics in Retailing

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand the concept of Retail marketing and retailing scene in India.	1,3,4	Un
CO – 2	understand the significance and types of retailers and retail formats.	1,3	Un
CO – 3	understand the important strategies for building retail store image and retail service quality management.	1,3,4	Un
CO - 4	know the factors that affect Retail consumer Retail pricing, and merchandising.	1,4	Un
CO- 5	study the role of retail store layout and Retail Logistics.	7	Ap
CO –6	understand the importance of retail market strategies for building Customer's service.	1,3,4	Ev
CO – 7	understand how services can be marketed in an effective way.	1,2,4,6	Ev
CO - 8	know the uses of various technologies in Retail operations and E-Tailing	8	Ap

SEMESTER –IV			
Core XIX	**Retail Marketing**		
Course Code: 21PCOC44	**Hrs/Week: 6**	**Hrs/ Sem: 90**	**Credits : 4**

UNIT – I Retail Marketing – An Overview **(18 hrs)**

Retail marketing – Meaning – Definition – Characteristics - Scope - Functions — Advantages of Retailing – Problems – Theories -– Retailing in Indian Scenario – Drivers – Major Retailers in India - Trends and Opportunities for Retailing in India – Future of Retail in India - Global Trend in Retailing.

Unit II Retailers, Retailing Consumer and Retail Formats **(20 hrs)**

Retailers - Types of Retailers –Retail Consumer – Factors influencing Consumer Decision Making – Customer Service in Retailing. Retail Formats - Classification of Retail Formats – Store based – Non store based retailing –Service Retailing – Emerging Trends in Retailing Formats

Unit – III – Retail Store Layout and Retail Logistics **(18 hrs)**

Retail Store Location –Internal and External atmospherics – Elements – Stores Positioning – Approaches – Strategies – Building Retailing Store Image – Retail Services Quality Management – Retail Logistics – Transportation – Warehousing – Cost Structure – Flow in Supply Chain Management.

UNIT – IV Retail Market Strategy, Merchandising and Retail Pricing **(17 hrs)**

Retail Market Strategy – Concept – Importance – Steps in the Strategic Retail Planning Process. Retail Merchandising Mix – Types – Principles – Brand in Retailing. Retail Pricing – Objectives – Factors of Pricing.

UNIT – V Information Technology in Retailing, Ethics and E – Tailing **(17 hrs)**

Information Technology in Retailing – Concept – Need – Importance – Types of Technologies used in retail operations – Barcode – RFID – Body Scanning – EPOS – EFT – Ethics in Retailing – E – Tailing in India.

Text Books:

1. Chitra D, Mahalakshmi V. Retail Marketing, Walnut Publication New Delhi, First edition Jan 2021
2. Banumathy S. and Jeyalakshmi M.,*Retail Marketing*,Himalaya Publishing House, Mumbai First Reprint 2021

Books for Reference:

1. Srinavasa Rao T .*Retail Marketing*.Global Vision Publishing House, New Delhi First Edition 2021

SEMESTER –IV			
Core XVIII Computerized Accounting Packages – Tally ERP.9			
Course Code: 21PCOCR1	**Hrs/Week: 6**	**Hrs/ Sem: 90**	**Credits : 4**

Objectives:

- To build upon the concept and procedure in entering accounting data in TALLY ERP with TDS and GST.
- To equip students with skill for employment in companies as data entry operator

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	Cognitive Level
CO – 1	understand Growth of software for accounting entry with technical advantages and fundamental concepts	1,2,4	Un
CO – 2	understand stock items, stock groups, units of measure creation with Godown transfer.	1,2,4	Un
CO – 3	procedural Creation of cost categories, and classify the types of vouchers with ledger entry for the preparation of finalaccounts in Tally ERP.9 software.	1,2,4	Ap
CO – 4	learn the concept, importance and application of GST	1,4,5	Ap
CO – 5	understand the Registration, Accounts and Returns under GST	4,5	Ap
CO –6	be familiar with the statutory Taxation of Tally like TDS.	1,4,5	Ap
CO – 7	understand the steps in creating Pay roll info in Tally ERP	4,5	An
CO – 8	apply pay roll info for employee creation, pay heads, attendance in appropriate employee group	4,5	Ap

SEMESTER –IV			
Core XVIII	**Computerized Accounting Packages – Tally ERP.9**		
Course Code: 21PCOCR1	**Hrs/Week: 6**	**Hrs/ Sem: 90**	**Credits : 4**

Unit I – Tally ERP .9 Accounting Vouchers and Final accounts: [25 Hrs]

New features of Tally ERP 9.0 - Creating and Setting up of company in Tally – Company features – Creating accounting ledgers . Types of accounting vouchers–- Primary groups – Final accounts. .

Unit II – Inventory Vouchers, Cost Centres, [20 Hrs]

Creating inventory ledgers – CreateStock Items - Stock Groups - Stock Categories - Units of measure - Stock journal and Reversing journals - Inventory vouchers. Create cost categories - Cost centres– invoice- inventory reports and exception reports.

Unit III - Goods and Service Tax in Tally: [15 Hrs]

GST introduction – Classification of goods and services – IGST – CGST – SGST – supply and its types – Time, value and place of supply – Registration under GST Act ITC – Eligible & Ineligible ITC – Debit note – Credit note – ISD invoice – E-way Bill – Accounts and Records – Returns under GST.

Unit IV - TDS: [15 Hrs]

Features of TDS – Flowchart of TDS – Account classification for TDS – TDS deduction entries for advance payment and balance payment – TDS computation report – TDS pending statement.

Unit V - Pay Roll: [15 Hrs]

Features of Tally – Pay roll info – Create pay heads -Gratuity pay heads - Employee group- Employee Salary details –Units of attendances – Production types- Pay sheet report- Pay slip- Pay roll statement report – Pay Roll register – Attendance sheet report – Gratuity report – Pay roll with PF and ESI .

Text Book:

Narmata Agrawal and Sanjay Kumar. *Comdex Tally 9.* Course Kit, New Delhi:Dream tech press,1st edition 2016

Books for Reference:

1.Tutorial Notes. CSC, Tally ERP 9.,2012

2.Nadhani A.K. and Nadhan K.K. Implementing Tally,New Delhi: BPB Publications 4th edition 2018

3.TALLY Notes , Bombay: TCIL,2011

SEMESTER –III			
Core XIII	**E – Commerce**		
Course Code: 22PCOC33	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Objective:

To familiarise students with the concepts and various issues of e-Commerce like Internet infrastructure, Security over internet and payment systems for e- Business.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO – 1	explain the concepts, application and models of e-commerce.	1,2,5	Un
CO – 2	examine the concepts and application of e-market	1, 5	Ap
CO – 3	appraise the concepts and application of e-business	1,2,5	Un, Ev
CO – 4	examine the e- payment systems	1,7	Un, Ap
CO - 5	analyse e-Commerce Security solutions for online transactions	1,7	Un, Ap
CO - 6	identify the security issues and regulatory and legal framework in e-Commerce.	1,5,6	Un
CO - 7	appraise the e-commerce laws	1,5,6	An, Ev
CO - 8	examine the taxation issues in e-commerce	2, 6	Ap

Semester – III			
Core XIII	**E – Commerce**		
Course Code: 21PCOC33	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits : 4**

Unit I Introduction to E-Commerce (15 Hours)

Introduction – Evolution of E-Commerce - Goals- Scope- Significance – Essentials – Components- Functions – Prospects – Applications – Strategies – Business Models – Major Modes in E-Commerce - Pre-Requisites of E-Commerce - Advantages – Disadvantages – Growth of E-Commerce – Segments – Characteristics of the Economic Model for E-Commerce – E-Commerce in India.

Unit II E-Market and E- Business (15 Hours)

Electronic Market – Three Models of Electronic Market – E-Market Dimensions – Market Category – Interactive Marketing – One to One Marketing – Permission Marketing – Pull and Push Technologies – B2B Hubs - **Electronic Business** – Applications – Indian Scenario for E-Business – Failure for E-Business Projects – Implementation - Success of E-Business – B2B — B2C- Categories of E- Commerce Application - E-Commerce Vs. E-Business – E-Market Vs. E-Business

Unit III E- Payment Systems (15 Hours)

Digital Payment Requirements – Categories of E-Payment Systems – Traditional Payment System – Modern Payment System - Digital Token based e-Payment Systems – Classification of Payment System – Payseal – Process – Advantages - e-Cash – Advantages – Disadvantages – Transaction - Bitcoin as a Cryptocurrency – Risk in e-Payment System – Designing e-Payment System – Digital Signature – Payment Security

Unit IV E-Security (15 Hours)

Introduction to Security – Electronic Security – Attacking Methods – Security Practices – Cryptography – Hackers View – Secure Electronic Transaction (SET) – Payment Enablers – Secure socket Layer (SSL) – Ten Practical Tips to Secure E-Commerce – Internet Security – Privacy Issues – Privacy on the Internet – Corporate e-mail privacy – Computer Crime – Types – Threats – Major Types of Security Problems – Online Crime - Challenges in E- Security.

Unit V E-Commerce Laws and Taxation Issues (15 Hours)

Legal Environment of E-Commerce – Information Technology Act 2000 - IT (Amended) Act, 2008 – Cyber Laws in India – Use and Protection of Intellectual Property (IP) in Online Business – IP Issues in designing a Web Site – E-Commerce and Patents – Trademark Issues - **Taxation Issues** - Issue of Taxing Electronic Commerce – Basic principles of Taxing e-Commerce – Jurisdiction on the Internet - Implied Warranties and Warranty Disclaimers on the Web – Terms of Service Agreements – E-Commerce Taxation Norms in Different Countries.

Text Books

1. Murthy C.S.V, e-Commerce Concepts, Models, Strategies, Mumbai, Himalaya Publishing House, 1st edition 2018.

2. Joseph P.T.., E-Commerce – An Indian Perspective, New Delhi, PHI Learning Private Limited, 6th edition 2019.

Books for Reference

1. David Whiteley. E-commerce, Strategy, Technologies and Applications. New Delhi: Tata McGraw Hill Publishing Company. Revised 5th edition 2010

2. Bhashin T.M..E-Commerce in Indian banking. New Delhi: Authors Press. 13th edition 2013.

SEMESTER IV			
Common core I – Marine Biology			
Code: 17PBCC41	**Hrs/week:6**	**Hrs/Semester : 90**	**Credits: 5**

Objectives

- To make the students realize the potentiality of marine environment
- To understand the marine ecosystem threats and conservation

Unit I **Marine Environment – Zonation and Biota**

Sea as a biological environment. Classification of marine environment.Plankton – classification (size, life, habitat) and adaptations. Inter-tidal, rocky, sandy and muddy shores –features of the flora, fauna and adaptations. Role of marine micro-organisms (bacteria and fungi) in nutrient cycles (nitrate, phosphate and sulphate)

Unit II **Characteristics of Sea Water**

Physical properties: waves, tides, currents- types, causes, and their impact on marine organisms. Illumination, temperature, pressure. Chemical properties: nutrients, (major, minor, and trace elements), salinity, pH, density, dissolved gases (oxygen, carbon-di-oxide).

Unit III **Marine Ecosystems**

Estuaries, salt marshes, mangroves. Coral reef - ecology and types, species interaction, adaptations and importance. Threats and conservation of coastal ecosystems (coral reef and mangroves)

Unit I V **Marine Pollution**

Sources, effects and control measures of heavy metal, radioactive, oil, and thermal pollutions. Algal blooms-sources and effects. Microbial indicators of pollution. Role of microbes in pollution abatement.

Unit V **Wealth of the sea**

Living resources: Fishery products- fish meal and fish oil. Natural pearls: formation, ornamental and medicinal importance. Non-living resources: mineral wealth (manganese nodules, beach placers, glauconite and garnet). Bioactive compounds from marine organisms (bacteria, fungi and macro algae and sponges). Phycocolloids, agar-agar and algin.

Books for Reference

1. Tait, R.V. and Dipper F.A (1998) Elements of marine ecology.-4thed. British Library Cataloguing in Publication Data.
2. Gross, G., 1993.Oceanography: A view of the Earth. Sixth edition. Prentice Hall Inc., New Jersey.
3. McCormick, J.M. and J.V.Thiruvathaakal, 1976. Elements of Oceanography. W.B. Saunders Company, Philadelphia.
4 .Nybakken, J.W. 1997. Marine Biology – An Ecological Approach. Addison Weslay Longman, Inc. California, 477pp.
5. Olivia J.Fernando 1999.Sea water-Properties and dynamics, Dhanesh Publications, Ponnagam,Thanjavur
6. Russel 1970. Marine Ecology, Academic Press- London and New York
7. Nelson and Smith 1973, Oil pollution and Marine Ecology-Plenum press
8. Benjamin- Cummings, Menlo Park, California.Vijaya Ramesh, K. (2004). Environmental Microbiology.MJP Publishers Chennai.
9. MoshrafuddinAhamed and Basumatary. S.K.(2006). Applied Microbiology. MJP Publishers Chennai
10.Daws, C.J.1981. Marine Botany John Wiley and Sons, New York.

PRACTICALS

Hrs / Week : 2

1.Determination of acidity
2 Determination of salinity
3 Determination of alkalinity
4 Determination of total hardness
5. Determination of nitrite
6. Determination of phosphate
7 .Biochemical test for micro-organisms-IMViC
8. Collection and identification of marine plankton (any three phyto and zooplanktons)
9. Identification and remarks of the following
   i. Plankton net
   ii Inter-tidal organisms
      a. Rocky shore :Sea anemone, *Chiton*
      b. Muddy shore:*Uca, Cerithidia*
      c. Sandy shore: *Arenicola, Murex*
   ii.Food fishes*: Cybium,Sardinella*
   iii Sea weeds: *Gracilaria,Sargassum*,
10. Submission: Record Note Book

SEMESTER III			
Core VII – Plant Physiology			
Code: 17PBOC31	**Hrs/week:6**	**Hrs/Semester : 90**	**Credits: 5**

Objectives:

- To facilitate the study of integrated activities in plants.
- To evaluate the stress related mechanisms of plants.

Unit I Water relations of plants - components of water potentials and their relation. Ascent of sap – theories. Translocation – source sink relationship. Transpiration - stomatal movement, antitranspirants. Inorganic nutrient - ion uptake - passive and active uptake and transport. Mineral nutrition and hydroponics.

Unit II Photosynthesis - recent concepts of thylakoid membrane - electron transport, redox system of chloroplast, photophosphorylation - cyclic, noncyclic, pseudocyclic. Mechanism of photosynthesis OEC (Oxygen evolving complex), C_3 and C_4 cycle, Rubisco, CAM pathway. Photorespiration and its significance.

Unit III Respiration - anaerobic, aerobic respiration. Glycloysis, TCA - cycle, oxidative phosphorylation, mitochondrial electron transport, inhibitors, uncouplers, glyoxylate cycle and cyanide resistant respiration. Pentose Phosphate Pathway (PPP). Sources of nitrogen - nitrogen metabolism - nitrogen fixation - symbiotic and asymbiotic, nitrogenase - biochemistry and mode of action, assimilation of nitrate and ammonia (GS - GOGAT - pathway)

Unit IV Physiological role and mechanism of action of auxin, gibberellin, cytokinin, ethylene, abscissic acid, morphactins and brassinosteroids. Photomorphogenesis - phytochrome mediated photoresponses. Physiology of flowering. Fruit ripening. Physiology of senescence and abscission, Biological clock.

Unit V Stress Physiology – biotic and abiotic stress - salinity, drought, freezing, radiation and heavy metal stress. Stress proteins in plants. Secondary messengers in plants-cAMP, Ca-calmodulin.

Books for Reference :

1. Beevers, L. 1976. Nitrogen metabolism in plants. William clowes & sons Ltd. London.

2. Bidwell, R.G.S. 1979. Plant physiology, Macmillan publishing company, New york
3. Devlin, R.M. 1974. Plant Physiology. Narosa publishing House, New Delhi
4. Jain, V.K. 2004. Fundamentals of Plant Physiology, S.Chand and Co.Ltd. New Delhi.
5. Noggle, G.R. and G.J. Fritz, 2002. Introductory plant physiology. Prentice Hall India, New Delhi.
6. Salisbury, F.B. and C.W. Ross, 2007. Plant Physiology. Thomson Wordsworth.
7. Taiz, L. and E. Zeiger. 1998. Plant Physiology. Sinauer Associates. Publishers Massachusetts, United States of America

Practical

Hrs/ week: 2

- Hill activity - effect of different wave lengths.
- Effect of antitranspirants and determination of stomatal index and frequency (Single leaf method & calcium chloride method)
- Determination of water potential(any one method)
- Membrane permeability studies.(using different solvents and temperature)
- Nitrate reductase activity – any one factor (light coditions/age)
- Determination of amylase activity.
- Determination of peroxidase activity
- Estimation of proline (Under normal and stressed conditions)
- Determination of chlorophyll content during aging/ under different light conditions
- Study on ion uptake.
- Determination of sugar content in fruits during ripening process.

Submission - Record Note Book

SEMESTER III			
Core VIII Biodiversity and Conservation			
Code: 17PBOC32	**Hrs/week:6**	**Hrs/Semester : 90**	**Credits:5**

Objective:

- To create awareness among the students to appreciate the variety in living world and their values.
- To manage and conserve the diversity of biological resource.

Unit I Biodiversity – concepts and scope. Levels of biodiversity - genetic diversity –nature and origin ,measurement based on DNA and chromosome ,molecular marker(RFLP,RAPD).Species diversity,. methods of assessment – diversity indices, species richness, species abundance, species evenness, taxic diversity, species turnover, species /area relationship and spatial pattern. Centers of Plant diversity.

Unit II Methods of analysis of vegetation - floristic , physiognomic and phytosociological. Remote sensing and Geographic Information System (GIS) application in Biodiversity studies . Values and uses of Biodiversity - economic, social, ethical aesthetic,optional and ecosystem services. Endemicplant diversity- endemism- types, endemic plants of India. Hot spots – distribution in India and world.

Unit III Biodiversity – global, national and regional level. Loss of biodiversity – loss of genetic diversity, process responsible for species extinction. Threatening -causes – habitat destruction, over exploitation, introduction of exotics, diseases. Man made causes – pollution, industrialization urbanization and deforestation .IUCN threat categories. Common threatened taxa of India. Red data book.

Unit IV Conservation of biodiversity. Current practices – habitat/ecosystem approaches, species based approaches , social approaches- sacred groves and sthalaviriksha. *In situ* conservation –National park, wild life sanctuaries and Biosphere reserve, afforestation, social forestry, agro forestry. *Ex situ* conservation - field gene bank, seed bank, pollen bank, tissue culture, DNA bank and cryopreservation methods. Green movements – Chipko movement and silent valley movement.

Unit V Organizations associated with biodiversity management, IUCN, WWF, UNEP, BSI, NPBGR, ICAR, WHF. Biodiversity legislations – GATT, TRIPS, CITES, Wild life preservation Act (1972), Indian forest Act (1927), Rio Summit – Agenda- 21, Convention on biological Diversity, Biodiversity Act (2002). Role of indigenous people in conservation. Biopiracy, sustainable development and management of biodiversity.

Books for Reference

1. Agarwal, K.C.2001. Fundamentals of Environmental Biology.S.chand &Co; New Delhi.
2. Dash, M.C.2001. Fundamentals of Ecology(2 nd edition). TATA Mc Graw Hill, New Delhi.
3. Dash, M.C.2004. Fundamentals of Ecology.TATA Mc Graw Hill, New Delhi.
4. Jhoshi, P.C. and Namita joshi . 2004. Biodiversity and conservation.APH Publishing Company, New Delhi
5. Khoshoo, T.K. Environmental concerns and strategies. Ashish Publishing House, New Delhi.
6. Krishnamoorthy, K.v.2004. An Advanced Text Book of Biodiversity oxford and IBH, New Delhi.
7. Odum, E.P. and Gay W. Barrelt, 2004. Fundamentals of Ecology (2 nd edition). TATA Mc Graw Hill, New Delhi .

Practical- Hrs / Week: 2

- Raunkiaers Frequency diagram – Quadrant / Transect method.
- Shannon Weiener,s Index and Abundance.
- Raunkiaers Biological Spectrum.
- Estimation of primary productivity of any terrestrial ecosystem (biomass method / Chlorophyll method)
- Determination of primary productivity of an aquatic ecosystem (Light / dark bottle method)
- World map showing hotspots.
- India map showing hotspots
- India map showing Biosphere reserves.
- Endangered / Endemic plants lists and photos (any 2).

Scientific Visits: Visit to any nearby place to observe *insitu* conservation of biodiversity - biosphere reserves, national parks, sanctuaries, wet lands, corals and mangroves.

SEMESTER III			
Core IX – Biostatistics and Bioinformatics			
Code: 17PBOC33	**Hrs / week: 6**	**Hrs/Semester : 90**	**Credits: 5**

Objectives:

- To make them analyze the biological data.
- To introduce the students to the explorations of advanced sciences.

Unit I Measures of central tendency: simple arithmetic mean, median and mode - their merits and demerits. Measures of dispersion: range, standard deviation, coefficient of variation and standard error.

Unit II Probability: definition, types (Apriori probability, Aposteriori probability), rules (addition rule and multiplication rule). Theoretical distributions: binomial and normal distribution. Test of significance - steps in tests of hypothesis. Chi-square analysis. Student's t test. ANOVA - assumption and analysis of variance (one way and two way).

Unit III Correlation analysis: definition, types. Methods of correlation- scatter plot diagram, graphic method, Karl Pearson's coefficient of correlation and rank correlation. Regression analysis: definition, types, regression lines and equations.

Unit IV Bioinformatics: definition, scope. Biological databases: Nucleotide databases – NCBI, EMBL, Genbank and DDBJ. Protein databases – PDB, SWISS PROT. Bioinformatics tools – BLAST, FASTA.

Unit V DNA sequence analysis: Global alignment, local alignment, gap penalty alignment, affine gap penalty alignment. Pairwise sequence alignment – dot matrix. Dynamics programming methods - Smith Waterman algorithm, Needleman -Wunsch algorithm. Scoring matrices - PAM and BLOSUM. Multiple sequence alignment – sum of pairs method and progressive method.

Books for Reference:

1. Attwood T.K and D. J. Pary Smith. 2006. Introduction to Bioinformatics Pearson Education, Ltd.
2. Gurumani N. 2005. An Introduction to Biostatistics. 2nd edition. M.J.P. Publishers, Chennai.
3. Jin Xiong, 2006. Essential Bioinformatics. Cambridge University Press.
4. Murthy C.S. V. 2004. Bioinformatics. 1st edition. Himalaya Publishing House.
5. Palanisamy, S. and M. Manoharan, 1994. Statistical methods for biologists. II Edition. Palani paramount publishers.
6. Rastogi, S.C., Namita Mendriata and Parag Rastogi, 2005. Bioinformatics methods and applications. 4th edition. PHI learning Pvt Ltd.
7. Satguru Prasad, 2003. Fundamentals of Biostatistics. 4th edition. Emkay Publications.
8. Veera Bala Rastogi, 2009. Fundamentals of Biostatistics. 2nd e dition. Ane Books Pvt. Ltd. Chennai.

Practical
Hrs / week:2

- Statistical analysis of leaves and fruits - mean, median, mode and standard deviation.
- Graphic representation of data.
- Diagrammatic representation of data.
- Correlation coefficient between length and width of leaves.
- Problem related to chi-square test.
- Study of probability using coin toss.
- Test of significance (Student's t test).
- Practiclas
- **W**eb browsing
- Retrieving data from biological database
- Bibliographic searching
- Sequence alignment and similarity searching
- Gene finding
- Protein prediction
- Biomolecular visualization

Submission - Record Note Book

Semester IV			
Core X – Plant Biotechnology			
Code: 17PBOC41	**Hrs/week:6**	**Hrs/Semester : 90**	**Credits: 5**

Objectives:

- To enumerate the role of 21st century science (biotechnology) in increasing productivity of crop plants and to enhance the production of high value metabolites.
- To develop skill to get employment in biotechnology laboratories and industries.

Unit I: Biotechnology-scope. Principles of plant tissue culture: totipotency, differentiation, dedifferentiation, redifferntiation. Establishment of plant tissue culture lab: equipment, culture vessels, pretreatment of explants. Composition of various tissue culture media and their preparation. Establishing callus: dynamics of callus growth, factors influencing organogenesis, embryogenesis and somatic embryos.

Unit II: Micropropagation: stages of micropropagation, factors affecting shoot multiplication, induction of roots. Synthetic seeds: methods of making synthetic seeds and applications. Production of virus free plants. Somoclonal variation: isolation and characterization of variants -molecular basis and induced mutations, applications and limitations. Cell suspension culture and production of secondary metabolites.

Unit III: Production of haploids (anther, pollen and ovule), detection of haploids - morphology and genetic markers, application of haploids. Protoplast isolation and culture. Protoplast fusion-techniques, selection of fused protoplasts, application. Uses of somatic hybrids and cybrids.

Unit IV Molecular farming **-** Nutritional quality and quality of seed protein. Immuno protective drugs. Gene therapy **–** types of gene therapy, methods of gene therapy, production of antibodies and vaccines, monoclonal antibodies and its application. Biosafety – definition, requirement, biosafety in relation to transgenic research. Intellectual property rights – process of patenting, applications. Farmer's Rights and plant breeder's Rights.

Unit V Biofertilizers: Mass production of *Rhizobium*, *Azospirillum* and Blue Green Algae (BGA), Vesicular Arbuscular Mycorrhizal Fungi (VAM). Single cell protein. Production of antibiotic (Penicillin), organic acid (Citric acid) and vitamin (Vitamin B_{12}). Outline of green synthesis of nanoparticles and their characterization.

Books for Reference:

1. Colin Rattledge and K. Bjon, 2001. Basic biotechnology. Cambridge University
2. Dubey, R.C. 2005. Textbook of Biotechnology. S. Chand & Co. New Delhi
3. George, E.F. and P.D. Sherrington, 1984. Plant propagation by tissue culture. Exegetic Ltd. London.
4. Gupta, P.K. 2000. Elements of Biotechnology. Rastogi publication, Meerut.
5. Kalyan Kumar De. 2004. An Introduction to Plant Tissue Culture. New Central Book Agency, Calcutta.
6. Kumar, H.D. 1993.Molecular biology and Biotechnology. Vikas publishers, New Delhi.
7. Mahesh, 2008. Paddy molecular Biotechnology, New age international, publishers. (p) Limited.
8. Mukhopadhyay S.N, prabhakar Sharma, and Rabindra Narain, 2011. A text book of DNA recombinant technology. Wisdom press. New Delhi.
9. Ramavat, K. G., 2000. Plant Biotechnology, S. Chand & Co., New Delhi
10. Reinort, J and M.M. Yeoman, 1983. Plant cell and tissue culture. Narosa publishing house Delhi.
11. Satyanarayana U. 2006. Biotechnology. Books and Allied (P) Ltd. Kolkatta.
12. Singh, B.D.2005. Biotechnology- Expanding Horizons. Kalyani Publishers, New Delhi.

Practical
Hrs /week: 2
Practical

- Isolation of *Rhizobium*
- Synthesis of nanoparticles
- UV – visible characterization of nanoparticles
- Preparation of synthetic seeds

Set up / pictures / photographs/ demonstration

- Apical meristem culture
- Cell suspension culture
- Protoplast Culture
- Anther Culture

Submission - Record Note Book

SEMESTER IV			
Core XI - Plant Ecology			
Code: 17PBOC42	**Hrs/week:6**	**Hrs/Semester : 90**	**Credits : 5**

Objectives:

- To enhance the understanding of the environment, key ecological issues, concepts and principles of environmental protection to make life on earth more sustainable and beneficial to human.

Unit I Plant and the environment:climatic factors - air, water and temperature; Edaphic factors - types based on texture and colour. Components of soil-soil air, soil water, pH, mineral matter, organic matter, soil profile - soil organisms - reclamation of soil erosions and conservation. Biotic Factors - positive and negative interactions. Structure and function of major ecosystems - terrestrial (Grass land , forest and desert) aquatic (pond).

Unit II Population structure and dynamics: Basic concepts - characteristics of population,size and density, dispersion, age structure, natality, mortality, biotic potential and life table. Population dynamics - theory of population growth , Plant population dynamics, Regulation of population growth, Evolution among population and population interaction.

Unit III Ecological succession - Definitions, Causes of succession and climax, concept, Monoclimax and poly climax theories, Kinds of succession, Hydrosere and Xerosere. Adaptation of plants- hydrophytes,xerophytes and halophytes,

Unit IV Environmental Management Plan (EMP), ecological indicators. Bioremediation - *In situ* and *ex situ* bioremediation of hydrocarbon, dyes, heavy metals and xenobiotics. Biodegradation of pesticides, biodegradable plastics, bio-augmentation. Bio-filtration - mechanism and microrganisms used. Microbial leaching, bio-mining. Ecology in national affairs- carbon trading, carbon sequestration, blue carbon, climate conference, convention and summit.

Unit V Global environment problems - climate change, global warming, UV - B, green house effect - ozone layer depletion, acid rain , nuclear accidents and holocaust. Disaster management – flood, earthquake and landslides. Eco-management, Environmental Impact Assessment (EIA). Sustainable eco-development, environmental education, Environmental protection Act (EPA)1986. Man and Biosphere (MAB)

Books for Reference :

1. Asthana and Meera Asthana, 2001. Environmental problems and solutions. S.Chand and Co. Ltd., New Delhi.
2. Balasubramanian,D; C.F.a. Bryee, K.Dharmalingam, J.Green and K. Jeyaraman, 2005. Concepts in Biotechnology. Universities Press.
3. Dash, M.C.2001.Fundamentals of ecology. Tata McGraw Hill publishing Co. Ltd., New Delhi.
4. Murugesan, A.G.and Rajakumari , 2005. Environmental Science and Biotechnology, theory and Techniques . M.J.P. Publishers, chennai.
5. Sharma, P.D1999.Elements of ecology. Rastogi Publications, Shivaji Road, Meerut.
6. Trivedi P.R, P.L Sharma and KN Sundarshan 1994. Natural environment and Constitution of India, Efficient offset printers, New Delhi.
7. Tyller Miller G., 2004. Environment Science Thompson Brooks/Cole. Singapore.
8. Varshney C.K 1989. Water pollution and management, S.P. Printers, Noida.

Practical
Hrs /week: 2

- Determination of soil pH (at least 3 types of soil)
- Determination of soil texture.
- Determination of soil moisture.
- Determination of soil bulk density.
- Determination of soil porosity.
- Determination of soil organic matter content.
- Estimation of dissolved O_2 in water samples.
- Estimation of BOD in water samples.
- Estimation of COD in water samples.
- Adaptation of plants- hydrophytes,xerophytes and halophytes,

Submission - Record Note Book

SEMESTER III			
Core IX	**Marine Biotechnology**		
19PBOC31	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 4**

Vision:

- To give elaborate account on marine environment and its role in controlling the Earth's climate.

Mission:

- To understand the different types of marine habitats and the adaptation of life there in.
- To understand the role of marine products and their socio economic and environmental significance

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyze how marine organism adapt to their dynamic environment	5	Un
CO-2	recall how natural events and human activities affect coastal habitats	7	Re
CO-3	critically analyze and evaluate pollution issues, their sources and the influences humans have with the dynamic marine environment	7	An
CO-4	achieve practical skills in processing, preserving and culturing marine plants	6	Ev
CO-5	evaluate the uses of marine resources and realize the role of phytoplankton and bacteria in the economy of the ocean	5	Ap
CO-6	able to signify the characteristic feature of coral reefs and their role in biodiversity conservation	1	An
CO-7	able to identify and understand the role of mangroves in coastal protection and their adaptation to its hostile environment	5	Ap
CO-8	explain the ecological relationship between organisms and their environment	2	An

SEMESTER III			
Core IX	**Marine Biotechnology**		
19PBOC31	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 4**

Unit I

Classification of marine habitat - ecology of pelagic, benthic and sublittoral zones, deep sea, sandy muddy and rocky shore. Characteristics of marine habitat – tides and chlorinity, upwelling, plate tectonics, tsunami, green house effect, carbon pump. Ocean and regulation of climate on earth.

Unit II

Marine biodiversity –phytoplankton - characteristics, measuring and sampling. Marine bacteria, marine fungi, seaweeds and sea grasses. Threats and conservation of seaweeds and sea grasses. Nutrient cycling: carbon, nitrogen,sulphur and phosphorus.

Unit III

Marine products - traditional uses; human food and agriculture. Marine colloids and hydrocolloids - Agar - agar, algin, alginates, carrageenan, diatomite, marine lipids, flavanoids, and carotenoids. Marine pharmacology –identification of bioactive compounds in marine organisms – mangroves, seaweeds, and sea grasses.

Unit IV

Culture of micro algae –laboratory culture, preservation and maintenance of culture and mass culture. Commercial cultivation of seaweeds. Marine pollution –thermal pollution, oil pollution, heavy metal pollution, radioactive pollution and industrial pollution. Algal blooms. Global climate changes: impact on specific diversity and productivity, ocean as carbon sink, effect on coral bleaching. Biological rhythms.

Unit V

Mangroves and salt marshes: geographical distribution, habit, adaptations, and trophic interactions. Present status and stresses on the mangroves with special reference to Sunderbans. Regeneration of mangroves. Coral reefs –ecology, species interaction, economic importance and conservation.

Books for Reference :

1. Cliton J. Dawes, 1981. *Marine Botany.* A wiley – Intersciences publication. John Wiley and sons., New York.
2. Dring, M.J. 1982. *The Biology of marine plants.* Edward Arnold.
3. Kumudranjan Naskar and Rathindranath, 1999. *Ecology and Biodiversity of Indian mangroves. Vol. II & I.* Daya publishing House, Delhi, 110 035. Mandal.
4. Michael, P. 1986. *Ecological methods for field and laboratory investigations*. Tata McGraw – Hill publishing Company Limited.
5. Sinha, P.C. 1998. *Marine pollution,* Anmol publications Pvt. Ltd. New Delhi 110 002. (India).

6. Tait, R.V. 1978. *Elements of Ecology*. Butter worths, London, Boston Sidney Wellington, Durban Toronto.
7. Warren, 1971. *Biology and water pollution control.* W.B.Saunders Company. Philadelphis, London. Toronto.

Practicals
Hrs/Week - 2

1. Determination of acidity
2. Estimation of alkalinity
3. Collection and identification of phytoplankton.
4. Determination of total hardness
5. Estimation of nitrate (Colorimetry)
6. Estimation of Phosphate (Colorimetry)

Specimens / photographs / charts

1. Plankton net
2. Seaweeds
3. Sea grasses
4. Mangroves
5. Alginates
6. Carrageenan

Books for Reference

Murugesan A.G. and Rajakumari 2005. *Environmental Science and Biotechnology and Biotechnology, Theory and Techniques,* MJP Publishers.

SEMESTER III			
Core XI	**Molecular Biology and r-DNA Technology**		
19PBOC33	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits: 4**

Vision:

- To understand the recent advancement in the biological study and concepts of gene cloning technology

Mission:

- To upgrade the knowledge about the latest concepts of prokaryotic and eukaryotic genome and their expression
- To make venture into plant genomic research.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL.
CO-1	know chemistry of genetic material and details of its replication at molecular level	2	Un
CO-2	understand the general principles of chromosome organization at different phases of cell cycle	2	Un
CO-3	explain gene regulation mechanisms at various levels by which she can learn how it controls growth and development of an organism	4	Cr
CO-4	know complexity of gene expression in eukaryotes over prokaryotes	3	Un
CO-5	understand vector mediated gene transfer techniques including screening and identification of recombinants	6	Un
CO-6	know the gene cloning tools and their mysteries in success of gene cloning technology	8	Un
CO-7	attain hands on experiences in the techniques associated there of	4	Cr
CO-8	practice the advanced techniques in genetic engineering such as DNA sequencing, blotting, DNA amplification and fingerprinting	3	Ap

SEMESTER III			
Core XI	**Molecular Biology and r-DNA Technology**		
19PBOC33	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits: 4**

Unit I

Chemistry of genetic material – DNA double helical structure-Watson and crick model, alternative models. DNA replication- Molecular mechanism of initation of DNA replication in *E. coli,* λphage and PBR322, elongation, termination. DNA replication in Eukaryotes- initation, cis and transacting elements, elongation and termination. DNA modification, DNA damages and repair mechanism , DNA repair and genetic diseases in human – Bloom's

Unit II

Organisation of genetic material –packaging of DNA-nucleosome model at molecular level; Genetic code- properties, codon assignment, wobble hypothesis; Regulation of gene expression in prokaryotes- General aspects of gene regulation, transcriptional regulation- inducible and repressible system, positive and negative regulation; operon concept- lac operon and tryp operon, relative positions of promotor and operator, master switches; Regulation of translation- protein synthesizing apparatus, molecular mechanism of translation, role of translation factors.

Unit III

Regulation of gene expression in eukaryotes – transcriptional control- initiation, multiple RNA polymerases, transcription factors; core elements; auxiliary elements - enhancers and silencers in transcription. pre initiation complex, elongation- elongation factors and termination-role of termination factors, nucleosome remodeling. Post transcriptional processing - RNA modification, splicing. Translation regulation - molecular mechanisms, initiation, elongation and termination, role of translation factors. Difference between prokaryotic and eukaryotic gene regulation.

Unit IV

Outline of genetic engineering –Enzymes used in rDNA technology, exonuclease, endonuclease, restriction endonuclease, S_i nuclease, DNA ligase, reverse transcriptase and alkaline phosphatase. Cloning vectors – plasmids – pBR ^{322}, shuttle vectors, M^{13} Bacteriophage vector, Cosmids, Ti plasmid. Isolation of genes from genomic and cDNA library.

Unit V

Gene transfer methods- vector mediated (*Agrobacterium*), direct gene transfer (physical and chemical). Screening and identification of recombinants. Mobile genetic elements – Is elements and transposons in maize and Bacteria. DNA sequencing – Maxam and Gilbert method, Dideoxy nucleotide method, Messing's shot gun method. DNA chips. Hybridization techniques – Southern, Northern and Western blotting. DNA amplification – PCR, RFLP, RAPD and finger printing.

Books for Reference

1. Benjamin Lewin, 2004. *Genes VII.* Pearson Prentice Hall.
2. Channarayappa, 2006, *Molecular Biology. Principles and Principles and practices.* Universities Press (India), Pvt. Ltd. 3.5.819. Hyderabad, 500 029.
3. David Preifelder, 2006. *Molecular Biology*. Narosa publishing House, Madras, New Delhi.
4. Gupta, R.K.2006. *Genetics.* Rastogi publications.
5. Nicholl DST, 2001. *An Introduction of genetic engineering*. Cambridge University press.
6. Old R.N. and Primrose, S.B. 2004. *Principle of gene manipulation*. Blackwell scientific publication, USA.
7. Power C. B. 2007. *Genetics Vols. I and II.* Himalaya publishing House. Kundanal chandak. Industrial Estate. Ghat Road. Nagpur- 440 018.
8. Robert H. Tamarin. 2006 *Principles of Genetics*. Tata Mc. Graw - Hill publishing company Ltd., New Delhi.
9. Sathyanarayana,U. 2006. *Biotechnology.* Book and Allied (P). LTD. Kolkatha.
10. Singh, B.D. 2005. *Genetic* Kalyani publishers, Chennai.

Practicals

Hrs/ week - 2

1. Estimation of DNA (Spectrophotometry)
2. Hyperchromisity of DNA
3. Isolation of DNA/ Plasmid from Bacteria
4. Isolation of DNA from plant materials
5. DNA amplification using PCR.
6. Seperation of DNA using AGE
7. Restriction enzyme digestion of DNA.
8. Identification of restriction bands.

Books for Reference:

Ponmurugan.P, B. Gangathara Prabhu. 2012. *Biotechniques*. MJP publishers. Chennai.

SEMESTER IV			
Core: XIII	**Plant Physiology**		
19PBOC41	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 4**

Vision:

- Able to understand the organized complexity of life process in plants.

Mission :

- Able to learn the role of physical and chemical process in plant function.
- Able to know about the responses of plant to the environment.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the water relation and nutritional needs of the plant from the soil, and assess the symptom specific nutritional deficiencies and the need of fertilizers for crop improvement	6	Un
CO-2	discuss how root structure and functions influence the transfer of inorganic nutrients from the soil into the plants,	3	Un
CO-3	analyse the mechanism of their assimilation of inorganic molecules into organic molecular components.	3	Un
CO-4	analyse light enhanced photochemical reactions that culminates in the synthesis of ATP and NADPH and fixation of carbon dioxide into organic compounds	3	Un
CO-5	describe respiration with its associated carbon metabolism and releasing of energy stored in chemical bonds in a controlled manner for cellular use	3	Re
CO-6	investigate plant's functions and adaptations under altered environmental conditions	7	Cr
CO-7	comment on the hormone controlled and light mediated morphogenetic events in plants	3	An
CO-8	design and conduct scientific experiments and analyse the data critically	6	Cr

SEMESTER IV			
Core: XII	**Plant Physiology**		
19PBOC41	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 4**

Unit I

Water relations of plants - components of water potentials and their relation. Absorption of water - Mechanism of ascent of sap. Translocation - Mechanism of translocation of solutes- source sink relationship, phloem loading and unloading. Transpiration - stomatal movement, antitranspirants, guttation. Inorganic nutrient - ion uptake - passive and active uptake and transport. Mineral nutrition-mineral deficiencies disrupt plant metabolism and function, hydroponics and its significance.

Unit II

Photosynthesis-General concepts, Principle of light absorption-action spectrum, absorption spectrum. Pigment system and quantum yield. Photosynthetic apparatus-organization of components in the thylakoid membrane, photochemical reaction- LHS, OEC, mechanism of electron transport -z-scheme and cyclic; proton transport and chemiosmotic synthesis of ATP; regulation of photosynthetic machinery; carbon reaction-general aspects, activity of rubisco-Calvin Benson cycle, Inorganic carbon concentrating mechanism- C_4 carbon cycle, CAM, C_2 oxidative photosynthetic carbon cycle (photorespiration) significance of C_2 cycle-ecological aspects of photosynthesis

Unit III

Respiration- overview, glycolysis, regulation of glycolysis, PPP, Mitochondria- Structural organization, Citric acid cycle, e^- transport system and chemiosmotic synthesis of ATP; alternative oxidase mechanism in plants (cyanide resistance respiration in plants); respiration and coupling of other metabolism. Assimilation of mineral nutrients in plants- N_2 cycle, Nitrate assimilation. Ammonium assimilation and synthesis of aminoacids (GOGAT). Biological fixation of N_2. Assimilation of S and P in plants.

Unit IV

Physiological role, biosynthesis and mechanism of action of auxin, gibberellin, cytokinin, ethylene, abscissic acid, morphactins and brassinosteroids. Photomorphogenesis - phytochrome mediated photoresponses. Physiology of flowering; Fruit ripening. Physiology of senescence and abscission, Biological clock-occurrence of circadian rhythm in plants-examples.

Unit V

Stress physiology-Secondary metabolites and plants defense mechanisms to biotic stress-defense against pathogens, insect herbivores. Abiotic stress and mechanism of plants responses to salinity, drought, freezing, radiation and heavy metal stress. secondary messenger in plants-cAMP, Ca-calmodulin

Books for Reference

1. Beevers, L. 1976. *Nitrogen metabolism in plants.* William clowes & sons Ltd. London.
2. Bidwell, R.G.S. 1979. *Plant physiology*, Macmillan publishing company,

New york
3. Devlin, R.M. 1974. *Plant Physiology*. Narosa publishing House, New Delhi
4. Jain, V.K. 2004. *Fundamentals of Plant Physiology*, S.Chand and Co.Ltd. New Delhi.
5. Noggle, G.R. and G.J. Fritz, 2002. *Introductory plant physiology.* Prentice Hall India, New Delhi
6. Salisbury, F.B. and C.W. Ross, 2007. *Plant Physiology*. Thomson Wordsworth.
7. Taiz, L. and E. Zeiger. 1998. *Plant Physiology*. Sinauer Associates. Publishers Massachusetts, United States of America

Practical
Hrs/ week: 2

1. Hill activity - effect of different wave lengths.
2. Effect of antitranspirants and determination of stomatal index and frequency (Single leaf method & calcium chloride method)
3. Determination of water potential(any one method)
4. Membrane permeability studies.(using different solvents and temperature)
5. Nitrate reductase activity – any one factor (light coditions/age)
6. Determination of amylase activity.
7. Determination of peroxidase activity
8. Estimation of proline (Under normal and stressed conditions)
9. Determination of chlorophyll content during aging/ under different light conditions
10. Study on ion uptake.
11. Determination of sugar content in fruits during ripening process.

Submission - Record Note Book

Books for Reference:

Francis H Witham, David F Blaydes and Robert N Devlin, 1970. *Experiments in Plant Physiology.* Vanmostrand Rainhold Company, New Delhi.

Semester IV			
Core XIV	**Plant Biotechnology**		
19PBOC42	**Hrs/week:4**	**Hrs/Semester: 60**	**Credits: 4**

Vision:

- To apply techniques in biology to explore novel varieties of plants and environmental protection

Mission:

- To enumerate the role of 21st century science (biotechnology) in increasing productivity of crop plants and to enhance the production of high value metabolites.
- To develop skill to get employment in biotechnology laboratories and industries.

Course Outcome

CO. No	Upon completion of this course ,students will be able to	PSO addressed	CL
CO-1	understand principles of plant tissue culture and media preparation	3	Re,Un
CO-2	acquire knowledge and skill in various micropropagation techniques.	4	Un,Ap
CO-3	understand meristem culture, Somaclonal variations, haploid plants, androgenesis, gynogenesis, embryogenesis.	4	Un
CO-4	describe meristem culture and clonal propagation of plants	4	Re
CO-5	synthesize synthetic seeds and understand their applications	3	Un
CO-6	understand the fermentation processes and their importance in industries	3	Un
CO-7	study and apply nanotech process for her research pursuit	4	Ap
CO-8	discuss the advances in genetic engineering and production of monoclonal antibodies and their novelty	1	Re

Semester IV			
Core XIV	**Plant Biotechnology**		
19PBOC42	**Hrs/week:4**	**Hrs/Semester: 60**	**Credits: 4**

Unit I

Biotechnology: Introduction, scope. **Plant tissue culture:** Laboratory organization, tools and techniques, methods of sterilization, medium and its preparation. **Culture initiation:** callus culture, cell culture, single cell culture. **Regeneration:** organogenesis, factors affecting regeneration, regulation of regeneration.

Unit II

Somatic embryogenesis: Introduction, factors affecting embryogenesis. **Micropropagation methods:** Introduction, stages of micropropagation. Plant protoplast isolation, factors affecting protoplast isolation, protoplast culture. Protoplast fusion and somatic hybridization, regeneration from protoplast, fusion methods, selection of hybrid cells application of protoplast hybridization.

Unit III

Somaclonal variation: isolation and characterization of variants -molecular basis and induced mutations, applications and limitations. Production of secondary metabolites (alkaloids). Synthetic seed technology and applications. Production of haploids (anther, pollen and ovule), application of haploids. Meristem culture for virus free plant.

Unit IV

Biofertilizers: Mass production of *Rhizobium*, *Azospirillum* and Blue Green Algae (BGA), Vesicular Arbuscular Mycorrhizal Fungi (VAM). Single cell protein (*Scenedesmus, Spirulina, Saccharomyces)*. **Nanotechnology:** Outline of green synthesis of nanoparticles and their characterization.

Unit V

Molecular farming: Nutritional quality of seed protein. Immuno protective drugs. **Regulations in Biotechnology: Biosafety**: definition, requirement, biosafety in relation to transgenic research, biosafety guidelines and implementation. **Intellectual property rights:** process of patenting of biotechnological products. Farmer's Rights and plant breeder's Rights.

Books for Reference:

1. Colin Rattledge and K. Bjon, 2001. *Basic biotechnology*. Cambridge University
2. Dubey, R.C. 2005. *Textbook of Biotechnology*. S. Chand & Co. New Delhi
3. George, E.F. and P.D. Sherrington, 1984. *Plant propagation by tissue culture.* Exegetic Ltd. London.
4. Gupta, P.K. 2000. *Elements of Biotechnology*. Rastogi publication, Meerut.
5. Kalyan Kumar De. 2004. *An Introduction to Plant Tissue Culture*. New Central Book Agency, Calcutta.
6. Kumar, H.D. 1993. *Molecular biology and Biotechnology*. Vikas publishers, New Delhi.

7. Mahesh, 2008. *Paddy molecular Biotechnology*, New age international, publishers. (p) Limited.
8. Mukhopadhyay S.N, Prabhakar Sharma, and Rabindra Narain, 2011. *A text book of DNA recombinant technology.* Wisdom press. New Delhi.
9. Ramavat, K. G., 2000. *Plant Biotechnology*, S. Chand & Co., New Delhi
10. Reinort, J and M.M. Yeoman, 1983. *Plant cell and tissue culture*. Narosa publishing house Delhi.
11. Satyanarayana U. 2006. *Biotechnology.* Books and Allied (P) Ltd. Kolkatta.
12. Singh, B.D.2005. *Biotechnology- Expanding Horizons.* Kalyani Publishers, New Delhi.

Practical
Hrs /week: 2

1. Isolation of Rhizobium
2. Synthesis and characterization of nanoparticles
3. Preparation of synthetic seeds
4. Callus induction
5. Embryo culture
6. Single cell Isolation
7. Isolation of BGA
8. Nodal Culture
9. Protoplast isolation

Set up / pictures / photographs/ demonstration

- Apical meristem culture
- Cell suspension culture
- Protoplast Culture
- Anther Culture

Submission - Record Note Book

Books for Reference

- Chawla HS, 2009. *Introduction to Plant Biotechnology*. Oxford & IBH publishing company Pvt., Ltd. New Delhi

SEMESTER I			
Core I Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)			
19PBOC11	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credit :4**

Vision:

- To have a comprehensive idea on cryptogams.

Mission:

- To understand the taxonomy, characteristics and uniqueness of primitive plants.
- To have a broad knowledge on economic importance and ecological significance of lower plants

Course Outcome

CO. NO	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appreciate the uniqueness and distinguish between diverse groups of primitive plants using their characteristic features	1, 2	An
CO-2	discuss the different life cycle patterns of lower plants	1, 2	Cr
CO-3	know the basic skills and techniques in micropreparation of diversified cryptogams	6	Ap
CO-4	apply the practical knowledge to identify a various cryptogams	1, 6	Ap
CO-5	understand that the cryptogams are unique in plant kingdom	1, 2	Un
CO-6	describe the economic and ecological significance of lichens	1, 2	Ap
CO-7	know the origin and phylogenetic evolution of Bryophyte	1, 2	Re
CO-8	know the scientific contribution done by eminent scientists in the field of cryptogams	1, 2	Un

SEMESTER I			
Core I Plant Diversity I (Phycology, Mycology, Lichenology and Bryology)			
19PBOC11	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credit :4**

Unit I

Algae: Classification of algae by F.E.Fritsh (1954). Contribution of Indian Phycologists: M.O.P. Iyyangar and T.V. Desikachary. General characteristics. Ultrastructure of Prokaryotic and Eukaryotic algal cells and their components: cell wall, protoplasm, flagella, eye spots, chloroplast, pyrenoid, nucleus and reserve foods. Algal cytology and genetics. Economic importance of algae.

Unit II

Habitat, range of thallus structure, vegetative, asexual, sexual reproduction and life cycle patterns of Cyanophyceae, Chlorophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae. Fossil algae of above classes.

Unit III

Fungi: Classification of Fungi by Alexopoulos and Mims (1979). General characteristics. Diversity of somatic, reproductive and fruiting structures in different groups of fungi: Myxomycetes, Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Heterothallism and Parasexuality in fungi. Economic importance of Fungi.

Unit IV

Lichens: A general account of lichens - Structure, nutrition; reproduction, classification, occurrence and Inter-relationship of Phycobionts and Mycobionts, Ecological and economic importance of lichens.

Unit V

Bryophyta: Classfication of Bryophytes by Rothmaler (1951). Origin of Bryophytes. General characteristics. Morphological, anatomical structure, vegetative, sexual reproduction and alternation of generation of Marchantiales, Jungermaniales, Anthocerotales, Sphagnales and Polytrichales. Spore dispersal mechanism in bryophytes. Economic importance of Bryophytes.

Algae

Books for Reference:

1. Bilgrami, K.S. and L.B. Sinha, 2004. *A Text Book of Algae*. CBS Publication and distributors, New Delhi.
2. Fritsch, F.E. 1972. *The structure and reproduction of algae.Vol.I & II.* Cambridge University Press.
3. Kamat, N.D 1982. *Topics in Algae*.SaikripaPrakasam, Aurangabad.
4. Robert Edward Lee,2008.*Phycology*.Cambridge University Press
5. South, G.R. and Whittick, 1987. *Introduction to phycology,* Blank well Scientific Publications, London.

Fungi

Books for Reference:

1. Alexopoulos and Mim's, 1983. *Introductory Mycology,* Wiley Eastern Ltd. Hyderbad.
2. Johri R.M., Sneh Lata & Kavita Tyagi 2010. *Text Book of Fungi*. Dominant Publishers & Distributors Pvt.Ltd.
3. Smith, G.M. 1988. *Cryptogamic Botany Vol.I* Mc-Graw Hill Book Company, New York.

Bryophyta

Books for Reference:

1. Cavers, F. 1964. *Inter relationship of the Bryophyta.* Dawsons of pall mall. London.
2. Peter George 2010.*Hand Book of Bryophyta*. Rajat Publications .New Delhi.
3. Rashid, A. 1999. *An introduction to Bryophyta*.Vikas Publishing House Pvt. Ltd.
4. Watson, E.V. 1971. *Structure and life of Bryophytes*. Hutchinson University Library, London.

Lichen

Books for Reference:

1. Ahmadjian, V. and Mason E. Hale, M.E. 1973. *The Lichens.* Academic Press, New York

Practical

Hrs/Week - 2

- **Algae:** *Nostoc, Oscillatoria, Ulva*, *Padina*, *Turbinaria*, *Hypnea, Gracilaria*,.

Collection, identification and preservation of fresh water and Marine algae**.**
Preparation of algal herbaria

- **Fungi:***Xylaria*, *Polyporus*, *Agaricus*.

Observation and study of fungi under natural habitat.

- **Bryophyta :***Plagiochasma*, *Anthoceros*, *Sphagnum*, *Polytrichum*.
- **Lichens:** *Usnea*, *Parmelia*
- Field visit to any one of the ecosystems rich in algae

Submission

- Record Note Book
- Bottle specimens/herbarium specimens (any five)

Books for Reference:

1. Ashok M. Bendre and Ashok Kumar. 2009. *A Text Book of Practical Botany –Volume 1*. Rastogi Publications, Meerut, India
2. Srivastava H. N, 1987. *Practical Botany Volume I,* Pradeep Publications, Jalandhar

SEMESTER I			
Core II Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)			
19PBOC12	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credit :4**

Vision:

- To have a comprehensive idea on vascular cryptogams and phanerogams.

Mission:

- To understand the taxonomy, characteristics and uniqueness of higher plants.
- To understand the characteristics of fossil vascular plants and their geological age of origin.

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appreciate the uniqueness and distinguish between diverse groups of Pteridophytes and Gymnosperms using their characteristic features	1, 2	An
CO-2	discuss different life cycle patterns in different groups	1, 2	Cr
CO-3	know the basic skills and techniques in micropreparation and formulate methods to identify different groups	1, 6	Ap
CO-4	know the evolutionary significance of Pteridophyte	1, 2	Un
CO-5	infer pteridophytes are pioneer in the evolution of seed habit	1, 2	Re
CO-6	compare and contrast the origin and evolution of steles, foliage, seeded and seedless plants.	1, 2	An
CO-7	compare and contrast the seeded and seedless plants.	1, 2	Ev
CO-8	review critically the biology , ecology of fossils and methods of fossilization.	1, 7	Un

SEMESTER I			
Core II Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)			
19PBOC12	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credit :4**

Unit I

Pteriodophyta: Classification of Pteridophytes by Smith (1955). Origin and evolution of Pteridophytes. General characteristics. Telome concept. Stelar evolution in pteridophytes. Heterospory and seed habit. Theories and modifications of alternation of generations Economic importance of Pteridophytes.

Unit II

Morphological, anatomical structure, asexual and sexual reproduction of Psilotales (Phylogenetic position of Psilotales), Lycopodiales, Selaginellales, Isoetales and Equisetales, Ophioglossles and Filicales. Life cycle pattern in homosporous and heterosporous pteridophytes.

Unit III

Gymnosperms: Classification of Gymnosperms by K.R.Sporne (1965). General characteristics. Morphological, anatomical structure and reproduction of Cycadaceae, Ginkgoaceae, Cupressaceae, Podocarpaceae, Araucariaceae

Unit IV

Morphological, anatomical structure and reproduction of Ephedraceae, Welwitschiaceae and Gnetaceae. Affinities of Gymnosperms with Angiosperms and Pteridophytes. Economic importance of Gymnosperms.

Unit V

Paleobotany: Geological time scale – fossilization and Fossil types: Compressions, incrustation, casts, molds, petrifactions, coal balls and compactions. General characters of fossil Pteridophytes: *Horneophyton, Sphenophyllum and Calamites.* Fossil Gymnosperms: *Williamsonia and Cordaites.*

Pteridophyta:

Books for Reference:

1. Bower, F.D. 1988. *Primitive land plants. Vol.I & 2*. Arihant Publishers Jaipur.
2. Pandi, S.N., P.S. Trivedi, S.P. Misra, 2006. *A text Book of Botany Vol. II.* Vikas Publishing House Pvt. Ltd.
3. Parihar, N.S. 1967. *An introduction to Embryophyta, Pteridophyta.* Central Book Depot Publications in Botany, Allahabad.
4. Rashid, A. 1985. *An introduction to Pteridophyta*, Vani Educational Books.
5. Sundara Rajan S. 2009. *Introduction to Pteridophyta.* New Age International Publishers. New Delhi

Gymnosperms:

Books for Reference:

1. Chamberlain, C.J. 1986. *Gymnosperms.Structure and evolution.* CBS Publishers & Distributors, Delhi.
2. Johri R.M., SnehLata and Kavita Tyagi. 2010. *Text Book of Gymnosperms*. Wisdom Press, New Delhi.
3. Sporne, K.R.1974. *The Morphology of Gymnosperms*. B.I. Publications Pvt. Ltd., New Delhi.

Practical :

Hrs/Week – 2

- **Pteridophytes :** *Selaginella, Isoetes, Equisetum, Adiantum, Pteris.*
- **Gymnosperms :** *Cycas, Araucaria, Cupressus, Podocarpus, Gnetum,*
- **Fossils:** *Sphenophyllum, Calamites* (Pteridophytes) *Williamsonia* and *Cordaites* (Gymnosperms)

Submission - Record Note Book

Books for Reference:

1. Ashok M. Bendre and Ashok Kumar. 2009. *A Text Book of Practical Botany –Volume 1.* Rastogi Publications, Meerut, India
2. Srivastava H. N, 1987. *Practical Botany Volume I,* Pradeep Publications, Jalandhar

SEMESTER I			
Core III	**Microbiology and Plant pathology**		
19PBOC13	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits: 4**

Vision:

- To provide information on the classification, growth and morphology of microbes and significance of Plant pathology

Mission:

- To study the growth characteristics of microorganisms enabling the learner to identify microorganisms by themselves.
- To understand the basic principles related to plant diseases.

Course Outcome

CO. No	Upon completion of this course, students will be able to:	PSO addressed	CL
CO-1	describe bacterial cell structure,microbial growth, metabolism and the ways to control their growth by physical and chemical means	1	Re
CO-2	differentiate gram positive and gram negative	4	An
CO-3	explain the microbial processes of replication, survival, and interaction with their environment.	3	Un
CO-4	evaluate the beneficial and harmful microbes in plants water, milk and food	4	Re
CO-5	use various microbiological techniques to isolate, characterize and identify bacterial colonies.	4	Ap
CO-6	understand the basic principles related to plant diseases	1	Un
CO-7	provide tools to design innovative, sustainable and tailored control methods to prevent plant diseases or to reduce their impacts	4	Cr
CO-8	understand the role of microorganisms in biotechnology, fermentation, medicine and other industries important to human well being	1	Un

SEMESTER I			
Core III	**Microbiology and Plant pathology**		
19PBOC13	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits: 4**

Unit I

Classification of bacteria - Bergey's major groups. Early development of microbiology-contributions of Leeuwenhoek, Robert Koch and Louis Pasteur. Isolation, pure-culture, nutritional requirement, measurement of growth, continuous culture, synchronous culture. Cultural characteristics of bacteria. Ultra structure of bacteria. Antimicrobial components : mode of action of penicillin, gramicidin, streptomycin and sulfonamides

Unit II

Morphology and nature of virus particles, Purification and quantitative assay of plant viruses, Infection and replication with reference to Gemini virus, CaMV and bacteriophage. Antiviral chemotherapeutic agents. General account of mycoplasma and rickettsiales.

Unit III

Types of food spoilage. Methods of food preservation. Milk micro flora and their significance, water microflora and their significance. Micro flora of soil and their role in soil fertility and carbon sequestration, rhizosphere microflora and mycorrhiza.

Unit IV

Introduction: components of disease (disease pyramid), causes of disease, classification of diseases, stages in the development of disease (disease cycle), general symptoms of plant diseases caused by fungi, bacteria and viruses. Dissemination of plant pathogens, Integrated disease management

Unit V

Detailed study of the following: damping off of seedlings, Black stem rust of wheat, wilt of cotton, blight of potato (early and late), downy mildew of grapes, ergot of rye, tundu disease of Wheat and Yellow vein mosaic of bhindi.

Books for Reference:

1. Abbas A.K. and A.H. Lichtmann. 2003. *Cell and Molecular Immunology*. Saunders, Philadelphia.
2. Agrios, G.N., 1997. *Plant Pathology*, Academic Press, London.
3. Caldwell DR 2005. *Microbial Physiology and Metabolism* Wm.C.Brown publishers. Lnc.
4. Dubey, R.C and D.K Maheshwari, 2003. *A text book of microbiology.* S.Chand and company, New Delhi.
5. Kumar H D and Swati Kumar 2008, *Modern concepts of Microbiology*. Vikas Publications. New Delhi.
6. Mehrotra, R.S. &A.Agarwal, 2003. *Plant Pathology*. Tata McGraw Hill

Publishing Company, New Delhi.
7. Pelczar H. and R. Reid, 1998. *Microbiology* – Concepts and Applications Tata Mc Grow Hill Publishing company P.Ltd. New Delhi.
8. Pelzar M J . ECS Chan and Noel R Krig. *Microbiology*, 2010 Tata Mc Grow Hill Puplishing company P.Ltd. New Delhi.
9. Prasad T V S., 2011 *Soil Microbiology.* Dominant Publishers and distributers. New Delhi
10. Prescott. L.M., J.P. Harley and D.A.Klein 2002. *Microbiology*. Mc Graw hill, New York.
11. Rangaswami, G. 1988. *Diseases of crop plants*. Prentice-Hall International, London.
12. Sharma, P.D. 2006. *Plant Pathology*. Narosa Publishing House Pvt. Ltd., New Delhi.

Practical

Hrs / week: 2

A

1. Methods of sterilization, media preparation
2. Light microscopic observation of bacteria- wet mount, simple and differential staining– Gram's staining, Hanging drop technique to observe mobility
3. Study on production of acid and gas
4. Effect of temperature, pH, salinity, disinfectants, radiation on the growth of bacteria.
5. Milk bacteriology : Enumeration of bacteria found in milk- SPC method. Testing the quality of milk -Dye-reduction test (Resazurin and Methylene blue).
6. Bacterial analysis of water for coli forms - MPN
7. Enumeration of soil bacteria by serial dilution technique (any three soil types).
8. Effect of antibiotics on the growth of bacteria. -Determination of MIC
9. Study of infected specimen prescribed in the syllabus

B

1. Record of brief life history of scientist related to microbiology
2. Drawing the electron microscopic structure of viruses-T_4, CaMV.
3. Drawing the electron microscopic structure of mycoplasma

Submission - Record Note Book

Books for Reference:

1. Lakshmanan M, Kunthala Jeyaraman, Jeyaraman and Gnanam, 1971. *Laboratory experiments in microbiology and molecular biology,* Higginbothams Pvt. Ltd.

Semester II			
Core V	**Horticulture , Plant breeding and Evolution**		
19PBOC21	**Hrs/week:5**	**Hrs/Semester : 75**	**Credits : 4**

Vision:

- To promote, develop and disseminate horticultural and plant breeding technologies through the blend of traditional wisdom and modern scientific knowledge.

Mission :

- To understand the techniques and make significant contribution to an efficient and sustainable production of crops
- To understand the concept of plant breeding and evolution

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	use the garden implements using in horticultural techniques	4	An
CO-2	identify good and healthy plants and seeds for propagation and develop skill in propagation of useful vegetable, fruit and garden plants.	4	Ap
CO-3	understand basic concepts of gardening and able to layout different types of gardens and suggest plant choices	4	Un
CO-4	understand the use of modern technologies on raising horticultural plants for economic benefits and adapt modern methods of irrigation system in order to conserve water	4, 7	Un
CO-5	equip knowledge on disease management, improved production, storage strategies and business practices.	7	An
CO-6	describe various selection techniques and methods that can be used in genetic improvement of self and cross pollinated crops	6	Ap
CO-7	describe various molecular breeding technique and method that could be used for genetic improvements of crops	2	Ap
CO-8	understand the genetic basis of evolution and evolutionary process	1	Ap

Semester II			
Core V	**Horticulture , Plant breeding and Evolution**		
19PBOC21	**Hrs/week:5**	**Hrs/Semester : 75**	**Credits : 4**

Unit I

Horticulture – definition, divisions and importance. Plant growing structures – objectives and types – green houses, hot beds, cold frames and conservatory - green house production system. Plant growth environment- Physical environment, Pest management- chemical and biological. Establishment and cultivation of orchard. Gardening - outdoor garden –types, principles, designing and garden components.

Unit II

Parameters associated with sexual propagation. Asexual reproducion - Natural, artificial methods. Seedage – characteristics of good seed, and seed treatment for germination – Transplanting of seedling. Propagation of horticultural crops – cuttage, layerage, graftage and budding.

Unit III

Indoor gardening - Purpose, plant choices, caring, potting media, disease and pest management of growing succulents, Terrarium, hanging basket. Bonsai -types and training of bonsai. Commercial gardening - cut flowers and economic flowers. Kitchen gardening – selection of site, lay out and choice of plants. Storage and preservation of fruits and vegetables.

Unit IV

Plant breeding: Nature and goals of plant breeding; Methods of Breeding self pollinated, cross pollinated and asexually propagated crops, pure line and mass selection. Plant transformation and genetically modified organisms in Agriculture: Role of *A.tumefaciens* in GMO development. Engineering of plasmids. Molecular marker and their role in plant breeding: RFLP's, AFLP's, SSR's and SNP's.

Unit V

Evolution: Introduction, Evolution and life, The genetic basis of evolution. Evolutionary process: Elemental forces, sources of variation, Role of natural selection and genetic Drift. Evolutionary Divergence: Races, species and isolating Mechanisms. The Origin of species Evolution above the species level.

Books for Reference:

1. AllardJohn, R.W. *Principles of plant breeding* Wiley & Sons, Inc.New York.
2. Chopra, V.L *Plant Breeding Theory and Practice*. Oxford and IBH Publishing Co. Pvt.Ltd. New Delhi.
3. Choudhri D and Amal Metha 2010. *Flower crops cultivation and management* Oxford book company . Jaipur
4. Edmund Senn - Andrew – Halfacre. 1977. *Fundamentals of Horticulture*. Tata Mc. Graw Hill.

5. Hartmann & Kester, 1989 – *Plant propagation*. Prentice – Hall of India Pvt. Ltd. New Delhi.
6. Kumar, N. 1997. *Introduction to Horticulture*. Rajalakshmi Publications, Nagercoil, India.
7. Mallikarjuna Reddy and Aparna rao 2010. *Plant propagation in horticulture*. Pacific book international. New Delhi.
8. Randahawa 1985. *Floriculture in India*. Allied publishers.
9. Sharma, J.R *Principles and practice of plant breeding* TataMcGraw-Hill Publishing Company Limited New Delhi.
10. Utpal Banerji 2008. *Horticulture* Mangal Deep Publication. Jaipur

Practical-
Hrs / Week: 2
Horticulture:

- Knowledge of garden implements and tools - Spade, Sprayer, Water can, Pruning scissor, Tiller, Digging fork, Pickaxe, Budding and Grafting Knife,
- Preparation of nursery and seed bed.
- Propagation -stem, leaf and root cutting.
- Propagation - air layering, budding and grafting technique.
- Designing kitchen garden, Rockery, Hanging basket, terrarium
- Flower arrangement and vegetable carving
- Preparation of potting mixture for different types of garden
- Preparation of natural rooting hormones/ foliage boosters/flowering boosters.

Plant breeding:

- Emasculation, bagging and crossing methods.Demonstration - Molecular breeding
- **Submission -** Record Note Book

Books for Reference: Jean Taylor , 1973. *Practical flower arranging*, The Hamlyn Publishing group Ltd., NewYork

SEMESTER II			
Core VI	**Biochemistry and Biophysics**		
19PBOC22	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits:4**

Vision:

- To enhance knowledge on biomolecules and the metabolism

Mission:

- To study the molecular structure of biomolecules.
- To trace out the various metabolic pathways and their significance.
- To highlight the principles of energy conversion in biological systems.

Course Outcome

CO.No.	Upon completion of this course ,students will be able to	PSO addressed	CL
CO-1	study the polymeric biomolecules and their monomeric building blocks	1	Re
CO-2	outline the metabolic pathways and be able to trace the regulatory process in the biological system	1	Re
CO-3	outline enzyme groups and know the nomenclature that be able to explain the specificity of enzyme's role and mode of action	3	An
CO-4	construct electromagnetic spectrum and understand the properties to relate biological applications.	6	Ap
CO-5	characterise thermodynamic systems at thermal equilibrium	3	Cr
CO-6	sketch molecular structures and bonding of bio-molecules. upon that knowledge be able to deduce the packaging and foldings of biomolecules	4	Re
CO-7	set up and operate variety of experiments to analyse data accompanied by problem solving and documentation.	6	Ap
CO-8	detect the source of vitamins and their chemistry and distinguish their symptoms specific to their deficiency	7	Re

SEMESTER II			
Core VI	**Biochemistry and Biophysics**		
19PBOC22	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credits:4**

Unit I

Biomolecules-Structure and properties of carbohydrates: mono-saccharides, disaccharides, polysaccharides and mucopolysaccharides. Biosynthesis and hydrolysis of sucrose and starch. Gluconeogenesis.

Unit II

Amino acids: classification based on R - group, structure and properties. Metabolism of phenylalanine, tyrosine and tryptophan. Commercial polypeptides – ACTH, Thymosin. Proteins: The peptide bond and primary structure. Ramachandran plot. Secondary structure, domain, motif and backbone folding. stabilizing forces in collagen. Tertiary structure (Myoglobin and ribonuclease) and Quaternary structure (hemoglobin).

Unit III

Lipids: classification, structure and properties of simple lipids (triglyceride and wax), compound lipids (phospholipids and glycolipids) and derived lipids.steroids - cholesterol, Terpines. Biosynthesis and degradation of fatty acid. Synthesis of nucleotides.

Unit IV

Enzymes –nomenclature IUPAC 1974. Principles of catalysis, enzyme action, active site, activation energy, enzyme kinetics. Cofactors and inhibitors. Coenzymes NADP, FAD, FMN and Co enzyme A. Secondary metabolites- classification, structure and properties of alkaloids (colchicine and atropine) and glycosides (cordiac and cyanogenic). Vitamins - sources and deficiency diseases.

Unit V

Dual nature of light, electromagnetic spectrum, phosphorescence and fluorescence. Laws of thermodynamics, concept of enthalpy, entropy and free energy. Redox couple, redox potential, coupled reactions, phosphorylation. High energy compound - ATP.

Books for Reference :

1. Bhutani, S.P. 2009. *Chemistry of Biomolecules*. Ane Books Pvt. Ltd. New Delhi.
2. Conn, E. E. and P. K. Stumpf, 1987. *Outlines of Biochemistry*. John Wiley and Sons, Inc.
3. Cox, M. M. and D. L. Nelson. 2008. *Principles of Biochemistry*. 5th edition. Replika Press Pvt. Ltd., India.
4. David Rawn, 2004. *Biochemistry.* Panima Publications, New Delhi.
5. Ferrier, D. R. 2014. *Biochemistry*. 6th edition. Wolters Kluwer (India) Pvt. Ltd., New Delhi
6. Gupta, S.N. 2011. *Biochemistry.* Rastogi Publications, Meerut, India.
7. Lehninger, A. L. 1987. *Principles of Biochemistry.* CBS publishers and Distributors. Delhi.

8. Nagini, S. 2007. *Text Book of Biochemistry*. 2nd edition. Scitech Publications (India) Pvt. Ltd., Chennai
9. Salil Bose, 1982. *Elements of Biophysics*. Jjothi Books, Madurai.
10. Sathyanarayana, U and U. Chakrapani. 2006. *Biochemistry.* 3rd edition. Arunabha Sen, Books and Allied (P) Ltd., Kolkata.

Practical

Hrs/Week: 2

- Estimation of sugar. (Benedict's method)
- Titration of amino acid (glycine)
- Estimation of free amino acid from plant tissues (Ninhydrin method)
- Estimation of total soluble protein from plant tissues (Barfoed's test)
- Separation of amino acids (ascending paper chromatography).
- Separation of photosynthetic pigments (column chromatography).
- Absorption spectrum of chlorophyll
- Study of enzyme kinetics and determination of Km value.
- Saponification value of two vegetable oils.
- Qualitative tests for alkaloids, flavonoids, glycosides and phenols.

Submission - Record Note Book

Books for Reference:

Jayaraman. J. 2001. *Laboratory manual in Biochemistry*. New Age International Publishers, New Delhi.

SEMESTER II			
Core VII	**Taxonomy of Angiosperms**		
19PBOC23	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credit : 4**

Vision:

- To provide a deep and practical understanding of floristic features of plants and their systematics

Mission:

- To identify the local flora up to the species level based on their morphological features
- To enable the students to get fair knowledge on different systems of classification and to have an insight on modern trends in classification of Angiosperms.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	apply the basic principles and rules of botanical nomenclature, and use taxonomic literature and describe the general principles of classification and binomial nomenclature for species naming.	1	Ap
CO-2	relate taxonomy to other sciences	4	Re
CO-3	understand the preparation and importance of herbarium, role of BSI	6	Un
CO-4	identify the common species of plants growing in Thoothukudi and their systematic position, their distinguishing morphological/ecological attributes.	1	Ap
CO-5	utilize the taxonomical terminology for identification of taxa	1	Un
CO-6	understand the comparative account among the families of angiosperms.	4	Un
CO-7	able to gain proficiency in the use of keys and manuals for identifying any unknown plants to species level	7	Ap
CO-8	combine classical plant taxonomy with modern molecular phylogeny	1	An

SEMESTER II			
Core VII	**Taxonomy of Angiosperms**		
19PBOC23	**Hrs/week: 5**	**Hrs/Semester : 75**	**Credit : 4**

Unit I

Definition and objectives-brief history of plant taxonomy – Botanical Nomenclature- need for scientific names, polynomial and binomial nomenclature- ICN principles, names of taxa - genus, species, infra-specific categories, type method, citation, typification, effective and valid publication, retention and rejection of names-, principle of priority, conservation of names. Identification methods: use of floras, manuals and monographs - dichotomous keys (indented and bracketed key), guidelines for constructing dichotomous keys - interactive keys (computer aided).

Unit II

Taxonomic hierarchy - Ranks in the hierarchical system (order, family, genus, species and intra specific). Classification: relative merits and demerits of major systems of classifications- Linnaeus, Bentham and Hooker's and Angiosperm Phylogeny Group (IV). Current trends in biosystematics - Phenetics - numerical taxonomy- construction of taxonomic groups, applications, merits and demerits. Phylogenetic - Cladistics – phylogenetic terms and phylogenetic diagrams.

Unit III

Taxonomic evidences - Morphology, Cytology, Embryology and chemosystematics (Phytochemicals phenols, alkaloids, flavonoids and terpenoids). Molecular systematics (DNA bar coding). Herbarium methodology- Specimen preparation, maintenance, management and functions. Role of Botanical Survey of India. General account of Central National Herbaria, Calcutta (CAL) and regional herbaria - Madras Herbarium (MH).

Unit IV

A detailed study of vegetative and floral characters of the following families: Ranunculaceae, Capparidaceae, Tiliaceae, Meliaceae, Rhamnaceae, Sapindaceae, Fabaceae, Combretaceae, Asteraceae, Sapotaceae.

Unit V

Solanaceae, Boraginaceae, Convoluvaceae, Scrophulariaceae, Bignoniaceae, Verbenaceae, Nyctaginaceae, Orchidaceae, Commelinaceae and Cyperaceae.

Books for Reference :

1. Davis, P.H. and V.M. Heywood, 1983. *Principles of Angiospersm Taxonomy,* Olive & Byod, London.
2. Gurcharan Singh, 2004. *Plant Systematics* – Oxford & IBH Publishing Co., New Delhi.
3. Gurcharan Singh, 2012. *Plant Systematics* – Oxford & IBH Publishing Co., New Delhi.

4. Harborne, J.B. and B.L. Turner; 1984. *Plant chemo-systematics*. Academic Press, London.
5. Jeffrey, C.1982. *Introduction to plant Taxonomy*. Cambridge university Press Cambridge.
6. Johri R.M. and Sneb Lafa, 2005. *Taxonomy* – Sonali publications, New Delhi.
7. Pandey, B.P.2005. *Taxonomy of Angiosperms*. S.Chand & Company, New Delhi.
8. Stace C.A., 1989. *Plant taxonomy and Biosystematics* Edward. Arnold, London.
9. Saxena N.B. and S. Saxena, 2010. *Plant Taxonomy*. Pragati Prakashan Publishers.
10. Subrahmanyam, N.S. 2007. *Modern Plant Taxonomy*. Vikas Publishing House Pvt. Ltd. New Delhi.
11. Vashishta P.C., 1989, *Taxonomy of Angiosperms*, R.Chand & Co., New Delhi.

Practical
Hrs / Week - 2

1. Study of wild taxa representing different families and identification to species level.
2. Construction of taxonomic keys (dichotomous).
3. Field trips within and around the campus; compilation of field notes and preparation of herbarium sheets of such plants, wild or cultivated, as are abundant.
4. Training in using floras for identification of specimens described in the class.

Submission - Record Note Book, five herbarium sheets, fifteen photographs and field note book

Books for Reference

Gample J.S. *Flora of the Presidency of Madras – Vol I & II,* Reprint 1956, Published under Authority of Secretary of state for India in Council.

SEMESTER II			
Core VIII	**Biostatistics and Bioinformatics**		
19PBOC24	**Hrs / week: 4**	**Hrs/Semester : 60**	**Credits: 4**

Vision:

- To familiarize in collection of data and analysis of data for scientific solution
- To apply advanced bioinformatics tools in the field of biology

Mission:

- To make them analyze the biological data.
- To introduce the students to the explorations of advanced sciences.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	understand the fundamentals of statistics and statistical analysis	4	Un
CO-2	apply the learned procedure for collecting data, analyzing and representation of the same	4	Ap
CO-3	calculate the central tendency and dispersion in collected data	4	An
CO-4	do statistical analysis and communicate the results of statistical analyses accurately and effectively	6	Ap
CO-5	apply knowledge of the most important bioinformatics databases and able to identify what information they contain?	4	Re
CO-6	analyze concepts and approaches in bioinformatics and its application in various biological fields	4	An
CO-7	explain the major steps and principles for doing different types of sequence alignments	6	Ap
CO-8	demonstrate the use of bioinformatics tools in biological research	6	Ap

SEMESTER II			
Core X – Biostatistics and Bioinformatics			
Code: 19PBOC24	**Hrs / week: 4**	**Hrs/Semester : 60**	**Credits: 4**

Unit I

Biostatistics: Introduction, collection, classification and presentation of data. **Descriptive statistics:** Introduction. **Measures of central tendency**: Definition, Types (simple arithmetic mean, median and mode) - **Measures of dispersion**: standard deviation, coefficient of variation and standard error (merits and demerits).

Problems: raw data, discrete data, continuous data – direct method only

Unit II

Inferential Statistics: Introduction. **Test of significance:** Chi-square analysis (goodness of fit, test of independence, test of homogencity). Student's t test (estimation of population mean, matched pair data analysis, comparison of means of two small groups). ANOVA: (one way and two way).

Problems: chi-square, student t test, ANOVA

Unit III

Correlation: Definition. Relationship (mutual dependence, cause and effect relationship), types. Methods of correlation: scatter diagram, correlation graph, Karl Pearson's coefficient of correlation. **Regression**: definition, regression equations, properties of regression lines, difference between correlation and regression.

Problems: Karl Pearson's coefficient of correlation, regression coefficient.

Unit IV

Bioinformatics: definition, scope. **Biological databases:** Nucleotide databases – NCBI, EMBL, Genbank and DDBJ. Protein databases – PDB, SWISS PROT. **Bioinformatics tools** – BLAST, FASTA.

Unit V

DNA sequence analysis: Global alignment, local alignment, gap penalty alignment, affine gap penalty alignment. Pairwise sequence alignment – dot matrix. Scoring matrices - PAM and BLOSUM. Multiple sequence alignment – sum of pairs method and progressive method.

Books for Reference:

1. Attwood T.K and D. J. Pary Smith. 2006. *Introduction to Bioinformatics* Pearson Education, Ltd.
2. Gurumani N. 2005. *An Introduction to Biostatistics.* 2nd edition. M.J.P. Publishers, Chennai.
3. Jin Xiong, 2006. *Essential Bioinformatics*. Cambridge University Press.
4. Rastogi, S.C., Namita Mendriata and Parag Rastogi, 2005. *Bioinformatics methods and applications*. 4th edition. PHI learning Pvt Ltd.
5. Satguru Prasad, 2003. *Fundamentals of Biostatistics*. 4th edition. Emkay Publications.
6. Veera Bala Rastogi, 2009. *Fundamentals of Biostatistics*. 2nd e dition. Ane Books Pvt. Ltd. Chennai.

Practical
Hrs / week:2
Biostatistics using excel

- **Descriptive statistics:** mean, median, mode, standard deviation, standard error, confidence interval.
- **Graphing data:** scatter graphs, bar graphs, error bars, lines
- **Association statistics:** Pearson coefficient, linear regression
- **Comparative statistics:** paired and unpaired t-test, Mann-Whitney U-test ANOVA
- **Frequency statistics:** χ^2 – test, χ^2 – test of association

Bioinformatics

- **W**eb browsing
- Retrieving data from biological database
- Bibliographic searching
- Sequence alignment and similarity searching
- Gene finding
- Protein prediction
- Structural Visualization of DNA, Proteins by using rcsb website.

Submission - Record Note Book

Books for Reference

1. Palanisamy, S. and M. Manoharan, 1994. *Statistical methods for biologists.* II Edition. Palani paramount publishers.
2. Murthy C.S. V. 2004. *Bioinformatics*. 1st edition. Himalaya Publishing House.

SEMESTER I			
Core I	**Plant Diversity I (Algae, Bryophyte, Fungi and Lichen)**		
Course Code:21PBOC11	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credit: 4**

Objectives:

- To have a comprehensive idea on cryptogams.
- To understand the taxonomy, characteristics and uniqueness of primitive plants and theircharacteristics.
- To have a broad knowledge on economic importance and ecological significance of lowerplants.

Course Outcomes

CO. NO	Upon completion of this course, students will beable to	PSO addressed	CL
CO-1	recall the distinguishing features of algae, bryophytes, fungi and lichens and appreciate their uniqueness	1, 2	An
CO-2	understand the status of cryptogams in evolutionof advanced plant groups	1, 2	Cr
CO-3	understand the basic skills and techniques in micropreparation and formulate methods to identify different plant groups	1, 6	Ap
CO-4	apply the practical knowledge to identify a particular group from a mixed group in the laboratory and in the field	6	Ap
CO-5	know the adaptive features of cryptogams to theirhabitats	1, 2	Un
CO-6	analyse the phylogenetic relationship between thedifferent groups	1, 2	Ap
CO-7	evaluate the economic and ecological significance of lichen	1, 2	Re
CO-8	critically think on the origin and evolution of Bryophyte	1, 2	Un

SEMESTER I			
Core I	**Plant Diversity I (Algae, Bryophyte, Fungi and Lichen)**		
Course Code: 21PBOC11	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credit: 4**

UNIT I: Algae: Classification of algae by F.E.Fritsh (1945), Parker (1982). Contribution of Indian Phycologists: M.O.P. Iyengar, T.V. Desikachary and V.K. Krishnamurthy.

Coastal line of India: South East coast of India, West coast of India.

General characteristics and life cycle pattern of algae. Special structural features of the algal cell – nucleus, centrosomes, flagella, eye spots, contractile vacuoles, chloroplast, pyrenoid and reserve foods. Phylogenetic relationships with other plant groups. Economic importance of algae.

UNIT II: General characteristics, ecological, morphological and interrelationships of Chlorophyceae, Xanthophyceae, Bacillariophyceae, Dinophyceae, Phaeophyceae, Rhodophyceae and Myxophyceae. Fossil algae.

UNIT III: Bryophyta: Classfication of Bryophytes by Rothmaler (1951). Origin of Bryophytes. General characteristics. Morphological, anatomical structure, vegetative, sexual reproduction and alternation of generation and interrelationship of Marchantiales, Jungermaniales, Anthocerotales, Sphagnales and Polytrichales. Spore dispersal mechanism in bryophytes. Economic and ecological importance of Bryophytes.

UNIT IV: Fungi: Classification of Fungi by Alexopoulos and Mims (1979). General characteristics. Diversity of somatic, reproductive and fruiting structures of Myxomycetes, Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Heterothallism, Heterokaryosis and Parasexuality in fungi. Economic importance of Fungi.

UNIT V: Lichens: A general account of lichens. Classification of lichens based on habitat, morphological features, internal structure, nature of fungal components. Occurrence and interrelationship of phycobionts andmycobionts, structure and reproduction in Ascolichens, Basiodiolichens and Deuterolichens. Lichens as indicators of Pollution, Economic importance of Lichens.

Books for Reference:

Algae

1. Bilgrami K.S and Sinha L.B *A Text Book of Algae*. New Delhi: CBS Publication and distributors, 2004.
2. Fritsch F.E *The structure and reproduction of algae*.Vol.I & II. UK: Cambridge

UniversityPress, 1972.

3. Kamat, N.D *Topics in Algae*. Aurangabad: Saikripa Prakasam, 1982.
4. Robert Edward Lee *Phycology*. UK: Cambridge University Press, 2008.
5. South G.R and Whittick *Introduction to phycology*. London: Blank well Scientific Publications,1987.
6. Chapman V.J and Chapman D.J *The Algae.* London: The Macmillan Press Ltd., andBasingstoke, 1975.

Bryophyta

1. Cavers F *Inter relationship of the Bryophyta*. London: Dawsons of Pall Mall. 1964.
2. Peter George *Hand Book of Bryophyta.* New Delhi: Rajat Publications , 2010.
3. Rashid A *An introduction to Bryophyta*. New Delhi: Vikas Publishing House Pvt. Ltd. 1999.
4. Watson E.V *Structure and life of Bryophytes*. London: Hutchinson University Library,1971.
5. Alain Vanderpoorten and Bernard Goffinet *Introduction to bryophytes,* UK: CambridgeUniversity Press, 2009.

Fungi

1. Alexopoulos and Mim's *Introductory Mycology*, Hyderbad: Wiley Eastern Ltd. 1983.
2. Johri R.M Sneh Lata and Kavita Tyagi *Text Book of Fungi*. New Delhi: Dominant Publishers and Distributors Pvt. Ltd. 2010.
3. Smith G.M *Cryptogamic Botany* Vol.I New York : McGraw Hill Book Company, 1988.

Lichen

1. Ahmadjian, V and Mason E. Hale M.E *The Lichens.* New York: Academic Press, 1973.

Practical: Hrs/Week - 2

- **Algae:** Micropreparation of *Nostoc, Oscillatoria, Coleochaete, Caulerpa, Codium, Valoniopsis, Enteromorpha, Ulva, Padina, Turbinaria, Hypnea, Gracilaria*.

  Collection, identification and preservation of fresh water and Marine algae. Preparation of algal herbaria
- **Bryophyta:** *Targionia, Reboulia, Plagiochasma, Pallavicinia, Anthoceros, Sphagnum,Polytrichum*.
- **Fungi:** *Pilobolus, Peziza, Xylaria, Polyporus, Agaricus*
  Observation and study of fungi under natural habitat.
- **Lichens:** *Usnea, Parmelia*

Field visit: No of days: 4 (Collection of Algae, Bryophytes, Fungi and Lichens)

Submission - Record Note Book

Bottle specimens/herbarium specimens (any five)

Laboratory Manuals for Reference:

1. Ashok M Bendre and Ashok Kumar *A Text Book of Practical Botany – Volume I*.Meerut: Rastogi Publications, 2009.
2. Srivastava H.N *Practical Botany Volume I,* Jalandhar: Pradeep Publications, 1987.

SEMESTER I			
Core II	**Plant Microbe Interaction**		
Course Code: 21PBOC12	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credits: 4**

Objectives:

- To provide information on the growth and morphology of microbes
- To familiarize the interaction of plants with microbes
- To understand the basic principles related to plant diseases.

Course Outcomes

CO. No	Upon completion of this course, students will be able to:	PSO addressed	CL
CO-1	perform the techniques of isolation, characterization and measure the growth of bacteria	4	Re
CO-2	differentiate the mode of action of antibiotics	1	An
CO-3	outline the stages of disease pyramids and disease cycle.	2	Un
CO-4	know about the enzymes involved in plant diseases	1	Re
CO-5	understand the basic principles related to plant diseases.	2	Ap
CO-6	purify, detect and identify the plant viruses.	3	Re
CO-7	understand the general symptoms of bacterial disease, viral diseases and fungal disease	1	Un
CO-8	provide tools to design innovative, sustainable and tailored control methods to prevent plant diseases or to reduce theirimpacts	6	Cr

SEMESTER I			
Core II	**Plant Microbe Interaction**		
Course Code: 21PBOC12	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credits: 4**

UNIT I: Early development of microbiology, contributions of Leeuwenhoek,Robert Koch, Edward Jenner, Alexander Flemming and Louis Pasteur.Isolation of pure culture and measurement of growth of bacteria. Purification and quantitative assay of plant viruses. Antimicrobial components: mode of action of penicillin, streptomycin and sulfonamides.

UNIT II: Introduction: Components of disease (disease pyramid); causes of disease; classification of diseases; stages in the development of disease (disease cycle); Enzymes in plant diseases-pectic enzymes, macerating enzymes and cellulolytic enzymes. Dissemination of plant pathogens, Integrated disease management.

UNIT III: Characteristic features of plant pathogenic bacteria, general symptoms of \bacterial diseases, Survival and spread of bacterial plant pathogens, control of bacterial disease. Symptoms, morphology of the causal organism, disease cycle and disease management of the following: Angular leaf spot of cotton, Citrus canker and Tundu disease of wheat.

UNIT IV: General characteristic of plant pathogenic fungi, survival, dissemination and spread, general symptoms, control of fungal diseases. Symptoms, morphology of the causal organism, disease cycle and disease management of the following: Wilt of cotton, Downy mildew of grapes and Ergot of rye.

UNIT V: General characteristic of plant viruses, translocation and distributions of viruses of plants, symptoms caused by plant viruses, Purification, detection and identification of plant viruses, control of plant viruses. Symptoms, morphology of the causal organism, disease cycle and disease management of the following: Bunchy top of banana, leaf curl of papaya and Yellow vein mosaic of bhindi.

Books for Reference:

1. Agrios G.N. *Plant Pathology*. London : Academic Press, 1997.
2. Caldwell D.R. *Microbial Physiology and Metabolism.* United states: Wm.C Brown publishers, 20 05.
3. Dubey R.C and Maheshwari D.K. *A text book of microbiology.* New Delhi:

S.Chand and company,2003.
4. Kumar H. D and Swati Kumar. *Modern concepts of Microbiology*. NewDelhi: Vikas Publications, 2008.
5. Mehrotra R.S and Agarwal A. *Plant Pathology*. New Delhi: Tata McGrawHill Publishing Company, 2003.
6. Pelczar H. and Reid R. *Microbiology* – Concepts and Applications. New Delhi:Tata Mc Graw Hill lPublishing company Pvt.Ltd., 1998.
7. Pelzar M. J, C h a n E.C.S and Noel. R *Microbiology*, New Delhi: TataMc Graw Hill Publishing company Pvt.Ltd., 2010.
8. Prasad T. V.S. *Soil Microbiology,* New Delhi: Dominant Publishers anddistributors, 2011.
9. Prescott L.M, Harley J.P and Klein D.A *Microbiology*. London:Mc Graw hill,2002.
10. Sharma P.D. *Plant Pathology*. NewDelhi: Narosa Publishing House Pvt. Ltd.,2006.

Practical: Hrs/week: 2

- Record of brief life history of scientist related to microbiology
- Methods of sterilization of glasswares
- Preparation of media
- Serial dilution technique
- Pure culture technique
- Effect of antibiotics on the growth of bacteria. Determination of MIC
- Micropreparation/ study of infected specimen prescribed in the syllabus
- Angular leaf spot of cotton
- Citrus canker
- Tundu disease of wheat
- Bunchy top of banana
- Leaf curl of papaya
- Yellow vein mosaic of bhindi.
- Wilt of cotton
- Downy mildew of grapes
- Ergot of rye

Submission - Record Note Book

Laboratory Manuals for Reference:

1. Lakshmanan M, Kunthala Jeyaraman, Jeyaraman and Gnanam, *Laboratoryexperiments in microbiology and molecular biology,* Higginbothams Pvt. Ltd., 1971.
2. Sharma P.D. *Plant Pathology*, NewDelhi: Narosa Publishing House Pvt. Ltd.,2006.

Semester I			
Core IV	**Phytochemistry and Pharmacognosy**		
Course Code: 21PBOC14	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credits: 4**

Objectives:

- Exploring the plant resources as pharmaceuticals and nutraceuticals.
- To acquire knowledge on identification, extraction and utilization of phytochemicalconstituents through teaching and training.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO-1	confirm the promising role of the phytoconstituents as cytotoxicity and substantiate them for the treatment of fatal diseases	8	Re
CO-2	understand the importance of secondary metabolites and relate them in treating the ailments	6	Un
CO-3	identify and categorize medicinal potential of herbs based on their chemical constituents and therapeutic applications	1	Un
CO-4	associate the medicinal compounds with their natural resources	2	An
CO-5	analyse of qualitative and quantitative medicinal compounds in herbal drug preparation.	2	An
CO-6	extract essential oils from natural resources and utilize them effectively as pharamaceuticals and cosmeticals	7,8	Av
CO-7	evaluate the purity of the drugs and able to detect adulterations and substitutions	2,4	Ev
CO-8	screen and elucidate various pharmacologically important phytoconstituents to ascertain its medical quality	5	Ev

Semester I			
Core IV	**Phytochemistry and Pharmacognosy**		
Course Code:21PBOC14	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credits: 4**

UNIT I: Phytochemistry, Histochemistry, Biosynthetic pathway for secondary metabolites. Secondary metabolites - definition, classification, preliminary phytochemical screening. Glycosides: Definition, properties, classification, natural sources, pharmacological and toxicological effects of glycosides. Terpenoids- β-Sitosterol, Glycyrrhizin. Phenolics - Coumarins and Tannins. Steroids and alkaloids.

UNIT II: Flavonoids: Definition, properties, classification, natural sources and therapeutic applications offlavonoids. Medicinal uses of resins.

UNIT III: Extraction methods – Maceration, infusion, percolation, Decoction, soxlet extraction, supercritical fluid extraction, distillation, Counter-current Extraction, and cold extraction. Volatile oils - source, constituents, properties, extraction and utilization of Lemon grass oil, Vetiver oil, Clove oil and Eucalyptus oil. Intellectual property rights and trade of medicinal plants.

UNIT IV: Pharmacognosy: Definition, scope and applications of herbal medicine. Classification (morphological, therapeutic, chemical. and chemotaxonomic classifications): Collection and processing of crude drugs - adulteration of crude drugs. Pharmacognostical standards, synergy and polyvalent action of secondary metabolites.

UNIT V: Evaluation of crude drugs – Physico-chemical, organoleptic analysis. Botanical name, family, useful part, chemical constituents, adulterants and uses of the following drug Glycosides – Senna, Aloe, Digitalis, Liquorice; Terpenoids – Coriander, Fennel, Cinnamom; Alkaloids – Datura, Vinca, Pepper; Lipids - Castor, Neem, Sesame oil.

Books for Reference:

1. Agarwal S.S. and Paridhavi M. *Crude Drug Technology*, Hyderabad: Universities Press, 2007.
2. Evens W.C. *Pharmacognosy Medicinal and Aromatic Crops,* Singapore:Harcourt Brace and company Asian Pvt. Ltd., Universities press, 1987.
3. Farooqui A.A and B.S.Sreeramu B.S. *Cultivation of medicinal and aromatic crops,*Pune: Universities press, 2001.
4. Gurdeep Chatwal. *Organic Chemistry of Natural Products,* Mumbai: Himalaya Publishing house,1983.

5. Kokate C.K. Purohit A.P. and Gokhale S.R, *Pharmacognosy,* Pune: Nirali PrakshanPublishing House Ltd., 2004.
6. Tewari K.S, Vishogi N.K and Mehrotra S.N. *Text Book of Organic Chemistry* ,Uttaarpradesh:VikasPublishing House Ltd., 1998.
7. Trivedi P.C. *Medicinal Plant conservation and utilization*, Jaipur: Aavishkarpublishers,2004.
8. Trivedi P.C and Sharma N.K. *Ethomedicinal Plants,* Jaipur: Pointer Publishers , 2004
9. Wallis. *Text Book of Pharmacognosy,* New Delhi: CBS Publishers, 2003.
10. Yohanarasimban S.N. *Medicinal plants of India,* Jodhpur: 2004.

Practical: Hrs/Week: 2

- Morphology, histology and Powder characteristics, extraction and detection ofCinnamon,Clove, Fennel and Coriander.
- Isolation and detection of active principles:Caffeine from Tea dust Sennosides from Senna Curcumin from Turmeric
- Analysis of crude drugs by chemical tests for the detection of Glycosides - Senna, *Aloe*, LiquoriceTerpenoids – Coriander, Fennel, Cinnamom Alkaloids – *Datura, Vinca*, Pepper Lipids - Castor, Neem, Sesame, Groundnut oilResin – Ginger, Asafoetida. Volatile oil – Lemon and clove
- Distillation of Volatile oils and detection of phytoconstituents by TLS Jasmine and *Eucalyptus*

Books for Reference:

1. Kokate K.C and Gokhale S.B. Practical Pharmacognosy, Pune: 2008.
2. Chauhan M.G. and Pillai A.P.G, Microscopic Profile of Powdered Drugs Used in IndianSystems of Medicine. Jamnagar: *Institute of Ayurvedic Medicinal Plant Sciences,* 2005.

SEMESTER II			
Core V	**Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)**		
Course Code: 21PBOC21	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credit: 4**

Objectives:

- To have a comprehensive idea on vascular cryptogams and phanerogams.
- To get an idea on the past history of biosphere and evolution of seed plants.
- To understand the taxonomy, characteristics and uniqueness of vascular plants.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	appreciate the uniqueness and distinguish between diverse groups of Pteridophytes and Gymnosperms using their characteristic features	1, 2	An
CO-2	discuss different life cycle patterns in different groups	1, 2	Cr
CO-3	know the basic skills and techniques in micropreparation and formulate methods to identify different groups	1, 6	Ap
CO-4	know the evolutionary significance of Pteridophyte	1, 2	Un
CO-5	infer pteridophytes are pioneer in the evolution of seedhabit	1, 2	Re
CO-6	compare and contrast the origin and evolution of steles,foliage, seed and seedless plants.	1, 2	An
CO-7	compare and contrast the seed and seedless plants.	1, 2	Ev
CO-8	review critically the biology, ecology of fossils andmethods of fossilization.	1, 7	Un

SEMESTER II			
Core V	**Plant Diversity II (Pteridophytes, Gymnosperms and Paleobotany)**		
Course Code: 21PBOC21	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credit: 4**

UNIT I: Pteriodophytes: Classification of pteridophytes (PPG) by Erics (2016 (upto order level). Origin and evolution of pteridophytes. General characteristics. Telome concept. Stelar evolution in pteridophytes. Heterospory and seed habit. Theories and modifications of alternation of generations. Life cycle pattern in homosporous and heterosporous pteridophytes. Distribution of pteridophytes in India

UNIT II: Morphological, anatomical structure, asexual and sexual reproduction of Psilotales, Lycopodiales, Selaginellales,Isoetales, Equisetales, Ophioglossles and Polypodiales. Aposory, Apogamy, Vivipary, Parthenogenesis. Economic importance of pteridophytes.

UNIT III: Gymnosperms: Classification of gymnosperms by Christenhusz *et al.* (2011) (Upto family level). General characteristics. Distribution of gymnosperms in India. Morphological, anatomical structure and reproduction of Cycadaceae, Ginkgoaceae, Welwitschiaceae,Gnetaceae and Ephedraceae,

UNIT IV: Morphological, anatomical structure and reproduction of Araucariaceae, Podocarpaceae and Cupressaceae. Affinities of gymnosperms with angiosperms and pteridophytes. Economic importance of gymnosperms.

UNIT V: **Paleobotany:** Geological time scale – fossilization and fossil types: compressions, incrustation, casts, molds, petrifactions, coal balls and compactions. General characters of fossil pteridophytes: *Horneophyton, Sphenophyllum* and *Calamites*. Fossil gymnosperms: *Williamsonia* and *Cordaites*. Indian Paleobotanists: Birbal Sahni, D.D. Pant, M. Ramanujam, Osmani.

Books for Reference:

Pteridophytes:

1. Bower, F.D. *Primitive land plants*. Vol. I & 2. Jaipur : Arihant Publishers. 1988.

2. Pandey S.N., Trivedi P.S., Misra S.P. *A text Book of Botany* Vol. II. New Delhi: Vikas Publishing House Pvt. Ltd., 2006.
3. Parihar, N.S. *An introduction to Embryophyta, Pteridophyta.* Allahabad: Central Book Depot Publications in Botany. 1967.
4. Rashid, A. *An introduction to Pteridophyta*. New Delhi: Vani Educational Books. 1985.
5. Sundara Rajan S. *Introduction to Pteridophyta*. New Delhi : New Age International Publishers. 2009.

Gymnosperms:

1. Chamberlain, C.J. *Gymnosperms.Structure and evolution*. New Delhi: CBS Publishers &Distributors, 1986
2. Johri R.M., Sneh Lata and Kavita Tyagi. *Text Book of Gymnosperms*. New Delhi : Wisdom Press. 2010.
3. Sporne, K.R. *The Morphology of Gymnosperms*. New Delhi: B.I. Publications Pvt. Ltd., 1974.

Practical: Hrs/Week – 2

Pteridophytes:

- *Selaginella* – Habit, Section: T.S. of stem, rhizophore, L.S. of cone
- *Isoetes* - Habit, Section: T.S. of leaf
  Permanent slide: L.S. of male and female cone
- *Equisetum* - Habit, Section: T.S. of internode
  Permanent slide: L.S. of cone
- *Lygodium* – Habit, Section: T.S. of rachis
  Permanent slide: T.S. of pinnule
- *Osmunda* – Habit, Section: T.S. of rachis
  Permanent slide: L.S. of cone
- *Pteris* – Habit, Section: T.S. of rachis and pinnule
- *Adiantum*- Habit, Section: T.S. of rachis and sori
- *Salvinia* – Habit, Section: T.S. of stolon
  Permanent slide: L.S. of cone

Gymnosperms:

- *Cycas* – Twig, Section: T.S. of corolloid root, rachis and leaflet
  Permanent slide: L.S. of microsporophyll, male cone (entire), female cone (entire)
- *Gnetum* – Twig, T.S. of stem and leaf
  Permananent slides: L.S. of male and female cone, wood showing anomalous secondary thickening and seed (entire).
- *Araucaria* – Twig, Section: T. S. of stem

Permanent slide: L.S. of cone

- *Podocarpus* – Twig, Section:
  T.S, of stem, leafPermanent
  slide: L.S. of cone
- *Cupressus*: Twig, Section: T. s. of stem
  Permanent slide: L.S. of male cone and female cone

Fossils:

Pteridophytes:

- *Sphenophyllum*
- *Calamites*

Gymnosperms

- *Williamsonia*
- *Cordaites*

Field study: No. of days 3 (Pteridophytes and Gymnosperms: Western Ghats)

Submission - Record Note Book

Lab manuals for Reference:

1. Ashok M. Bendre and Ashok Kumar. *A Text Book of PracticalBotany*Volume1. Meerut : Rastogi Publications. 2009.
2. Srivastava H. N, *Practical Botany* Volume I, Jalandhar : PradeepPublications, 1987.

SEMESTER II			
Core VI	**Marine Botany**		
Course Code: 21PBOC22	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credits: 4**

Objectives:

- To give elaborate account on marine environment and its role in controlling the Earth'sclimate.
- To understand the different types of marine habitats and the adaptation of life there in.
- To understand the role of marine products and their socio economic and environmental significance

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyze how marine organism adapt to their dynamic environment	5	Un
CO-2	recall how natural events and human activities affect coastal habitats	7	Re
CO-3	critically analyze and evaluate pollution issues, their sources and the influences humans have with the dynamic marine environment	7	An
CO-4	achieve practical skills in processing, preserving and culturing marine plants	6	Ev
CO-5	evaluate the uses of marine resources and realize the role of phytoplankton and bacteria in the economy of the ocean	5	Ap
CO-6	able to signify the characteristic feature of coral reefs and their role in biodiversity conservation	1	An
CO-7	able to identify and understand the role of mangroves in coastal protection and their adaptation to its hostile environment	5	Ap
CO-8	explain the ecological relationship between organisms and their environment	2	An

SEMESTER II			
Core VI	**Marine Botany**		
Course Code: 21PBOC22	**Hrs/week:5**	**Hrs/Semester: 75**	**Credits: 4**

UNIT I: Classification of marine habitat - ecology of pelagic, benthic and sublittoral zones, deep sea, sandy muddy and rocky shore. Characteristics of marine habitat – tides and chlorinity, upwelling, plate tectonics, tsunami, green house effect, carbon pump. Ocean and regulation of climate on earth.

UNIT II: Marine biodiversity –phytoplankton - characteristics, measuring and sampling. Marine bacteria, marine fungi, seaweeds and sea grasses. Threats and conservation of seaweeds and sea grasses. Nutrient cycling: carbon, nitrogen, sulphur and phosphorus.

UNIT III: Marine products - traditional uses; human food and agriculture. Marine colloids and hydrocolloids - Agar - agar, algin, alginates, carrageenan, diatomite, marine lipids, flavanoids, and carotenoids. Marine pharmacology –identification of bioactive compounds in marine organisms – mangroves, seaweeds, and sea grasses.

UNIT IV: Culture of micro algae –laboratory culture, preservation and maintenance of culture and mass culture. Commercial cultivation of seaweeds. Marine pollution –thermal pollution, oil pollution, heavy metal pollution, radioactive pollution and industrial pollution. Algal blooms. Global climate changes: impact on specific diversity and productivity, ocean as carbon sink, effect on coral bleaching. Biological rhythms.

UNIT V: Mangroves and salt marshes: geographical distribution, habit, adaptations, and trophic interactions. Present status and stresses on the mangroves with special reference to Sunderbans. Regeneration of mangroves. Coral reefs – ecology, species interaction, economic importance and conservation.

Books for Reference:

1. Cliton Jand Dawes. *Marine Botany.* New York: A wiley – Intersciences publication John Wiley andsons, 1981.
2. Dring M J. *The Biology of Marine plants.*London: Edward Arnold, 1982.
3. Kumudranjan Naskar and Rathindranath. *Ecology and Biodiversity of Indian mangroves. Vol. I & II,* Delhi: Daya publishing House, 1999.
4. Michael P. *Ecological methods for field and laboratory investigations*, Uttar Pradesh: Tata McGraw – Hill publishing Company Limited, 1986.
5. Sinha P.C. *Marine pollution,* New Delhi: Anmol publications Pvt. Ltd., 1998.

6. Tait R.V. *Elements of Ecology*, London: Butter worths, 1978.
7. Warren. *Biology and water pollution* control, London: W.B.Saunders Company, 1971.

Practicals: Hrs/Week: 2

- Determination of acidity
- Estimation of alkalinity
- Estimation of Salinity
- Collection and identification of phytoplankton.
- Determination of total hardness
- Estimation of nitrate (Spectrophotometry)
- Estimation of Phosphate (Spectrophotometry)
- Heavy metal analysis from mangrove sediments

Specimens / photographs / charts

- Plankton net
- Seaweeds
- Sea grasses
- Mangroves
- Alginates
- Carrageenan

Books for Reference

1. Murugesan A.G and Rajakumari. *Environmental Science and Biotechnology andBiotechnology Theory and Techniques, Chennai:*MJP Publishers, 2005.

SEMESTER II			
Core VII - Developmental Botany			
Course Code: 21PBOC23	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credit: 4**

Objectives

- To study the vegetative and reproductive development of seed-bearing plants
- This course is aimed at understanding the structural organization of tissues, organs and theirdevelopmental events controlled by environmental cues and genetic factors

Course Outcome

CO. No	Upon completion of this course ,students will be ableto	PSO addressed	CL
CO-1	understand the overview of essential aspects of development, organization and life cycle of seed bearing plants	3	Un
CO-2	know how embryo arises and the nature of signals that guide complex patterns of growth and differentiation in the embryo	4	Un
CO-3	explore and illustrate how the molecular and genetic approaches provide an insight into the mechanismthat translate cues into organized pattern growth and development	4	Re, Un
CO-4	understand cell differentiation, organ development and network of gene signals that control developmental sequences	3	Un
CO-5	role of shoot and root apical meristem in vegetative growth and development	3	Re, Un
CO-6	know the biochemical and physiological changes associated with the development of sex organs, fertilization events and fruit development	4	Un,Ap
CO-7	know how the intrinsic programmes of development coupled to external influences such as nutrient levels, energy inputs and environmental signals.	4	Un
CO-8	acquire hands on training experience related to the course.	4	Re

SEMESTER II			
Core VII	**Developmental Botany**		
Course Code: 21PBOC23	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credit: 4**

UNIT I: **Embryogenesis:** Basic concept of development. Polarity and cell linages. Principle of determinants in plant embryogenesis – axis and pattern formation – apical, basal and radial; Cell plasticity - Meristem and indeterminate growth; Types of meristem – Root apical meristem (RAM) – quiescent center - development of lateral root and root hair formation - position dependent signaling process- hormonal control and maintenance of RAM; Shoot apical meristem (SAM)- organization and activities of SAM, role of gene and transcription factors; vegetative organization, tissue differentiation, leaf initiation and differentiation, Genetic approaches on SAM.

UNIT II: **Seed germination and Seedling establishment**: Seed structure, seed dormancy- breaking of seed dormancy; Seed germination – phases, mobilization of stored resource, seedling growth – growth curve- response to environmental cues- trophism – gravitrophism, phototrophism, thigmotrophism – role of auxin distribution in trophism; phototrophism- photomorphogenesis- shoot differentiation- vascular tissue differentiation; root growth and differentiation – emergence of lateral growth and biochemical and physiological considerations.

UNIT III: **Vegetative growth and organogenesis**: Leaf initiation and determinationof phyllotaxy, differentiation of epidermal tissues and appendages, mesophyll tissues; venation pattern, role of hormones; primary root system and shoot system architecture; secondary growth in stem and root- secondary tissue and cambial activity- vascular cambium and corkcambium- abnormal secondary growth.

UNIT IV: **Floral development:** Floral evocation and development of floral parts - Floral meristem, floral organ development – gene control mechanism, homeotic gene control organ identity, competency and determination in floral evocation. Integrating environmental cues – photoperiodism – monitoring day length, circardian ryhythm, vernalization- promoting flowering with cold- temperature control; physiological and molecular control of floral organ development and hormone signals in floral evocation
–, gender expression in flowers, genetic control of floral symmetry.

UNIT V: **Developmental biology of floral organs:** Anther differentiation – tapetalbehavior, microsporogenesis, pollen development and maturation. Male gametogenesis- pollen germination; megasporogenesis – development of female gametophyte- organization of embryo sac- gene regulation on megagametogenesis- pollen pistil interaction self incompatibility – causes – morphological, cyto genetical reasons – fertilization- development of seed and fruit formation.

Books for Reference:

1. Leyser O and Day S *Mechanisms in plant development*. France: Black WellPublishing Company, 2009.
2. Howell S.H *Molecular genetics of plant development*. NY: CambridgeUniversityPress, 1998.
3. Taiz L and Zeiger E *Plant Physiology and development*. USA: SinauerAssociates.Sixth Edition. 2010.
4. Ragavan V *Developmental Biology of flowering plants.* NY:Springer. 2000.
5. Ragavan V *Experimental Embryogenesis in Vascular plants*. London:Academic Press Inc., 1976.
6. Shivana K.R and Joshi B.M *The angiosperm pollen structure and function*. .Singapore: John Wiley & Sons, 1985.
7. Benjamin H Willier and Jane M Oppenheimer *Foundations of ExperimentalEmbryology.* New Delhi. Prentice of India Private Limited, 1968.

Practical: Hrs/week: 2

- Micropreparation of shoot apex/root apex/flower buds/ anther/ ovary/epidermal appendages formicrotomy
- Directionality of pollen tube growth: protein extraction and protein gelelectrophoresis
- Pollen viability test
- Pollen germination test
- Hand sectioning of anther and ovary
- Dissecting embryo and endosperm

Books for Reference

1. Chawla H.S *Introduction to Plant Biotechnology*. New Delhi:

Oxford & IBHpublishing company Pvt.,Ltd., 2009.

SEMESTER III			
Core IX	**Biochemistry and Biophysics**		
Course Code: 21PBOC31	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credits:4**

Objectives:

- To provide updated knowledge of plant's molecular, macro molecular and supra molecular architecture and how they determine the function of plant life.
- To enhance transferable skills such as conduction of quantitative estimation of biomolecule and give mathematical reasoning to interpret the data of the same.
- Familiarise and applies the concept of other branches of sciences that span plant biology such as chemistry, physics and mathematics.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	study the polymeric biomolecules and their monomeric building blocks	1,2	Re
CO-2	illustrate that living organisms and biological system interact via molecular connection	1,3	Re
CO-3	able to realise the importance of structural configuration and atomic rearrangement of macromolecule with respect to their functions	1,6	Re
CO-4	detect the source of vitamins and their chemistry and distinguish their symptoms specific to their deficiency	2,4	Re
CO-5	outline enzyme groups and know the nomenclature that be able to explain the specificity of enzyme's role and mode of action	2,3	An
CO-6	set up and operate variety of experiments to analyse data accompanied by problem solving and recording.	3,4	Ap
CO-7	draw electromagnetic spectrum and understand the properties of light to relate biological applications.	2,7	Ap
CO-8	explain that energy is needed by plant and that is transformed in biochemical system as governed by the laws of thermodynamics	3,7	Cr

SEMESTER III			
Core IX	**Biochemistry and Biophysics**		
Course Code: 21PBOC31	**Hrs/week: 6**	**Hrs/Semester: 90**	**Credits:4**

UNIT I: **Biomolecules: Carbohydrates** - Classification, Structure of monosaccharides (glucose, galactose, fructose and mannose), disaccharides (trehalose, sucrose, maltose and cellobiose), polysaccharides (starch, cellulose, glycogen, chitin). Properties of carbohydrates. **Amino acids:** Structure and classification based on R - group. **Protein:** Structural organisation of protein (primary, secondary (keratin), tertiary (myoglobin) and quaternary structure (hemoglobin)), bonds involved in protein structure. Properties of protein.

UNIT II: **Metabolism**: Introduction to metabolism. **Metabolism of carbohydrate**: Gluconeogenesis, metabolism of glycogen, galactose and fructose. **Metabolism of aromatic amino acids**: Biosynthesis and degradation of phenylalanine, tyrosine and tryptophan. Intermediatory metabolism. Commercial polypeptides – ACTH, Thymosin.

UNIT III: **Lipids:** Classification, structure and properties of simple lipids (triglyceride and wax), compound lipids (phospholipids andglycolipids) and derived lipids (steroids - cholesterol, terpines). **Metabolism of lipids:** Biosynthesis and degradation of fatty acid and cholesterol. **Vitamins:** Biochemical functions of vitamin A, B_{12}, C, D.

UNIT IV: **Enzymes** –nomenclature IUPAC 1974. Isozymes, Allozymes. Principles of catalysis, enzyme action, active site,activation energy, enzyme kinetics (invertase). Cofactors and inhibitors. Coenzymes NADP, FAD, FMN and coenzyme A. Factors affecting enzyme activity.

UNIT V: **Biophysics**: Dual nature of light, electromagnetic spectrum, phosphorescence, fluorescence and bioluminescence. Laws of thermodynamics, concept of enthalpy, entropy and free energy. Redox couple, redox potential, coupled reactions, oxidative phosphorylation. High energy compound - ATP.

Books for Reference:

1. Bhutani S.P. *Chemistry of Biomolecules*. New Delhi: Ane Books Pvt. Ltd., 2009.
2. Conn E. E. and Stumpf P. K. *Outlines of Biochemistry*. New York: John Wiley and Sons, Inc., 1987.
3. Cox M.M. and Nelson D. L. *Principles of Biochemistry*. India: Replika Press Pvt. Ltd., 5th edition, 2008.
4. David Rawn. *Biochemistry*. New Delhi: Panima Publications, 2004.
5. Ferrier D. R. *Biochemistry*. New Delhi: Wolters Kluwer (India) Pvt. Ltd., 6th edition, 2014.
6. Gupta S.N. *Biochemistry*. Meerut, India: Rastogi Publications, 2011.
7. Lehninger A. L. *Principles of Biochemistry*. Delhi: CBS publishers and Distributors, 1987.
8. Nagini, S. *Text Book of Biochemistry*. Chennai, India: Scitech Publications Pvt. Ltd., 2nd edition, 2007.
9. Salil Bose. *Elements of Biophysics*. Madurai: Jothi Books, 1982.
10. Sathyanarayana, U and Chakrapani U. *Biochemistry*. Kolkata: Arunabha Sen, Books and Allied (P) Ltd. 3rd edition, 2006.

Practical

Hrs/Week: 2

- Estimation of total carbohydrates.
- Titration of amino acid (glycine)
- Estimation of free amino acid from plant tissues (Ninhydrin method)
- Estimation of total soluble protein from plant tissues (Barfoed's test)
- Separation of amino acids (ascending paper chromatography).
- Separation of photosynthetic pigments (column chromatography).
- Absorption spectrum of chlorophyll
- Study of enzyme kinetics and determination of Km value.
- Saponification value of two vegetable oils.
- Enzyme assay- Protease
- Chem sketch/morvin sketch for compound structure prediction
- Pass online analysis
- Submission - Record Note Book

Laboratory Manual for Reference:

1. Jayaraman. J. *Laboratory manual in Biochemistry.* New Delhi: New Age International Publishers, 2011.

SEMESTER III			
Core X	**Taxonomy of Angiosperms**		
Course Code:21PBOC32	**Hrs/week:6**	**Hrs/Semester: 90**	**Credit:4**

Objectives:

- To acquire knowledge on different systems of classification and to have an insight on modern trends in classification of Angiosperms.
- To provide practical understanding of floristic feature of angiosperm that enable to identify plants up to species level in the field / forest inventory
- Infer the significance of taxonomy in understanding the evolutionary relationship between plants and to involve in research practices.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the rules of botanical nomenclature and taxonomical hierarchy that enable to organize the plant based on the hierarchical system	1	Ap
CO-2	apply scientific literature for identifying and grouping of underrepresented plants in the taxonomic literature	4	Re
CO-3	to outline different systems of classification and recall the contribution of taxonomist/naturalist in plant systematics	6	Un
CO-4	compare the traditional and modern system of classification and report its merits and demerits.	1	Ap
CO-5	realize the importance of taxonomical literature (flora, monograph, botanical gardens, herbarium and government organization) and utilize them for plant identification and conservation.	1	Un
CO-6	apply effectively the traditional and modern tool (Keys, interactive keys, e-flora, digital herbarium) to develop skill in plant identification	4	Un
CO-7	recognize how the role of cytology, embryology , phytochemistry and molecular biology of plants help to authenticate the identity of plants	7	Ap
CO-8	gain hands on working experience in describing the floristic feature of the plants of specified families and make sketches of that.	1	An

SEMESTER III			
Core X	**Taxonomy of Angiosperms**		
Course Code:21PBOC32	**Hrs/week:6**	**Hrs/Semester: 90**	**Credit:4**

UNIT I: Definition, objectives and brief history of plant taxonomy. Botanical Nomenclature: need for scientific names, polynomial and binomial nomenclature. ICBN: principles, Rules and Recommendations, the rank of taxa (family, genus, species, infra-specific taxa), type method, typification, author citation, publication, effective and valid publication, retention, rejection of names and principle of priority. Phylocode: principles, rules and advantages. Taxonomic hierarchy: Ranks in the hierarchical system (order, family, genus, species and intra specific)

UNIT II: Classification: Relative merits and demerits of major systems of classifications: Linnaeus, Bentham and Hooker's and Angiosperm Phylogeny Group (IV). Current trends in Biosystematics: Phenetics: principles of taximetrics. Cladistics: phylogenetic terms and phylogenetic diagrams. Numerical taxonomy: construction of taxonomic groups, applications, merits and demerits.

UNIT III: Tools of taxonomy: Floras, monographs, revisions, websites. Herbarium and botanical gardens: their role in teaching, research and conservation, important herbaria and botanic gardens of the World. Dichotomous keys: guidelines for constructing dichotomous keys (indentedand bracketed key), interactive keys (computer aided). Digital herbaria: e- flora. Taxonomic evidences: anatomy, cytology, embryology and chemosystematics based on the phytochemicals (phenols, alkaloids, flavonoids and terpenoids). Molecular systematics (DNA bar coding).

UNIT IV: Vegetative and floral characters of the following families: Ranunculaceae, Capparidaceae, Tiliaceae, Meliaceae, Rhamnaceae, Sapindaceae, Fabaceae, Combretaceae, Asteraceae, Sapotaceae.

UNIT V: Vegetative and floral characters of the following families: Solanaceae, Boraginaceae, Convoluvaceae, Scrophulariaceae, Bignoniaceae, Verbenaceae, Nyctaginaceae, Orchidaceae, Commelinaceae and Cyperaceae.

Books for Reference:

1. Davis P.H. and Heywood V.M. Principles of Angiosperm Taxonomy. London: Olive & Byod, 1983.
2. Gurcharan Singh. Plant Systematics. New Delhi: Oxford & IBH Publishing Company, 2004.
3. Gurcharan Singh. Plant Systematics. New Delhi: Oxford & IBH Publishing Company, 2012.
4. Lawrence G.H.M. Taxonomy of Vascular Plants. New Delhi: Oxford & IBH Publishing Company, 1951.
5. Naik V.N. Taxonomy of Angiosperms. New Delhi: Tata Mc Graw Hill Publishing Co., 1984.
6. Pandey S. N., Misra S.P. Taxonomy of Angiosperms. New Delhi: Ane Books India, 2008.
7. Sharma O.P. Plant Taxonomy. New Delhi: Tata Mc Graw Hill Publishing Co Ltd., 1993.
8. Singh G. Plant Systematics – Theory and Practice. New Delhi: Oxford & IBH, 1999.
9. Mathur R.C. Systematic Botany Angiosperms. Agra: Agra Book Store, 1972.

Practical:

Hrs/Week-2

- Study of wild taxa representing different families and identification to species level.
- Construction of taxonomic keys (dichotomous).
- Field trips within and around the campus; compilation of field notes and preparation of herbarium sheets.
- Identification of plants using floras.

Submission - Record note book, five herbarium sheets, photography of five dissected flowers and field note book

Taxonomic Manual for Reference:

1. Gample J.S. Flora of the Presidency of Madras – Vol I & II, Reprint. Authority of Secretary of state for India in Council, 1956.

SEMESTER - III			
Core XI	**Molecular Biology and Genetic Engineering**		
Course Code: 21PBOC33	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credits: 4**

Objectives:

- To furnish broad insight on chemical nature of hereditary material (DNA), organization of chromosome at different phases of cell cycle, basic rules, governing its replication and to examine genes have the code to life.
- To apply the understanding of DNA and adopt molecular techniques to manipulate gene to get the desired output.
- To educate the students in strategizing research methodologies employing genetic engineering techniques.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know the chemistry of genetic material and details of its replication at molecular level	1	Un
CO-2	pronounce how errors during replication are repaired	6	An
CO-3	infer complexity of gene expression in eukaryotes over prokaryotes	2	Un
CO-4	explain gene regulation mechanisms at various levels by which they can learn how it controls growth and development of an organism	4	Cr
CO-5	Understand the principles of genetic engineering and basic steps of gene cloning	2	Un
CO-6	advocate the role of enzymes and vectors responsible for gene manipulation, transformation and genetic engineering	1	Un
CO-7	grasp different types of gene transfer methods employed in gene cloning process	2	Cr
CO-8	practice the advanced techniques in genetic engineering, investigate the different strategies of recombinant DNA technology and resolve the problems encountered	3	Ap

SEMESTER - III			
Core XI	**Molecular Biology and Genetic Engineering**		
Course Code: 21PBOC33	**Hrs/week: 5**	**Hrs/Semester: 75**	**Credits: 4**

UNIT I: **Replication of DNA:** Molecular mechanism of DNA replication in prokaryotes (activation, initiation synthesis of new strands of DNA, termination and helix formation) and eukaryotes (replication of the ends of eukaryotic chromosomes, telomerase enzyme), Enzymology of DNA replication (DNA polymerase enzymes in prokaryotes and eukaryotes and DNA ligase enzymes), replication models (theta replication of DNA, rolling circle model and D-loop model). **DNA repair:** necessity of DNA repair, mistakes in DNA (types), Biochemical mechanism of DNA repair (mismatch repair and repair of thymidine dimers).

UNIT II: **Gene expression:** Definition of gene, types of genes, functions of genes, transcription and processing of RNA in prokaryotes and eukaryotes, genetic code, translation in prokaryotes (initiation, elongation, termination) and eukaryotes (initiation, elongation, termination and polypeptide folding), post translational processing of protein (protein folding).

UNIT III: **Regulation of gene expression:** Gene regulation in prokaryotes: Coordinated gene regulation, strategies of gene regulation, mechanism of gene regulation at transcriptional level induction (*lac* operon – structure, functioning) and repression (*trp* operon – structure). **Gene regulation in eukaryotes:** genome level (presence of multigene families, gene alteration, gene arrangement), transcription level (acetylation of histones, euchromatin remodeling complexes, methylation of nucleotides, control elements, transcription factors, mediators, insulator, regulatory proteins, hormones and chromosome level), post-transcriptional level (post-transcriptional control by choice of splice site, polyproteins, regulation of gene expression by RNA, control on transport of RNA, control at translation of RNA, mRNA degradation control, protein folding level and protein degradation control).

UNIT IV: **Genetic Engineering:** Discovery, denaturation and renaturation of DNA, artificial synthesis of gene, restriction enzymes – types, target sites, DNA cleavage styles (sticky and blunt end style). Biologicaltools for recombinant DNA technology (enzymes, linkers, foreign DNA and cloning vectors). Vectors – cloning and expression vector, plasmid vectors – types, characteristics (pBR322 and pUC8), bacteriophage vectors (lambda phage and M13 vectors), cosmid vectors (pJB8), phagemid vectors (pBluescript), artificial chromosome vectors (BAC and YAC), shuttle vectors, fosmid vectors.

UNIT V: **Techniques used in Genetic Engineering:** Generation of DNA fragments (DNA cleavage by restriction enzymes, Southern blotting technique, Northern blotting and Western blotting). Artificial synthesis

of gene (Chemical assembly of oligonucleotides, enzymatic assembly of oligonucleotides and complementary DNA synthesis). Joining of foreign DNA fragment to a cloning vector (sticky, blunt end ligation and homopolymer tailing method). Introduction of recombinant DNA into host cell (transformation, transduction, electroporation, liposomes, microinjection and microprojectile). Selection and screening of transformed cells (reporter genes, elimination of non-transformed cells, identification of clones having rDNA, selection, formation and expression of cloned genes). Genetic engineering and human welfare.

Books for Reference:

1. Veer Bala Rastogi. *Principles of Molecular Biology*. India: MEDTECH.2016.
2. Brown T.A. *Gene cloning and DNA analysis, An Introduction.* Manchester: John Wiley & Sons. 2010.
3. Primrose S.B and Twyman R. *Principles of gene manipulation and genomics*.Wiley. 7th edition 2006.
4. Verma P.S. and Agarwal V.K. Genetic Engineering. New Delhi: S. Chand & Company. 2010.
5. Benjamin Lewin. *Genes VII.* Burlington: Pearson Prentice Hall. 2004.
6. Channarayappa. *Molecular Biology. Principles and Principles and Practices.* India: Universities Press Pvt. Ltd., 2006.
7. Nicholl D.S.T. *An Introduction of genetic engineering*. UK: Cambridge University press. 2001.
8. Robert H. Tamarin. *Principles of Genetics*. New Delhi: Tata Mc. Graw-Hill publishing company Ltd., 2006.
9. Sathyanarayana U. *Biotechnology.* Kolkatha: Book sand Allied (P). Ltd., 2006.
10. Glick B.R, Pasternak J.J and Patten C.L. *Molecular Biotechnology: principles and applications of recombinant DNA*. Washington: ASM Press. 4th edition 2010.

Practicals

Hrs/ week - 2

- Estimation of DNA by diphenylamine method.
- Estimation of RNA by Orcinol method.
- Isolation of bacterial genomic DNA.
- Isolation of genomic DNA from plant tissue.
- Separation of DNA fragments using AGE.

- Digestion of DNA with restriction enzymes.
- Vecscreen software to detect foreign DNA.
- Protein translation using p BLAST.

Laboratory Manual for Reference:

1. William D. Stansfield, Jame S. Colome and Raul J. Cano. *Theory and Problems Molecular and cell biology*. Schaum's outline series, 1st edition McGraw-Hill. 2019.

SEMESTER - IV			
Core: XIII	**Plant Physiology**		
Course Code: 21PBOC41	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 5**

Objectives:

- To make them understand the organized complexity of the life process in plants.
- To investigate how the physical process and chemical connection determine plant's function and to layout practical skills in conducting a physiological experiment.
- To comprehend how the environmental cues sensitize chemical signals to regulate a lot of physiological functions.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the effect of the soil-plant-water continuum (SPWC) and assess the need of mineral nutrients and symptoms specific to nutrient deficiency.	6	Un
CO-2	discuss how root structure and functions influence the transfer of inorganic nutrients from the soil into the plants,	3	Un
CO-3	analyse the mechanism of assimilation of inorganic molecules into organic molecular components.	3	Un
CO-4	analyse light enhanced photochemical reactions that culminates in the synthesis of ATP and NADPH and fixation of carbon dioxide into organic compounds	3	Un
CO-5	describe respiration with its associated carbon metabolism and releasing of energy stored in chemical bonds in a controlled manner for cellular use	3	Re
CO-6	review systematically how plant's manage physiologically with respect to environmental stress.	7	Cr
CO-7	Remark on the hormone controlled and light mediated morphogenetic events in plants.	3	An
CO-8	design and conduct scientific experiments and analyze the data critically	6	Cr

SEMESTER - IV			
Core: XIII	**Plant Physiology**		
Course Code: 21PBOC41	**Hrs/week: 6**	**Hrs/Semester : 90**	**Credits: 4**

UNIT I: Water relations of plants - components of water potentials and their relation. Absorption of water - Mechanism of ascent of sap. Translocation - Mechanism of translocation of solutes- source sink relationship, phloem loading and unloading. Transpiration - stomatal movement, antitranspirants, guttation. Inorganic nutrient - ion uptake - passive and active uptake and transport. Role of mineral nutrients- deficiency and toxicity symptoms. Hydroponics and its significance.

UNIT II: Photosynthesis-General concepts, Principle of light absorption-action spectrum, absorption spectrum. Pigment system and quantum yield. Photosynthetic apparatus-organization of components in the thylakoid membrane, photochemical reaction- LHS, OEC, mechanism of electron transport -Z-scheme and cyclic; proton transport and chemiosmotic synthesis of ATP; regulation of photosynthetic machinery; carbon reaction-general aspects, activity of rubisco- Calvin Benson cycle, Inorganic carbon concentrating mechanism- C_4 carbon cycle, CAM, C_2 oxidative photosynthetic carbon cycle (photorespiration) significance of C_2 cycle-ecological aspects of photosynthesis. Accumulation and partitioning of photosynthates.

UNIT III: Respiration- overview, mitochondria-structural organization, glycolysis, regulation of glycolysis, PPP, Citric acid cycle, e^- transport system and chemiosmotic synthesis of ATP; alternative oxidase mechanism in plants (cyanide resistance respiration in plants); respiration and coupling of other metabolism. Assimilation of mineral nutrients in plants- N_2cycle, Nitrate assimilation. Ammonium assimilation and synthesis of aminoacids (GOGAT). Biologicalfixation of N_2. Assimilation of S and P in plants.

UNIT IV: Growth hormone- history, biosynthesis, molecular mechanism of action and physiological role of auxin-regulators of cell elongation, phototropism and gravitropism; gibberellin-regulators of plant height; cytokinin-regulators of cell division in shoots and roots, movement of nutrients, chloroplast development; abscisic acid-seed maturation, antistress signal (closes stomata in response to water stress), ethylene-fruit ripening, senescence, abscission, morphactins and brassinosteroids. Photo morphogenesis-phytochrome-mediated photo responses. Physiology of flowering. Biological clock-occurrence of circadian rhythm in plants-examples.

UNIT V: Stress physiology-concepts; types; biotic stress- role of secondary metabolites in plants defense mechanism against pathogens, insect and herbivores. Abiotic stress-types-salinity, drought, freezing, radiationand heavy metal. Biological impacts-morphological, anatomical, metabolical and physiological. Regulatory mechanism-stress sensing, signal transduction pathways, transcriptional regulation, regulatory hormones, ROS, phytochelatins, secondary messenger in plants-

cAMP, Ca-calmodulin.

Books for Reference

1. Beevers, L. *Nitrogen metabolism in plants.* London: William clowes& sons Ltd., 1976.
2. Bidwell, R.G.S. *Plant physiology*. New York: Macmillan publishing company. 1979.
3. Devlin, R.M. *Plant Physiology*. New Delhi: Narosa publishing House.1974.
4. Jain, V.K. *Fundamentals of Plant Physiology*. New Delhi: S.Chand and Co. Ltd., 2004.
5. Noggle, G.R. and Fritz, G.J. *Introductory plant physiology.* New Delhi: Prentice Hall. 2002.
6. Salisbury, F.B. and Ross. C.W. *Plant Physiology*. Thomson Wordsworth, 2007.
7. Taiz, L. and Zeiger. E. *Plant Physiology*. United States of America: Sinauer Associates. Publishers Massachusetts.1998.

Practical Hrs/ week: 2

- Hill activity - effect of light quality.
- Effect of antitranspirants in transpiration and determination of stomatalindex and frequency (Single leaf method & calcium chloride method)
- Determination of water potential(any onemethod)
- Membrane permeability studies.(using different solvents and temperature)
- Nitrate reductase activity – any one factor (light conditions /age)
- Determination of amylase activity.
- Determination of peroxidase activity
- Estimation of proline (Under normal and stressed conditions)
- Determination of chlorophyll content during aging/ under different light conditions
- Study on nutrient ion uptake.
- Determination of sugar content in fruits during ripening process.

Submission - Record Note Book

Laboratory Manual for Reference:

1. Francis H Witham, David F Blaydes and Robert N Devlin, *Experiments in Plant Physiology.* New Delhi: Vanmostr and Rain hold Company. 1970.

SEMESTER IV			
Core XV	**Plant Biotechnology**		
Course Code: 21PBOC43	**Hrs/week: 4**	**Hrs/Semester: 60**	**Credits:4**

Objectives:

- To acquire knowledge on laboratory organization and handling the tools of in-vitro culture of plant that of novel quality
- To understand the role of 21st century science (biotechnology) in increasing productivity of crop plants and to enhance the production of high value metabolites.
- To advance laboratory skill to get employment in biotechnology laboratories and industries.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	comprehend the basic principal of in-vitro tissue culture and develop skills in methods of tissue culture	3	Re, Un
CO - 2	practice *in-vitro* tissue culture techniques for getting required plants from explants	4	Un, Ap
CO - 3	expound *in-vitro* somatic hybridization and formation of somaclonal variation and its commercial application	4	Un
CO - 4	substantiate tissue culture is the viable option for the conservation of endangered plants	4	Re
CO - 5	grasp the techniques of mass cultivation of biofertilizer and defend biofertilizer a boon to sustainable agriculture	3	Un
CO - 6	categories different methods of synthesis of nanoparticles and understand the wide range of application of nanotechnology.	3	Un
CO - 7	describe what is plant molecular farming and highlight that transgenic plants are bioreactor for production of quality protein and other metabolites valuable to medicine and industries	4	Ap
CO - 8	utilize transferable skills obtained through the course for the professional accomplishment	1	Re

SEMESTER IV			
Core XV	**Plant Biotechnology**		
Course Code: 21PBOC43	**Hrs/week: 4**	**Hrs/Semester: 60**	**Credits:4**

UNIT I: **Biotechnology**: Historical development, scope. **Plant tissue culture:** Laboratory organization, preparation of different media and role of growth hormones in *in-vitro* plant development. Plant regeneration pathway: direct embryogenesis, **organogenesis:** organ culture – nodal culture, internodal culture. **Embryo culture**: embryo rescue, breaking of seed dormancy. Factors affecting regeneration, regulation of regeneration. **Production of haploids:** Anther and pollen culture.**Callus culture**.

UNIT II: C**ell culture:** single cell culture and production of secondary metabolites (Alkaloids) **Somatic embryogenesis:** Introduction, factors affecting embryogenesis. **Protoplast Culture:** Plant protoplast isolation, factors affecting protoplast isolation, Protoplast fusion and production of somatic hybrids, selection of hybrid cells and application of protoplast hybridization. **Somaclonal variation:** Isolation and characterization of variants -molecular basis and induced mutations, applications and limitations. **Micropropagation methods:** Apical meristerm culture and production of virus free multiple shoots.

UNIT III: Industrial Biotechnology: role of microbes, strain development, fermentation – **Types of fermentors:** process optimization and recent development in fermentation technology. **Commercial production**: Biopesticide, bio diesel, SLF, alcohol production, pharmaceutical and cosmetics from higher plants. **Enzyme technology:** Cellimmobilization and microbial enzyme production at commercial scale.

UNIT IV: **Phytoremediation:** Microbial degradation of toxic chemicals from soil and water: Plants as a phytoremediating agents. **Biofertilizers:** Mass production of *Rhizobium*, *Azospirillum* and Blue Green Algae (BGA), Vesicular Arbuscular Mycorrhizal Fungi (VAM), Single cell protein (*Scenedesmus, Spirulina, Saccharomyces)*. Algae in bioengineering.

Nanotechnology – role of bio sensor in environmental monitoring. Outline of green synthesis of nanoparticles and their characterization.

UNIT V: **Transgenic plants: Transformation for resistance to biotic stress** – pathogens, insects, virus and bacteria. **Transformation for resistance to abiotic stress** – herbicide resistance, resistance to drought. **Transgenic plant and improved quality:** extended self life, fruit ripening and prevention of discoloration of fruits. **Transgenic plant for improved nutrition** – golden rice, improved seed quality. **Transgenes and immune protective drugs** – edible vaccine, plantibody **Regulations in Biotechnology:** Biosafety: definition, requirement, biosafety in relation to transgenic research, biosafety guidelines and implementation. Intellectual property rights: process of patenting of biotechnological products. Farmer's Rights and plant breeder's Rights.

Books for Reference:

1. Colin Rattledge and K. Bjon. *Basic biotechnology*. New York: Cambridge University Press, 2001.
2. Dubey R.C. *Textbook of Biotechnology*. New Delhi: S. Chand & Co. 2005.
3. George E.F. and Sherrington P.D. *Plant propagation by tissue culture.* London: Exegetic Ltd. 1984.
4. Gupta, P.K. *Elements of Biotechnology*. Meerut: Rastogi publication 2000.
5. Kalyan Kumar De. *An Introduction to Plant Tissue Culture*. Calcutta: New Central Book Agency 2004.
6. Kumar, H.D. *Molecular biology and Biotechnology*. New Delhi: Vikas publishers 1993.
7. Mahesh. *Paddy molecular Biotechnology*. New age international, publishers. (p) Ltd. 2008.
8. Mukhopadhyay S.N, Prabhakar Sharma and Rabindra Narain. *A text book of DNA recombinant technology.* New Delhi: Wisdom press, 2011.

9. Ramavat K. G. *Plant Biotechnology* , New Delhi: S. Chand & Co. 2000.

10. Reinort J and Yeoman M. M. *Plant cell and tissue culture*. Delhi: Narosa publishing house 1983.

11. Satyanarayana U. *Biotechnology.* Kolkatta: Books and Allied (P) Ltd. 2006.

12. Singh, B.D. *Biotechnology - Expanding Horizons.* New Delhi: Kalyani Publishers 2005.

Practicals:

(Hrs. /week - 2)

- Isolation of Rhizobium
- Isolation of rhizosphere bacteria
- Isolation of phosphate solubilizing microorganism
- Synthesis and characterization of nanoparticles
- Preparation of synthetic seeds
- Isolation of protoplast
- Callus induction
- Embryo culture
- Single cell Isolation
- Isolation of BGA
- Nodal Culture
- Protoplast isolation

Set up / pictures / photographs/ demonstration

- Golden rice
- Edible vaccine
- Fermentor

Submission - Record Note Book

Laboratory Manual for Reference:

1. Chawla, HS. *Introduction to Plant Biotechnology*. New Delhi: Oxford & IBH publishing company Pvt. Ltd. 2009.

Submission: Record Note Book

SEMESTER - IV			
Core Elective	**Entrepreneurship Botany**		
Course Code: 21PBOE41	**Hrs / Week: 4**	**Hrs /Semester: 60**	**Credits: 4**

Objectives:

- To able to understand the available natural resources and explore the greatest opportunity to increase and achieve sustainable competitive business advantage.
- To introduce organizations and agencies that can backup entrepreneurial initiatives.
- To expose students to various business opportunities emerging from the plant resources.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	adapt the methods of preservation of vegetables and fruits and identify the industrial scope of these resources	6	Un
CO-2	determine the quality of oil and prepare aesthetic product to find out good marketing capacity	6	Ap
CO-3	understand contemporary opportunities in business situations of value added products and develop skills needed to successfully convert them into entrepreneurial ventures	6	Un
CO-4	explore how the value added products can enhance the profitability of local farmers	6	Un
CO-5	acquire knowledge on primary forest product, wood products and secondary wood products and infer wood industries are major sector in many economy	2,6	Un
CO-6	able to differentiate natural and synthetic wood able to dictate the their pros and cons	3	Un
CO-7	develop ideas that will lead them to start their own business and enable them to be professionally competent	6	Ap
CO-8	able to start entrepreneurship (small scale/medium scale industries) , extract the financial support available and manage the targeted customers to enhance profitability	6	Re

SEMESTER - IV			
Core Elective	**Entrepreneurship Botany**		
Course Code: 21PBOE41	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

UNIT I: **Fruits and Vegetables preservation:** Fruits and vegetables preservation methods: Dehydrating, canning, salting, pickling and freezing. Fruits and Vegetables Products: tutti frutti, health drink, mango pulp, pickle, jam, jelly, amla candy and raisin. Factors influencing the growth of microorganisms in food. Sources of contamination of fruits. Types of spoilage.

UNIT II: **Bioventure:** Industry, overview of *Spirulina*, *Pleurotus* sajor-caju, *Ganoderma*, *Lentinus edodes*, drumstick and coconut. Straight Vegetable Oil (SVO) and Pure Plant Oil (PPO): methods and marketing. Fresh and dry flowers for aesthetics.,

UNIT III: **Value added plant based products:** Mushroom recipes (soup, omelette, pakoda and briyani). Preparation of - Coco peat, Banana products, Palm products, fiber products; Packing techniques – low, trans wrap, deep drawing, doy, sachet, top seal, vacuum: Cost management and estimation.

UNIT IV: **Commercial Wood products:** Natural durability of wood. Wood preservation: Nonpressure processes, Pressure process, Chemical processing of wood. Commercial wood species and identification, Synthetic woods, Marine plywood, Fuel wood, pulp and paper making woods, matchstickwood. Economic importance of pulp and wood

UNIT V: **Marketing and trade :** Steps for starting a small scale industry. Registration as SSI. Role of SIDBI. Advantages and problems of SSI. Government Schemes for SSI: NABARD, NCDC, MSME, NSIC. Marketing and entrepreneurship: different types of marketing, identification of types of consumer and their needs, building consumer relationship. FSSAI, FAO, ICDS, import and export businessdevelopment and strategies.

Text Books:

1. Bahi N. *Hand Book on Mushrooms*. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd. Print, Fourth edition, 2015.

2. Desrosier N.W. and Desrosier J.N. *The Technology of Food Preservation*. New Delhi: CBS Publishers & Distributors. Fourth edition, 1987.

3. Narayanaswami R.V. and Rao K.N. *Outlines of Botany*, Chennai: India: Esvee Press, 1976.

Books for Reference

1. Taneja S. and Gupta S.L. *Entrepreneurship development*, New Delhi: New venture creation, Galgeha Publication Company, 2015.

2. Desai V. *Entrepreneurship development*, Mumbai: Himalaya publication house, First edition, 2015.

3. Khanna S.S. *Entrepreneurial development*. New Delhi: S. Chand Company Ltd., 2016.

4. Manohar D. *Entrepreneurship of small scale industries*, New Delhi: Deep and deep publication, 1989.

5. Lal G., Siddhapa G.S. and Tandon G.L. *Preservation of fruits and vegetables*. New Delhi: Indian council of Agricultural Research (ICAR), 2009.

6. Ranganna S. *Hand book of analysis and quality control of fruits and vegetable products*. New Delhi: Tata mcgraw hill, Second edition, 2001.

7. Cruses W.V. and Fellows P.J. *Commercial fruits and vegetable processing*. United States: CRC press, 2000.

8. Franz F.P. Kollmann. *Wood Science and Technology*. New York: Springer Verlag, 1988.

9. Pearson and Brown. *Commercial Timbers of India*. New Delhi: Government of India Publication, 1984.

10. Tieuran H.D. *Wood Technology*. New York: Pituran Publishing Company, 1951.

SEMESTER – III	
Self Study	**Chemistry For National Eligibility test - II**
Code : 17PCHSS2	**Credit : 1**

Inorganic Chemistry

1. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
2. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
3. Transition elements and coordination compounds: reaction mechanisms.
4. Organometallics in homogeneous catalysis.
5. Cages and metal clusters.
6. Bioinorganic chemistry: photosystems, porphyrins, oxygen transport, electron-transfer reactions; nitrogen fixation.
7. Characterisation of inorganic compounds by NMR, EPR, NQR, and microscopic techniques.
8. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Organic Chemistry

1. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.
2. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.
3. Pericyclic reactions – electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.
4. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O,N,S).
5. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.

6. Structure determination of organic compounds by IR, UV-Vis, ^{1}H & ^{13}C NMR and Mass spectroscopic techniques.

Physical Chemistry

1. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.
2. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities – calculations for model systems.
3. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.
4. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.
5. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.

SEMESTER – IV			
Common Core - Nanoscience And Technology			
Code : 17PPCC41	**Hrs / Week : 6**	**Hrs / Sem : 90**	**Credits : 4**

Unit I Introduction

History of Nanotechnology - Nano structures - importance of nanomaterials - Synthesis of nanomaterials - Physical methods - Laser Ablation, Evaporation, Sputtering and solvated metal Dispersion - Chemical methods - Thermolysis, Sonochemical approach, reduction of metal ions by hydrogen and Methanol - Biosynthesis (Elementary idea only).

Unit II Preparation and characterisation

Structural characterisation (X-ray diffraction, Scanning Tunneling Microscopy, Atomic force microscopy) - Properties of nanomaterials (Optical, Electrical and magnetic properties) – Synthesis of semiconductor nanomaterials (Precipitation methods, Thermal decomposition of complex precursors) - Synthesis of Ceramic nanomaterials - Physical methods (Gas condensation and Laser methods) - Chemical method (Sol-gel synthesis).

Unit III- Carbon nanotube

Carbon nanotube - Carbon allotropes (Diamond, Graphite, Carbon nanotubes) - Types of Carbon nanotubes – Graphene sheet to single walled nanotube - Synthesis of carbon nanotubes (Electric arc - Discharge method, Laser method, Fluidised bed CVD method, Solar production of Carbon nanotubes) - Purification and properties of Carbon nanotubes – Fullerenes - Purification and properties of Fullerenes.

Unit IV Quantum well, Quantum wire and Quantum dots

Introduction - preparation of Quantum nanostructures - Fermi gas and Density of states – Calculation of the density of states in 1, 2 and 3 dimension - Infrared detector - Quantum wire(Production, Structure, Use Quantum dot - Fabrication Techniques - Application of Quantum dots – Quantum dot information storage, Infrared photodetectors, Lasers.

Unit V Magneto electronics and Applications of Nanotechnology

Magneto electronics: Nanocrystalline soft magnetic materials - Permanent magnetic materials - Theoretical background - Super para magnetism - Coulomb blockade - Single electron transistor – Spintronics - Giant magneto resistance - Quantum Hall Effect - Fractional Quantum Hall Effect.

Applications of Nanotechnology: Chemistry and Environment - Energy applications of Nanotechnology - Information and Communication- Heavy industry - Consumer goods - Nano medicine - Medical applications of molecular nanotechnology (Nanorobots, Cell repair machines, nanonephrology).

Book for Study:

1. Nano Physics, Dr.Sr.Geraldin Jayam

Unit	Book no.	Page No
III	1	2.1-2.7,2.14-2.20,2.26-2.29
IV	1	4.1-4.10,4.15-4.30
V	1	5.1-5.5,5.10-5.30

Book for Reference

1. Shanmugam.S, Nanotechnology, MJP Publishers, Chennai(2011)
2. Parthasarathy. B.K, Nanostructure and Nanomaterials, Isha Books, Delhi(2007)
3. Fahrner.W.R (Ed), Nanotechnology and Nanoelectronics- materials, Devices, measurement techniques, Spinger(2004)
4. Charles.P. Poole Jr Frank J. Owens;John Wiley & Sons inc.Publication(2003)
5. Massimiliano Di ventra, Stephane Evoy, James R. Heflin Jr(Editors) , Introduction to Nanoscale science and Technology Springer(2009)
6. Guozhong Cao, Nanostructures and Nanomaterials – Synthesis, Properties and Applications, Imperial College Press, London(2004).

Semester – II			
Elective II A	**Energy and Environmental Chemistry**		
Code : 19PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Vision:

To protect and improve the environment as a valuable asset against hazardous chemicals and energy resources.

Mission:

- To learn the various types of sonochemical reactions.
- To summarise renewable and non renewable energy resources.
- To gain knowledge about Environment and its problem solving techniques.

Course outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	compare heterogeneous liquid- liquid and heterogeneous solid- liquid reactions	2	An
CO - 2	distinguish between renewable and non- renewable energy resources.	5,6	An
CO - 3	explain the construction, working and applications of primary and secondary batteries.	4,8	Ap
CO - 4	classify and compare the fuels based on their appearance such as solid, liquid and gas.	7	Cr
CO - 5	demonstrate the Orsat process for flue gas analysis.	8	Ap
CO - 6	identify a catalyst used in fine chemical synthesis.	4,6	Un
CO - 7	sketch the natural cycles of environment such as the hydrological, oxygen and nitrogen cycles.	6	Cr
CO - 8	differentiate chemical and photochemical reactions occurs in atmosphere.	1,5	An

Semester – II			
Elective II A	**Energy and Environmental Chemistry**		
Code : 19PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Sonochemistry

Introduction Instrumentation (Whistle reactor, Ultrasonic cleaning bath, Direct Immersion Sonic horn, The Cup horn) Types of Sonochemical reactions - Homogeneous reaction(Strecker, Solvolysis and Hydrolysis) - Heterogeneous liquid-liquid reactions (Hydrolysis, Solvolysis, Saponification and Esterification), Heteogeneous solid-liquid reactions, Induced Organic reactions (Bouveault reactions, Cannizzaro reaction, Strecker Synthesis, Reformatsky reaction, Barbier reaction of carbonyl compounds, Dickmann reaction)

Unit II Energy resources

Introduction - classification of energy resources - Renewable - Solar energy (Solar cells, Solar batteries, Solar heat collector and Solar water heater), Wind energy (Wind mills and Wind farms), Ocean energy (Tidal energy, Ocean thermal energy and geothermal energy) and Bio mass energy (Bio fuel and Hydrogen fuel).

Non Renewable - Batteries- Construction, Working and Applications: Primary battery - Leclanche Cell, Alkaline battery, Lithium ion; Secondary battery - NICAD, Lead Acid , Nickel metal hydride cell - Fuel cell - Use of alternate energy sources – Energy Conversion process: Anaerobic digestion and bio gas.

Unit III Fuels and combustion

Introduction - Classification of fuels - Calorific values - Solid fuel - Classification of coal by rank - Metallurgical coke and its manufacture (Otto Hoffmans method) - Liquid fuel - Petroleum - synthetic petrol and its manufacture (Bergius process) - Knocking - Octane number and Cetane number. Gaseous fuel - Liquid Petroleum gas, Natural gas, Compressed natural gas - Ignition temperature - Explosive range - Analysis of flue gas (Orsat process).

Unit IV Recent developments in catalysis

Introduction - Reactions over Solid - Acid catalyst (Alkylation, Cracking & Hydrocracking, Isomerisation), Catalyst in Fine Chemical synthesis (Halogenation, Amination, Condensation, selective Oxidation reactions), Photocatalyst - Introduction - Semiconductor as photocatalyst - Water splitting by Semiconductor Particle - Photocatalysis in the removal of Organic and Inorganic pollutants - Photocatalytic reduction of Dinitrogen, Photocatalysis of Organic reactions.

Unit V Environmental chemistry

Environmental Segments - The natural cycles of environment: the hydrological, oxygen and nitrogen cycles - Chemical and Photochemical reactions in atmosphere: SO_2, O_2 and O_3

chemistry, nitrogen oxides and organic compounds - Greenhouse effect - Ozone hole - El Nino phenomenon.

Microorganisms - the catalysts of aquatic chemical reactions - Acid-base and ion exchange reactions in soil - Nitrogen pathways and NPK in soil - Waste classification and disposal - Solid waste management.

Text Books:

1. Ahluwalia V.K & Varma R.S, Alternate Energy Process in Chemical Synthesis,1st Edition,Narosa Publishing House, Delhi, 2008.
2. Jain P.C and Monika Jain, Engineering Chemistry, 15th edition, Dhanpat Rai Publishingcompany Pvt. Ltd, New Delhi, 2011.

Books for Reference:

1. B.Viswanathan, S.Sivasanker, A.V.Ramaswamy, Catalysis-Principles and Applications,Fourth edition, Narosa Publishing House, Delhi, 2011.
2. Harish Kumar Chopra, Anupama Parmar, A textbook of Engineering Chemistry, NarosaPublishing House, 1st edition, New Delhi, 2008.
3. Dr.A.Ravikrishnan, Environmental Science & Engineering, Sri Krishna High tech Publishing Company Pvt. Ltd, Eleventh edition, 2015.
4. A.K.DE, Environmental Chemistry, New age international publishers, 6th edition, 2006.

Semester – II			
Elective II B	**Industrial Chemistry**		
Code : 19PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Vision:

To develop better predictability of human health maintenance and prevention of various hazards.

Mission:

- To gain knowledge on industrial products.
- To create awareness regarding adulterants, radiation and its toxicity.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	learn some of the industrial products like cosmetics, paints, dyes and pigments and their manufacturing	1, 5	An
CO - 2	test the adulterants present in cosmetics and take care of skin and hair	6	An
CO - 3	get to know various types of alloys and its manufacture and applications	5	Ap
CO - 4	have sufficient knowledge on corrosion and the methods for preventing corrosion	1, 5	Ap
CO - 5	discuss the basic concepts of radiation chemistry	1	An
CO - 6	understand the concepts, importance and need of nuclear energy	1	Ev
CO - 7	aware of disposal techniques of nuclear wastes and safety in working with nuclear energy	6	An
CO - 8	know various power projects in India.	7	An

Semester – II			
Elective II B	**Industrial Chemistry**		
Code : 19PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Cosmetics and Personal Care

Cosmetic formulations – Skin care - Hair care - Deodarants and Antiperspirants - Colour cosmetics - Sun protection aerosols - Nail cosmetics - Mouth cosmetics - Perfumes and fragrances.

Basic ingredients - Additives and flavours used in soaps, tooth pastes, lipsticks, perfumes, colognes, deodorants and antiperspirants - Harmful beautifying practices and their chemistry (Keratin depletion in hair – colouring - cleaning and curling of hair) - Basic tests for identifying good and bad cosmetics – pH Test.

Unit II Alloys and Corrosion

Alloys – Introduction - General characteristics of Alloys – manufacture – purpose of alloying - the Iron-Carbon Alloys - Carbon steels - Types of alloys - Heat treatment of alloys (Hardening of steel and Annealing) – Steel - Alloy steel – Stainless steel – Cast iron – Brass – Bronze – Nichrome.

Corrosion – Definition - Rusting of iron - Chemical corrosion - electrochemical corrosion - Factors influencing corrosion - Atmospheric and soil corrosion - Corrosion control - Hot dipping (galvanizing and tanning), Electroplating and Anodizing.

Unit III Pigments, Dyes and Paints

Pigments – Classification - Manufacture and uses of White lead, Lithopone, Ultramarine blue, Chrome green.

Dyes – Classification, preparation and dyeing processes.

Paints – Composition, manufacture and testing of paints - Special paints – temperature indicating paints, fire retardant paints, water repellant paints.

Unit IV Radiation Chemistry

Interaction of radiation with matter - primary effect due to charged particle - Radiation tracks, spurs and delta rays - linear energy transfer (LET) - Bethe's equation for LET for charged particles due to collisions with electrons **-** Radiation dosimetry - Units of radiation energy (Rad, Gray, Rontgen, RBE Rem, Sivert) - Radiolysis of water.

Unit V Applications of Nuclear chemistry and Trace elements

Chararacterisation of fission reactions - Product distribution, Theories of fission - Fissile and fertile isotopes - Synthetic elements - Nuclear reprocessing - Radiation hazards and prevention - Applications of isotopes - Neutron activation analysis - Isotopic dilution analysis -

Uses of traces in structural and mechanistic studies, agriculture, medicine and industry - Radiocarbon dating - Hot atom energy - Atomic power projects in India.

* **Students may visit Industries / premier Institutions.**

Text books:

1. Jain & Jain, Engineering Chemistry, S.Chand Publications, New Delhi, 2007.
2. Sharma B.K, Industrial Chemistry, Goel Publishing House, 2000.
3. Siva kumar.R, Siva Kumar. N, Engineering Chemistry, The Mc Graw-Hill companies,New Delhi, 2009.

Books for Reference:

1. Kirpal Singh, Chemistry in Daily Life, Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edn., 2008.

2. Charkarabarthy.B.N, Industrial Chemistry, Oxford and IBH Prb.Co., 2005.

3. Gopalan.R,Venkappayya .D, Sulochana Nagarajan, Engineering Chemistry II, VikasPublications, New Delhi, 2011.

4. V. Srinivasa, S.D.Uma Mageswari, M.Meena, Engineering Chemistry, ScietechPublications, 2002.

5. Arnikar.H.J, Essentials of Nuclear Chemistry, Wiley Eastern Ltd., 1988.

Semester – I			
Elective I	**A. Advanced Topics in Chemistry**		
Course Code : 21PCHE11	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objectives:

- To understand about molecular modelling and drug designing.
- To have in-depth knowledge about host-guest molecules.
- To create awareness about common diseases and their treatments.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	formulate molecular dynamics in drug design.	5	Ap
CO 2	perform docking using Autodock virtual screening and De nova designs.	6,8	Cr
CO 3	develop recent trends in the synthesis of crown ethers.	6	Cr
CO 4	design a green method for the synthesis of compounds using twelve principles of Green chemistry.	5,6	Cr
CO 5	compare heterogeneous liquid- liquid and heterogeneous solid- liquid reactions	2	An
CO 6	acquire knowledge about common diseases due to insects, animals, air and water borne diseases.	1,8	Un
CO 7	synthesise the nanomaterials by ultrasonication.	7	Cr
CO 8	sketch the natural cycles of environment such as the hydrological, oxygenand nitrogen cycles.	6	Cr
CO 9	differentiate chemical and photochemical reactions occurs in atmosphere.	1,5	An

Semester – I			
Elective I	**A. Advanced Topics in Chemistry**		
Course Code : 21PCHE11	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Molecular modelling and Drug designing

Introduction Molecular modelling - Drug discovery: the Evolution and process - The role of Computer assisted drug design - Process of drug discovery- Bioassay- Lipinski's rule of five - Quantum mechanical simulations - *Ab Initio* methods, Semi Empirical methods- Molecular dynamics in drug design - Docking- types of searching methods in Docking, docking methods, the scoring function, docking using Auto Dock, Virtual screening, De novo design. Cheminformatics - SMILES (Simplified Molecular Input Line Entry Specification), Applications of Cheminformatics in Drug discovery.

Unit II Supramolecular Chemistry

Introduction - Development - Classification - Based on cavity and forces - Recent developments in Supramolecular compounds - Molecular self-assembly - Self-replicating molecular systems, Molecular self-assembly based on hydrogen bond and Metal coordinated self-assembly - Catenenes and Rotaxanes - Synthesis of crown ethers - Synthesis of Cryptands - Metal complexes with Crown ethers and Cryptands.

Unit III Green Chemistry

Twelve principles of greenchemistry - Green solvents - Supercritical CO_2 and H_2O - Microwave assisted reaction - Stille reaction, Suzuki reaction - Krohnke reaction -Hiyama reaction - Sonogashira reaction.

Introduction to Sonochemistry - Instrumentation - Types of Sonochemical reactions - Homogeneous reaction -Strecker reaction - Heterogeneous liquid-liquid reactions - Hydrolysis and Solvolysis - Heteogeneous solid-liquid reactions - Bouveault reactions, Barbier reaction of carbonyl compounds - Miscellaneous applications of ultrasound - Preparation of porous carbon powder - Sonochemical treatment of polluted water.

Unit IV Pharmaceutical Chemistry

Introduction - Drugs for common diseases due to insects & animals, Air borne diseases, Water borne diseases, Respiratory diseases & Diseases of the Nervous system. Pharmaceutical Aids - Preservative, Anti-oxidants, Sequestrants - Colouring agents, Flavouring agents and artificial sweetening agents added in drugs - Different dosage forms of Drugs - Solid (Tablet), Semisolid (Paste, Cream), Liquid (Solution, Suspension, Emulsion) and Gaseous dosage form.

Unit V Environmental Chemistry

Environmental Segments - Natural cycles of environment: the hydrological, oxygen and nitrogen cycles - Chemical and Photochemical reactions in atmosphere: SO_2, O_2 and O_3chemistry, nitrogen oxides and organic compounds - Greenhouse effect - Ozone hole - El Nino phenomenon.

Microorganisms - Catalysts of aquatic chemical reactions - Acid-base and Ion exchange reactions in soil - Nitrogen pathways and NPK in soil - Waste classification and disposal - Solid waste management.

Text Books

1. Anand Solomon K. *Molecular modelling and Drug Design*. MJP publishers. 2016.
2. Kalsi P.S, Kalsi J.P. *Bioorganic, Bioinorganic and Supramolecular Chemistry*. New Age International Publishers. Second edition. 2010.
3. Ahluwalia V.K, Varma R.S. *Alternate Energy Processes in Chemical Synthesis: Microwave, Ultrasonic and Photo Activatio*n. Narosa Publishing House. New Delhi. 2008.
4. DE A.K. *Environmental Chemistr.* New age international publishers. 5th edition.

Books for Reference

1. Khopkar S.M. *Analytical chemistry of Macrocyclic and Supramolecular compounds.* Delhi: Narosa Publishing House. Second edition 2008.
2. Ahluwalia V.K,Rajender S. Varma. *Green Solvents for Organic synthesis*. Narosa Publishing House Pvt. Ltd. 2009.
3. Paul T.Anastas. *Text Book on Green Chemistry*. OUP. 2006.
4. Raghupati Mukhopadhyay, Sriparna Datta, Rajib Kumar Das. *Textbook of Pharmaceutical chemistry & Medicinal Chemistry*. Books and Allied (P) Ltd. First Edition 2011.
5. Jayashree Ghosh. *A Textbook of Pharmaceutical Chemistry*. New Delhi: S. Chand & Company Ltd. 1997.
6. Dr. Ravikrishnan A. *Environmental Science & Engineering*. Sri Krishna High tech Publishing Company Pvt. Ltd. Eleventh edition 2015.

Semester – I			
Elective I	**B. Food and Health Chemistry**		
Course Code : 21PCHE12	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objectives:

- To learn the importance of basic nutrients and maintain good health**.**
- Acquire knowledge about micro and macro nutrients to enhance our health.
- Aware of food adulterants affecting body health.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	classify nutrients, proteins, vitamins and minerals.	1	An
CO 2	examine physical and mental health.	6	An
CO 3	explain various metabolism of drugs.	2	Un
CO 4	compare hard and soft drugs.	1	Ev
CO 5	measure blood pressure and sugar.	8	An
CO 6	detect various blood group for different persons.	3, 6	Ev
CO 7	calculate body mass fluid and give the factors which affect BMF.	4	Ap
CO 8	test the adulterants present in food items.	8	Cr

Semester – I			
Elective I	**B. Food and Health Chemistry**		
Course Code : 21PCHE12	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Health and its maintenance

Health - Mental health and Physical health - Food Pyramid - Types of Malnutrition - Causes and Remedies - Macro and Micro nutrients - Carbohydrates - Classification and their Biological functions - Proteins - Classification and their Biological functions - Vitamins - Classification and their Biological functions - Minerals (Fe, Ca, P, Na and K) and their Biological functions.

Unit II Drugs Metabolism

Introduction - Drug metabolism pathways - Phase I transformations - Oxidative reactions, The NIH Effect (Alkene epoxidation, Aliphatic hydroxylation, Oxidation of Carbon-Oxygen system and Oxidation of Carbon-Sulphur system), Reductive reactions (Carbonyl reduction, Reduction of Nitro group, Reductive Dehalogenation) and Hydrolytic reactions - Phase II transformations - Conjugation reaction (Glucouronic acid conjugation, Amino acid conjugation, Sulphate conjugation, Acetic acid conjugation and methyl conjugation) and Hard and Soft drugs.

Unit III Body Fluids

Blood Volume - Blood group - Functions of blood - Blood pressure - Anaemia - Blood sugar - Haemoglobin - Chemistry of respiration - Urine - Electrolyte balance.

Enzymes - Types and their action - Hormones and their biological functions - Digestion in mouth, stomach, pancreas and intestine.

Unit IV Energy Metabolism

Introduction - Energy and metabolism - Measurement of energy - Energy cycle - Transformation of energy - Controlled energy in human metabolism - Covalent bond, Hydrogen bond and Phosphate bond. Controlled Reaction rates - Enzymes, Coenzymes and Hormones - Types of Metabolic reactions - Anabolism and catabolism - Energy metabolism - Basel metabolism, Methods of measuring BMR and Factors influencing BMR - Total energy requirement.

Unit V Food adulteration and Testing

Introduction - Legal aspects of food adulteration and prevention - Common Food adulterants in edible oils, ghee, coffee powder, chilli powder, turmeric powder, meat and milk - Harmful effects of the adulterants - Food Additives - Sweeteners, preservatives, flavours and colourants - Pesticide contaminants - Toxicants.

Text books

1. Ahluwalia V.K, Madhu Chopra. *Medicinal chemistry.* Ane Books Pvt ltd. Ane's Student edition, 2009.
2. Deb A.C. *Fundamentals of Biochemistry*. Calcutta: New Central Book Agency. 1994.
3. Alex V. Ramani. *Food chemistry*. Chennai. MJP Publishers. 2014.

Books for Reference

1. Ashutosh Kar. *Medicinal Chemistry.* New Delhi: Wiley Easterns Ltd. 1993
2. Jayashree Ghosh. *A text book of Pharmaceutical chemistry.* S. Chand & Co Ltd. 1999.
3. Satake M, Mido Y. *Chemistry for Health Science.* New Delhi: Discovery Publishing House. 2003.

Semester – II			
Elective II	**A. Nanoscience and Technology**		
Course Code : 21PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objectives:

- To introduce and give an insight into the fascinating area of Nanoscience.
- To synthesise the nanomaterials by eco-friendly methods and characterise the synthesized nanomaterials.
- To apply in different fields for the welfare of society.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	recall a thorough knowledge of basic underline disciplines of nanoscience and nanotechnology	4	Re
CO 2	explain the preparation, characterization and properties of nanomaterials	6	Un
CO 3	analyze the types and properties of carbon nanotubes	1	An
CO 4	assimilate existing and new concepts, methodology and researches and apply them in their academic research environment	7	Ev
CO 5	aware of challenges, risks and promises of nano technological development	6	Cr
CO 6	synthesise the nanomaterials by physical, chemical and biological methods.	6	Cr
CO 7	characterise the synthesized nanomaterials by various techniques.	5	Ev
CO 8	apply the nanomaterials in energy storage, food and in day-to-day life.	8	Ap

Semester – II			
Elective II	**A. Nanoscience and Technology**		
Course Code : 21PCHE21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Introduction to Nanotechnology

Introduction - Definition - Nanoscience and Nanochemistry - Terminology used in Nanotechnology - Nanostructures (Nanoparticles, Nano scale in one dimension, two dimension and three dimension) - Classification of nanoparticles - Properties of nanomaterials - Surface property, Physico-chemical, Electrical and electronic, Redox, Optical, Mechanical and Magnetic properties - Quantum Dot, Quantum well, Quantum wire and Nanocrystal.

Unit II Synthesis and characterisation

Synthesis of nanomaterials - Top down and Bottom up approach - Physical methods (Laser Ablation, Evaporation, Sputtering and Gas condensation) - Chemical methods (Thermolysis, Sonochemical approach and Sol-gel synthesis) - Biosynthesis (Elementary idea only) - Structural characterisation of nanomaterials - X-ray diffraction, Scanning Tunneling Microscopy and Atomic force microscopy.

Unit III Carbon nanotubes

Carbon nanotubes - Carbon allotropes (Diamond, Graphite, Carbon nanotubes) - Types of Carbon nanotubes - Synthesis of carbon nanotubes - Electric arc Discharge method, Laser method, Chemical vapour deposition method (CVD) - Purification methods, properties and applications of Carbon nanotubes.

Fullerenes - Synthesis and purification - Properties and applications of Fullerenes.

Unit IV Nanocomposites

Definition - Ceramic-matrix nanocomposites - Nanocompsites by mechanical alloying - Metal-matrix nanocomposites – Poymer nanomaterials - Synthesis methods - Solution intercalation - Melt intercalation - Emulsion polymerization - In-situ polymerization - Properties of polymer nanostructured materials - Material properties - Thermoplastic nanocomposites - Nylon 6 nanocomposites - Thermoset nanocomposites - Epoxy nanocomposites - Elastomer nanocomposites - TPO nanocomposites.

Unit V Applications of Nanotechnology

Chemistry and Environment - Water purification - Energy storage - Rechargeable batteries, Hydrogen storage - Information and Communication - Heavy industry - Consumer goods (food, textiles and cosmetics) - Nano medicine - Medical applications of molecular nanotechnology (Nanorobots, Cell repair machines, nanonephrology).

Books for Reference

1. Shanmugam S. *Nanotechnology.* Chennai: MJP Publishers. 2011.
2. Parthasarathy B.K. *Nanostructure and Nanomaterials*. Delhi: Isha Books. 2007.
3. Uday Kumar. *Concepts in Nanochemistry*. New Delhi: Anmol Publications Pvt. Ltd. 2013.
4. Bandyopadhyay A.K. *Nano Materials*. New Age International Publishers, 2nd Edition 2012.
5. Viswanathan B. Nano Materials. *New Delhi:* Narosa Publishing House. 2013.
6. Khanna O.P. *A Text Book of Nanochemistry*. New Delhi: Astha Publishers & Distributors. 2014.
7. Guozhong Cao. *Nanostructures & Nanomaterials: Synthesis, Properties & Applications*. Imperial College Press. 2004.

Semester – II			
Elective II	**B. Energy and Computational Chemistry**		
Course Code : 21PCHE22	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objectives:

- To protect and improve the environment as a valuable asset against hazardous chemicals and energy resources.
- To acquire a realistic training of computational tools in career.
- To encourage the preferential use of renewable instead non-renewable energy.

Course outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	organise C++ programming for the determination of some Chemical properties.	8	An
CO 2	calculate the delocalisation energy for aromatic system.	4	Ev
CO 3	distinguish between renewable and non- renewable energy resources.	5,6	An
CO 4	explain the construction, working and applications of primary and secondary batteries.	4,8	Ap
CO 5	classify and compare the fuels based on their appearance such as solid, liquid and gas.	7	Cr
CO 6	demonstrate the Orsat process for flue gas analysis.	8	Ap
CO 7	identify a catalyst used in fine chemical synthesis.	4,6	Un
CO 8	acquire knowledge about paints, dyes and pigments and their manufacture.	5	Un

Semester – II			
Elective II	**B. Energy and Computational Chemistry**		
Course Code : 21PCHE22	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I Energy resources

Introduction - classification of energy resources- Renewable: Solar energy (Solar cells, Solar batteries, Solar heat collector and Solar water heater), Wind energy (Wind mills and Wind farms), Ocean energy (Tidal energy, Ocean thermal energy and geothermal energy) and Bio mass energy (bio fuel and Hydrogen fuel).

Non Renewable – Batteries- Construction, Working and Applications: Primary battery - Leclanche Cell , Alkaline battery, Lithium ion; Secondary battery - NICAD, Lead Acid , Nickel metal hydride cell - Fuel cell - Use of alternate energy sources - Energy Conversion process: Anaerobic digestion and bio gas.

Unit II Fuels and Combustion

Introduction - Classification of fuels - Calorific values - Solid fuel - Classification of coal by rank - Metallurgical coke and its manufacture (Otto Hoffmans method) - Liquid fuel - Petroleum - Synthetic petrol and its manufacture (Bergius process) - Knocking - Octane number and Cetane number. Gaseous fuel - Liquid Petroleum gas, Natural gas, Compressed natural gas - Ignition temperature - Explosive range - Analysis of flue gas (Orsat process).

Unit III Recent developments in catalysis

Introduction - Reactions over Solid - Acid catalyst (Alkylation, Cracking & Hydrocracking, Isomerisation) - Catalyst in Fine Chemical synthesis (Halogenation, Amination, Condensation, selective oxidation reactions) - Photocatalyst - Semiconductor as photocatalyst - Water splitting by Semiconductor Particle - Photocatalysis in the removal of Organic and Inorganic pollutants - Photocatalytic reduction of Dinitrogen - Photocatalysis of Organic reactions.

Unit IV Computational Chemistry

Introduction - Character set in C++ - Tokens - Keywords, identifiers and constants, variables, operators (Input/Output) - Cascading - Selection of statements - IF, IF …..ELSE, SWITCH, WHILE, DO…..WHILE, FOR, BREAK, CONTINUE and GOTO - Functions - Arrays - Classes - Pointers - Inheritance.

C++ programming for the determination of electronegativity of an atom - Lattice energy using Born - Lande equation - Normality, Molarity and Molality of solutions - Solubility of sparingly soluble

salts - Molecular weights of organic compounds - Calculation of delocalisation energy values for aromatic systems.

Unit V Drawing Tools for Chemistry

Chemdraw: Introduction – Features and functionalities - search mode - Exploring the user interface and tool bars - Importing and exporting from chemdraw - Construction of following structures using Chemdraw: Carbohydrates, Amino acids, Lipids, Nucleic acids.

Chem sketch: Introduction - Screen parts and their functions - Features - Chemsketch versus Chemdraw - 2D, 3D optimisation - Application.

Text Books

1. Ramesh Kumari. *Computers and their Applications to Chemistry.* New Delhi: Narosa Publishing House. Second Edition 2005.
2. Jain P.C, Monika Jain. *Engineering Chemistry*. New Delhi, Dhanpat Rai Publishing company Pvt. Ltd. 15th Edition 2011.

Books for Reference

1. Raman K.V. *Computers in Chemistry.* New Delhi: Tata McGraw-Hill Publishing Company Limited. 8th Edition 2005.
2. Viswanathan B, Sivasanker S, Ramaswamy A.V. *Catalysis: Principles and Applications*. Delhi: Narosa Publishing House. 4th Edition 2011.
3. Harish Kumar Chopra, Anupama Parmar. *A textbook of Engineering Chemistry*. New Delhi: Narosa Publishing House. 1st Edition 2008.
4. Gopalan R, Venkappayya D, Sulochana Nagarajan. *Engineering Chemistry II*. New Delhi: Vikas Publications. 2011.
5. Srinivasa V, Uma Mageswari S.D, Meena M. *Engineering Chemistry*. Scitech Publications. 2002.
6. https:// www.acdlabs.com/resources/freeware/chemsketch/
7. Bethany Halford. *Reflections on ChemDraw*. 2014.

Semester III			
Elective III	**B. Chemical Instrumentation**		
Course Code:21PCHE32	**Hrs/Week:4**	**Hrs/Sem:60**	**Credits:4**

Objectives:

- To impart the students with basic principles and concepts in Instrumental techniques.
- To understand the nature and Choice of methods of measurements.
- To learn the limits of detection and amplification.
- To demonstrate the concepts of Operational amplifiers.

Course outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO1	demonstrate automatic operation and computer control	1,5	Ap
CO2	precise control of current and voltage.	6,8	Ap
CO3	differentiate modulation and demodulation	5	An
CO4	point out limitation on amplifier performance	1	Cr
CO5	predict binary logic concepts, logic gates and multi-vibrators	7	Un
CO6	distinguish visual, filter and spectrophotometers.	6	Ap
CO7	control noise level in a system.	1,7	Cr
CO8	interpret the optimal value of adjustable parameters	7,8	Ev

Semester–III			
Elective III	**B. Chemical Instrumentation**		
Course Code: 21PCHE32	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Unit I Measurement and Instrumentation

Introduction - The nature of a measurement - Choice of a method of measurement - Control of variables - Basic design patterns - General properties of modules - Propagation of uncertainity - Single channel design - Limit of detection and amplification - Automatic operation and computer control.

Unit II Operational amplifiers

The operational amplifiers – Limitations on amplifier performance – Mathematical operations - Differentiation - Integration - Measurement of current and voltage - Precise control of current and voltage.

Unit III Signal-to-Noise Optimisation

Sensitivity and detection limits – Noise – Minimising Noiseinasystem – Signal averaging - Modulation: Chopping - Demodulation: Phase sensitive detection-Other methods of Optimising Signal-to-Noise ratio.

Unit IV DigitalElectronics

Binary logic concepts - Logic gates - Multivibrators - Counters - Wave shaping – Analog to digital convertors – Instruments and Digital computers.

Unit V Instrumentation for Optical Absorption Spectrometry

VisualPhotometers-FilterPhotometers-Spectrophotometer-DoublebeamSpectrophotometer - Recording Spectrophotometers - Optimal value of adjustable parameters – Multiple internal reflection assembly – Rapid scanning spectrometer – Non-dispersive Photometers – Photometric titration equipment – Fourier transform Spectrometers.

Textbooks

1. Strobel H.A. *Chemical instrumentation-A systematic approach to Instrumentation Alanalysis.* Phillipines: Addison-Wesley Publishing Company Inc. 2nd Edition 1973.

Books forReference

1. Jeffery G.H, Bassett J, Mendham J, Denney R.C. *Vogel's Text book of Qualitative chemical analysis.* Essex: Longman Scientific and technical. 5th Edition1989.
2. Skoog D.A, Hollar F.J, Crouch S.R. *Principles of Instrumental analysis.* Belmont CA: Thompson Brooks/Cole. 6th Edition 2007.

Semester III	
Self-Study Course – Course on Competitive Exams	
Code: 21PCHS31	**Credits: 2**

Objectives:

- To provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy.
- Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the government sector.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	solve real life problems requiring interpretation and comparison of various representations of ratios	2,6	Ap
CO 2	distinguish between proportional and non-proportional situations and when appropriate apply proportional reasoning	6	An
CO 3	solve problems applying probabilistic reasoning to make decisions	2	Ap
CO 4	evaluate claims based on empirical, theoretical and subjective probabilities	6,4	Re
CO 5	create and use visual displays of data	4	Cr
CO 6	solve problems using high speed mental calculations	6	Ap
CO 7	understand the basic concepts of logical reasoning skills	1,4	Un
CO 8	acquire satisfactory competency in use of data analysis	7	Un

Semester III	
Self-Study Course **Course on Competitive Exams**	
Code: 21PCHS31	**Credits: 2**

UNIT I

Number System (Including divisibility) – HCF and LCM (Including Factors, Multiples and Prime Factorization).

(Chapter: 1 & 2, pages 1 – 46)

UNIT II

Fractions and Decimals – Square and Square roots, Cube and Cube Roots, Indices and Surds.

(Chapter: 3 & 4, pages 47 – 94)

UNIT III

Time, Work and Wages (Including Pipes & Cistern) – Time, Speed and Distance (Including Trains, Boats and Stream, Circular Motion, Races and Games.

(Chapter: 15 & 16, pages 317 - 374)

UNIT IV

Permutations & combinations and Probability.

(Chapter: 18, pages 391 - 416)

UNIT V

Set Theory (Including Venn Diagram) – Data Analysis and Data Interpretation (Including Caselet, Table, Line Graph, Bar Graph, Mixed Bar).

(Chapter: 24 & 27, pages 559 – 570, 615 – 648)

Text Books:

1. Er.Deepak Agarwal, Gupta D.P. *Rapid Quantitative Aptitude with Shortcuts and Tricks for Competitive Exam.* Disha Publication.

Books for Reference

1. Dr. Aggarwal R.S. *Quantitative Aptitude for Competitive Examinations* S. Chand Publication.

2. Rajesh Verma, *Fast Track Objective Arithmetic.* Arihant Publication.

SEMESTER-III			
COMMON CORE - TRANSFORMS WITH MATLAB			
Code: 17PCCC31	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits : 3**

Objectives

- Comprehend the concepts of Z and Fourier Transforms
- To enable students develop their calculation skills using MATLAB.

UNIT I

Fourier Transforms:Introduction - Fourier Integral theorem - Fourier Transforms - Alternative form of Fourier complex integral formula - Relationship between Fourier Transforms and Laplace Transforms.

(Text Book 1 - Chapter 2 : Sections 2.1 , 2.2 , 2.3 , 2.4 , 2.5)

UNIT II

Properties of Fourier Transforms - Finite Fourier Transforms .

(Text Book 1 - Chapter 2 : Sections 2.6 , 2.7)

UNIT III

Z - Transforms : Introduction - Properties of Z- Transforms - Z-Transforms of some basic functions - Inverse Z- Transforms - Use of Z-Transforms to solve finite differential equations.

(Text Book 1 -Chapter 5 : Section 5.1 , 5.2 , 5.3 , 5.4 , 5.5)

(Exercise Problems are not included)

UNIT IV: MATLAB

Introduction : MATLAB Environment - Types of files - Search - Constants , Variables and Expressions - Vectors and Matrices - Polynomials - Input / Output statements-MATLAB graphics.

(Text Book 2 - Chapter 1, 2, 3, 4, 5,6)

UNIT V

Control Structures - Writing Programmes and functions - Ordinary Differential Equations and Symbolic Mathematics - MATLAB Applications : Z-Transforms and Fourier Transforms.

(Text Book 2 - Chapter 7, 8, 9, 15 (Sections : 15.1, 15.6, 15.7 ,15.8)

TEXT BOOKS:

1. T.Veerarajan : Transforms and Partial Differential Equations (Updated Edition) .

2. RajkumarBansal , Ashok Kumar Goel , Manoj Kumar Sharma : MATLAB and its Applications in Engineering, Pearsons Publications.

SEMESTER- II			
CORE ELECTIVE – WEB DESIGNING & MULTIMEDIA			
Code: 17PCSE21	**Hrs / week :6**	**Hrs / Semester: 90**	**Credits :3**

Objective:

- To study the basic and advanced concepts in Web designing and multimedia.

UNIT I : HTML

Introduction – Creating, Saving, Viewing HTML documents – Applying Structure tags – Linking - Images – Formatting Text

UNIT II:

Tables:Creatingtables,Inserting,Deleting,Updating,Formatting– Forms: Creating and processing forms - Frames:Understandingframes,Creatingframes,Enabling and Effective Frames,Creating inline Frames

UNIT III : XML

Introduction – New kinds on the block – displaying XML – XML in the real world – Well Formed and Valid Documents – Cascading Style sheets

UNIT IV: MULTIMEDIA

Definition – Where to use multimedia – Adobe Photoshop: Layering – Designing – Transporting – Filtering – Cropping - Rotating

UNIT V:

Flash: Text Effects – Frame by frame animation - animation using guided path animation using multilayer – text/ image morphing.

TEXT BOOKS:

- Mastering HTML 4, premium edition, Deborah S. Ray & Eric J. Ray, BPB Publications.
- Boumphrey, Stephen Mohr, Paul Houle, and others, 'XML Applications', Wrox Press Ltd, Sohr Publishers & Distributors Pvt Ltd.
- Photoshop CS5
- Flash CS5 in Simple Steps Edition-2011 Published by Dream Tech Press Authored byKogentLearing Solutions Inc

BOOKSFOR REFERENCE:

- Adobe photoshop CS6 Bible by Lisa DanaeDayley& Brad Dayley
- Web Technology & Design. Author, C. Xavier. Publisher, New Age International,

SEMESTER-III			
ELECTIVE I - CLOUD COMPUTING			
Code: 17PCSE31	**Hrs/week:5**	**Hrs/sem:75**	**Credits: 5**

Objectives:

- Comprehend the core concepts of the cloud computing.
- Apply the fundamental concepts in data centers to understand the tradeoffs in power, efficiency and cost.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT I: UNDERSTANDING CLOUD COMPUTING

Cloud computing - cloud types- the cloud cube model- deployment models-service models-characteristics of cloud computing-assessing the role of open standards.

UNIT II: CLOUD ARCHITECTURE

The cloud computing stack – composability – infrastructure – platforms – virtual appliances – communication protocols – Connecting to the cloud: The Jolicloud net book OS – Chromium OS the browser as an operating system.

UNIT III: DEVELOPING CLOUD SERVICES

Infrastructure as a service (IaaS) – IaaS workloads- Platform as a service (PaaS) – Software as a service (SaaS)– Identity as a service (IDaaS) – Compliance as a service(CaaS).

UNIT IV: VIRTUALIZATION AND CLOUD APPLICATIONS

Virtualization technologies – load balancing and virtualization – advanced load balancing – the Google cloud – Google Analytics – Google translate- Google Toolkit –Google APIs-windows azure service – windows Azure App fabric.

UNIT V: CLOUD STORAGE

Cloud storage – unmanaged cloud storage – managed cloud storage – creating cloud storage systems – working with Amazon storage systems: Amazon Elastic compute cloud(EC2)- Amazon simple storage system(S3) – Amazon Elastic block store(EBS)- cloud front.

TEXT BOOK:

1. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd, 2012. New Delhi. Chapters:1,3,4,5(pgs:94-99),8(pgs:162-173),10(pgs:201-216),15(pgs:316-321),9(pgs:185-199)

BOOK(S) FOR REFERENCE:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, Second Edition, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pvt. Limited, July 2008.

SEMESTER II			
Core IX – Digital Image Processing			
Code: 19PCCC21	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Vision

To interpret images mathematically and process them for the extraction of data using matlab

Mission

To equip the students with the knowledge of fundamental concepts and techniques in basic digital image processing and their applications to solve real life problems.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	calculate the Fourier transforms of standard functions both from the definition and by using tables.	2	Ap
CO-2	design and implement the different transforms like Fourier transform and Z transform.	2	Cr
CO-3	write given function in terms of sine and cosine in Fourier series and also to get knowledge in Fourier Transforms.	2	Re
CO-4	solve finite difference equations using Z- transform using MATLAB	1	Ap
CO-5	review the fundamental concepts of a digital image processing system.	3	Re
CO-6	analyze images in the frequency domain using various transforms.	2	Re
CO-7	interpret Image compression, segmentation and representation standards	3,4	An
CO-8	understand image filtering for use in various applications	1	Un

SEMESTER II			
Core IX – Digital Image Processing			
Code: 19PCCC21	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Unit I- Introduction

Introduction – steps in image processing, Image acquisition, representation, sampling and quantization, relationship between pixels. – color models – basics of color image processing.

Unit II - Image Enhancement

Image enhancement in spatial domain – some basic gray level transformations – histogram processing – enhancement using arithmetic , logic operations – basics of spatial filtering and smoothing.

Unit III - Image Enhancement

Image enhancement in Frequency domain – Introduction to Fourier transform: 1- D, 2 –D DFT and its inverse transform, smoothing and sharpening filters.

Unit IV - Image Restoration

Image restoration: Model of degradation and restoration process – noise models – restoration in the presence of noise- periodic noise reduction.. Image segmentation: Thresholding and region based segmentation.

Unit V - Image Compression

Image compression: Fundamentals – models – information theory – error free compression – Lossy compression: predictive and transform coding. JPEG standard.

Text Book:

1. R.C. Gonzalez, R.E.Woods, 2002, Digital Image processing, 2nd Edition, Pearson Education.

Books for Reference:

1. T.Veerarajan : Transforms and Partial Differential Equations (Updated Edition) .
2. Rafael C. Gonzalez, Richard E. Woods: Digital Image Processing, Pearsons Education, third edition.
3. RajkumarBansal , Ashok Kumar Goel , Manoj Kumar Sharma : MATLAB and its Applications in Engineering, Pearsons Publications.

SEMESTER – I			
Core II - J2EE			
Code : 19PCSC12	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Vision: To acquire knowledge on the usage of recent platforms in developing web applications

Mission:

- Enhancing the students skills to design and develop interactive, client-side, server-side executable web applications.
- Able to apply the skill learnt for projects.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identifying a high-level overview of the J2EE architecture	2	Re
CO-2	identify the services and components which comprise the J2EE specification	2	Re
CO-3	explain how J2EE technology applications are packaged	1,2	Un
CO-4	illustrate Web application development using Web Components Servlet and JSP	1,5,8	Un
CO-5	summarize the features of Servlet and frameworks used in web applications development	5	Un
CO-6	understand design applications using Straut and Hibernate and Spring	1,6	Un
CO-7	finding new applications from existing beans in Enterprise beans.	1,8	An
CO-8	summarizing the types of Enterprise beans	2	Un
CO-9	recognizing the Hibernate framework in the development of Java application.	1,5	Re

SEMESTER – I			
Core II - J2EE			
Code : 19PCSC12	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Unit I

J2EE introduction – J2EE Architecture (J2EE Tiers , Containers , Roles) –J2EE Servers and services –Services of EJB Container – J2EE Technology – Packaging – Web services – Advantages of J2EE Applications

Unit II

Enterprise Bean introduction – Benefits of Enterprise Beans - Types of Enterprise Beans – Session Bean – Entity Bean – Message-Driven Bean – The Contents of a Enterprise Bean – The Life Cycles of Enterprise Beans.

Unit III

Servlet - Servlet Lifecycle - Servlet API -Object model of Servlet framework - Understanding web.xml, servlet tags and directory structure of web application - GenericServlet and HttpServlet, ServletConfig & ServletContext - Handling Form data with get and post request - Initializing a servlet - Request Dispatcher, Redirecting Request - Session Management -Filters in servlet -programs in servlet to read all parameters from form, database handling program, reading cookies values. JSP - What is JSP page? Compare it with servlet - Lifecycle of JSP page - JSP syntax using Directive, Declaration , Expression , Scriplet, Comment - Using javabean and Action Tag in JSP - JSP implicit objects - Using JSP standard tag library (JSTL) - Session management - Exception handling - Custom tag - Transferring Control to Another Web Component - Using JDBC in JSP -Programs in JSP -Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.

Unit IV

Basic of Struts2 - Understanding MVC architecture - Struts2 framework - Understanding default-stack - comparing struts with other framework - Working with Struts2 Actions - Introducing Struts 2 actions - Packaging your actions - Implementing actions Adding workflow with interceptors - Why intercept requests? - Interceptors in action - Surveying the built-in Struts 2 interceptors - Declaring interceptors - Building your own interceptor Data transfer: OGNL and type conversion - Data transfer and type conversion: common tasks of the web application domain - OGNL and Struts 2 - Built-in type converters - Customizing type conversion Validation framework - RequiredFieldValidator Class - RequiredStringValidator Class - ExpressionValidator Class - Email Validator Class - RegexFieldValidator Class - DateRangeFieldValidator Class Struts

Unit V

Hibernate - Introduction to Hibernate - Understanding ORM (Object Relational Mapping) - Understanding Transient, Persistent and Detached Object states - Issues while writing manual JDBC code - Hibernate and JPA (Java Persistence API) - Writing persistence classes -Steps to work with Hibernate - Handling CRUD operations in Hibernate - Mapping Inheritance between classes with tables in database -HQL -One to One and One to One mapping in Hibernate- Core Spring -Springing into action -Wiring beans. -Advanced wiring. -Aspect oriented Spring - Spring in Web and Backend -Building spring web application -JDBC with spring / Hibernate with spring.

Text Book:

1. Elliotte Rusty Harold, " Java Network Programming", O'Reilly publishers, 2000

Books for Reference:

1. Ed Roman, "Mastering Enterprise Java Beans", John Wiley & Sons Inc., 1999.
2. Hortsmann & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002.
3. Patrick Naughton, "COMPLETE REFERENCE: JAVA2", Tata McGraw-Hill, 2003.
4. Struts 2 in Action , Manning publication , Donald Brown, Chad Michael Davis, and Scott Stanlick Spring in Action , Craig Walls , Manning Dreamtech press
5. Pure JSP by James Goodwill Techmedia SAMS publication
6. Hibernate in Action Manning publication , Christian Bauer and Gavin King Java Servlet Programming O'Reilly Publication-Author: Jason Hunter.
7. Struts 2 Black Book James Holmes "Struts: The Complete Reference, " 2nd Edition 2007 McGraw Hill Professional
8. Patrick Peak And Nick Heudecker, Patrick Peak, Nick Heudecker Hibernate Quickly, " 2007 Dreamtech
9. Subrahmanyam Allamaraju and Cedric Buest , "Professional Java Server Programming (J2EE 1.3 Edition), ", Shroff Publishers & Distributors Pvt Ltd.

SEMESTER – II			
Core VI - Distributed Database Management System			
Code : 19PCSC21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Vision : To build the background of database systems by deepening the understanding of the theoretical and practical aspects of the database technologies, showing the need for distributed database technology to tackle deficiencies of the centralized database systems and finally introducing the concepts and techniques of distributed database including principles, architectures, design, implementation and major domain of application.

Mission :

- Identify the introductory distributed database concepts and its structures.
- Describe terms related to distributed object database design and management.
- Produce the transaction management and query processing techniques in DDBMS.
- Relate the importance and application of emerging database technology.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand what is Distributed DBMS	4	Un
CO-2	understand various architectures of DDBMS	4	Un
CO-3	apply various fragmentation techniques in a given problem	4	Ap
CO-4	understand the steps of query processing	4	Un
CO-5	finding how optimization techniques are applies to Distributed Database	4,6	An
CO-6	learn and understand various Query Optimization Algorithms	3	Un
CO-7	understand Transaction Management & Compare various approaches to concurrency control in Distributed database	6	Un
CO-8	understand various algorithms and techniques for deadlock and recovery in Distributed database	3	Un

SEMESTER – II			
Core VI - Distributed Database Management System			
Code : 19PCSC21	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Unit I : Introduction

Distributed Data Processing, Distributed Database Systems, Promises of DDBSs, Complicating factors - Distributed DBMS Architecture Models- Autonomy, Distribution,
Heterogeneity DDBMS Architecture – Client/Server, Peer to peer, MDBS

Unit II: Data Distribution Alternatives:

Design Alternatives – localized data, distributed data Fragmentation – Vertical, Horizontal (primary & derived), hybrid, general guidelines, correctness rules
Distribution transparency – location, fragmentation, replication - Impact of distribution on user queries.

Unit III: Query Processing

Query Processing Problem, Layers of Query Processing Query Processing in Centralized Systems – Parsing & Translation, Optimization, Code generation, Example Query Processing in Distributed Systems – Mapping global query to local .
Optimization of Distributed Queries: Query Optimization, Centralized Query Optimization, Join Ordering Distributed Query Optimization Algorithms.

Unit IV: Distributed Transaction Management & Concurrency Control

Transaction concept, ACID property, Objectives of transaction management, Types of transactions, Objectives of Distributed Concurrency Control, Concurrency Control anomalies, Methods of concurrency control, Serializability and recoverability, Distributed Serializability, Enhanced lock based and timestamp based protocols, Multiple granularity, Multi version schemes, Optimistic Concurrency Control techniques

Unit V : Distributed Deadlock & Recovery Deadlock concept, Deadlock in Centralized systems

Deadlock in Distributed Systems – Detection, Prevention, Avoidance, Wait-Die Algorithm, Wound-Wait algorithm Recovery in DBMS - Types of Failure, Methods to control failure, Different techniques of recoverability, Write- Ahead logging Protocol, Advanced recovery techniques- Shadow Paging, Fuzzy checkpoint, ARIES, RAID levels, Two Phase and Three Phase commit protocols.

Text Book:

1. Principles of Distributed Database Systems, Ozsu, Pearson Publication

Books for Reference:

1. Rahimi & Haug, Wiley, Distributed Database Mangement Systems,
2. Chanda Ray, Distributed Database Systems, Pearson Publication
3. Sachin Deshpande, Distributed Databases, Dreamtech
4. A. Silberschatz, H.F. Korth and S. Sudharshan, 2006, Database System Concepts,5thEdition, Tata McGraw Hill, New Delhi.

SEMESTER- II			
Core VII – .Net Framework Programming			
Code: 19PCSC22	**Hrs / week :5**	**Hrs / Sem: 75**	**Credits :4**

Vision:

Create and deploy database driven applications and services

Mission:

- Learn to use controls in programming
- Learn to develop user friendly applications

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	set up a programming environment for ASP.net programs	1	Ap
CO-2	creating ASP.Net applications using standard .net controls	1	Cr
CO-3	develop a data driven web application	1,4	Ap
CO-4	connecting to data sources and managing them	1,4	Ap
CO-5	maintain session and controls related information for user used in multi-user web applications	1	Ap
CO-6	understand the fundamentals of developing modular application by using object oriented methodologies	1,4	Re
CO-7	learn to diagnose the cause of errors and handle it	1	Ap
CO-8	create and deploy ASP.NET web applications	1,4,6,8	Cr

SEMESTER- II			
Core VII – .Net Framework Programming			
Code: 19PCSC22	**Hrs / week :5**	**Hrs / Sem: 75**	**Credits :4**

Unit I

Introduction to Visual Basic .NET : Window forms – working with controls – working with dialog boxes –MDI- Drag and drop operation – variables – Controlling Program flow.- Procedures in VB.Net-Accessing a Database.

Unit II

Introducing ASP.Net – Getting started with ASP.Net applications: Web forms – creating ASP.Net Webform applications – Using ASP.Net Webforms for server controls : Beginning with server controls – Taking a closer look at web controls – Illustrating Basic web controls – Working with Validation Controls : The compare Validator – The Range Validator – Regular Expression Validator – Custom validator –Validation Summery control – Multiple validation control.

Unit III

Developing ASP.Net Server controls : Developing ASP.Net server controls – Creating and using Web User Control – Creating ASP.Net Pages to web user control – Using Rich Web controls: Calendar web server control.

Unit IV

Debugging ASP.Net Web Applications: Tracing ASP.Net Applications – Handling Errors in ASP.Net applications – Using ADO.Net with ASP.Net: ADO.Net – ADO.Net Object model .

Unit V

Welcome to C# - Working with variables, Operators and Expressions – Writing methods applying scope – using decision statements-Using Iteration Statements – Managing Errors and Exceptions – Creating and Managing Classes – Using Arrays and Collections

Text Book:

1. Mridula Parihar, Yesh Sinhal and Nitin Pandey, “Visual Studio .Net Programming”, PHI, 2002.

Books for Reference:

1. John Sharp, Jon Jagger, “Microsoft Visual C# .Net Step by Step”, PHI, 2005.
2. Nitin Pandey, “Microsoft Asp.NET”, PHI, 2002.
3. “ASP.NET Made Simple” BPB Publictaions, First Edition, 2001.
4. Kiric Allen Evans, Ashwin Kamanna, Joel and Muller, “XML and ASP.NET”, Pearson Education, First Indian Reprint, 2002.
5. Andrew Trolsen, “C# and the .NET Platform”, APress, Second Print, 2006.

SEMESTER- II			
Core VIII – Data Mining & R Programming			
Code: 19PCSC23	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Vision:

Extract patterns of usable data using appropriate algorithms

Mission:

- To study the basic and advanced concepts in Data Mining Techniques.
- To understand the various algorithms involved in data mining and its applications.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	display a comprehensive understanding of different data mining tasks and the algorithms most appropriate for addressing them.	1	Un
CO-2	know Strengths & Limitations of Data Mining Methods	1	Un
CO-3	display interesting patterns from large data, to extract and analyse, make predicitons and solve problems	1, 4	An
CO-4	evaluate models/algorithms with respect to their accuracy.	6	Ev
CO-5	demonstrate capacity to perform a self directed piece of practical work that requires the application of data mining techniques.	1	Ev
CO-6	develop hypotheses based on the analysis of the results obtained and test them.	1	Ev
CO-7	learn to Set Up Data for Experiments	1,4	Ap
CO-8	conceptualize a data mining solution to a practical problem.	1,4, 8	Ap

SEMESTER- II			
Core VIII – Data Mining & R Programming			
Code: 19PCSC23	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Unit I

Introduction: Basic Data Mining Tasks- Data Mining Versus Knowledge Discovery in Databases. Data Mining Techniques: Introduction-A Statistical Perspective on Data Mining-Similarity Measures- Decision Trees-Neural Networks-Genetic Algorithms

Unit II

Classification: Introduction- Statistical Based Algorithms-Distance Based Algorithms-Decision Tree Based Algorithms-Neural Network Based Algorithms- Rule Based Algorithms-Combining Techniques.

Unit III

Clustering: Introduction-Similarity and Distance Measures-Outliers Hierarchical Algorithms-Partitional Algorithms.

Unit IV

Introduction: Overview and History of R, Getting Help, Data Types, Subsetting, Vectorized Operations, Reading and Writing Data. (5L) Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards. (5L) Scoping Rules, Debugging Tools, Simulation, R Profiler.

Unit V

Association rules, frequent itemsets- Finding high-correlation with low-support- Classifiers - Bayesian, Nearest Neighbour- Decision Trees- Clustering techniques -Supervised, Semisupervised learning: Expectation maximization; Web search: HITS and PageRank

Text Book:

1. Margaret H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson publications, Ninth Impression.

Books for Reference:

1. K. P. Soman, ShyamDivakar, V. Ajay "Insight in to Data Mining Theory and Practice", PHI Learning Pvt. Ltd, 2006.
2. Jiawei Han, MichelineKamber, Jian Pei " Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, Third Edition
3. W. N. Venables, D. M. Smith, An Introduction to R, R-core team,2015
4. Jiawei Han, Micheline Kamber: Data mining: concepts and techniques (2nd ed), Morgan
5. Kaufman (2006).
6. Bing Liu: Web Data Mining: Exploring Hyperlinks, Contents and Usage Data, Springer (2006).
7. Soumen Chakrabarti: Mining the Web: Discovering knowledge from hypertext data, Elsevier (2003).
8. Christopher D Manning, Prabhakar Raghavan and Hinrich Schütze : An Introduction to Information Retrieval, Cambridge University Press (2009).

SEMESTER- II			
Core X – Advanced Computer Networks			
Code: 19PCSC24	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Vision

To give exemplary graduate education in information networking, information security, and mobility.

Mission

- To understand modern computer networks
- to familiarize routing algorithms
- to detect the technical problems in networking

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm.	3,7	Ap
CO-2	demonstrate the working of HUB and Switches.	7	Ap
CO-3	examine the Performance of ARQ Protocols, Ethernet LAN, Token Ring, RIP, TCP and UDP.	7	Ap
CO-4	identify the networking technologies and associated network standards.	7	An
CO-5	solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm.	3,7	Ap
CO-6	construct the route discovery algorithm to determine the shortest path in an internet represented as a weighted graph.	5,7	Ap
CO-7	understand network architecture	7	`Un
CO-8	implementation of protocols like TCP, UDP and IP using OPNET and NS-2	5,7	Ap

SEMESTER- II			
Core X – Advanced Computer Networks			
Code: 19PCSC24	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Unit I

Layered Network Architecture and Network Topologies:

Introduction - Evolution of data Networks – Switching Techniques – Categories of networks - ISO/OSI Reference Model – TCP/IP Model,Network Topologies.

Unit II

Internetworking devices and Data Link Layer:

Repeaters – Hubs – Switches – Bridges: Transparent and Source Routing– Routers.Logical Link Control – Error Detection Techniques – ARQ protocols – Framing – HDLC –Point to Point protocol. Medium Access Control – Random access Protocols – Scheduling approaches to MAC.

Unit III

Local Area Networks& Wide Area Networks and Network Layer:

Ethernet- Token Bus/Ring , FDDI – Virtual LAN ,WAN Technologies – Frame Relay, ATM, Wireless LAN. Internetworking – IP Addressing – Subnetting – IPv4 and IPv6– Routing – Distance Vector and Link State Routing – Routing Protocols.

Unit IV

Transport Layer and Services:

Connection oriented and Connectionless Service – User Datagram Protocol – Transmission Control Protocol – Congestion Control – QoS parameters.

Unit V

Application Layer and Contemporary Issues:

Domain Name System – Simple Mail Transfer Protocol – File Transfer Protocol – Hypertext Transfer Protocol - World Wide Web.Contemporary Issues

Text Book:

1. Alberto Leon-Garcia, “Communication Networks” Tata McGraw-Hill 2012.

Books for Reference:

1. Robert Gallager, “Data Networks”, Prentice Hall, 2009.
2. W. Stallings, Data and Computer Communications, Prentice Hall, 2007
3. Fred Halsall, Data communications, “Computer Networks and Open systems”, Addison Wesley 2006.
4. BhushanTrivedy, Computer Networks, Oxford university press,2012.

SEMESTER – I			
Core Practical - I J2EE Lab			
Code : 19PCSCR1	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 2**

1. Write a Servlet to display “Hello World” on browser.
2. Write a Servlet to display all the headers available from request.
3. Write a Servlet to display parameters available on request
4. Write a Servlet to display all the attributes available from request and context
5. Write a Servlet which displays a message and also displays how many times the message has been displayed (how many times the page has been visited).
6. Assume that the information regarding the marks for all the subjects of a student in the last exam are available in a database, Develop a Servlet which takes the enrollment number of a student as a request parameter and displays the marksheet for the student.
7. Develop a Servlet which looks for cookies for username and password, and forwards to a home.jsp in case the cookies are valid and forwards to login.jsp, in case the cookies are not found or the cookies are not valid.
8. Develop a Servlet to authenticate a user, where the loginid and password are available as request parameters. In case the authentication is successful, it should setup a new session and store the user's information in the session before forwarding to home.jsp, which displays the user's information like full name, address, etc.
9. Write a simple JSP page to display a simple message (It may be a simple html page).
10. Write a JSP page, which uses the include directive to show its header and footer.
11. Create a Java class called Product with the following properties: name, description, price. Create a listener that notifies (through System.out) whenever a user adds a product to a shopping cart (i.e. adds an object to the session object) or removes it again. Hint: check out the class HttpSessionAttributeListener. Make it print the name and price of the object (hint: access the session through the HttpBindingEvent object). Also, let the listener print the total price of all objects saved in the session so far (one way to accomplish this could be to keep a collection of all objects saved to the session – or just their keys – in the listener or an associated class).
12. Create a servlet filter that logs all access to and from servlets in an application and prints the following to System.out: a. the time the request was received b. the time the response was sent c. how much time it took to process the request d. the URL of the resource requested e. the IP address of the visitor
13. Develop a interest calculation application in which user will provide all FACULTY OF COMPUTER APPLICATIONS information in HTML form and that will be processed by servlet and response will be generated back to the user.
14. Develop an application to demonstrate how the client (browser) can remember the last time it visited a page and displays the duration of time since its last visit. (Hint: use Cookie)
15. Develop an application to keep track of one user across several servlet invocations within the same browser session.

SEMESTER- II			
Core Practical III – Data Mining Lab (R Lab)			
Code: 19PCSCR3	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :2**

Using R programming language write programs for the following concepts:

1.Vectorization

2. Control structures

3. Functions

4. Scoping Rules

5. Loop functions

6. Graphics and visualization

7. Grammar of data manipulation (dplyr and related tools)

8. Debugging/profiling

9. Statistical simulation

SEMESTER- II			
Core Practical IV – Network Simulation Lab I			
Code: 19PCSCR4	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :2**

1. Implementation of File System Calls
2. Implementation of ICP Techniques – Pipe, Message Queue, Shared Memory
3. Socket Programming
    a) TCP Sockets
    b) UDP Sockets
    c) Applications using Sockets
4. Simulation of Sliding Window Protocol
5. Simulation of Routing Protocols
6. RPC
7. Development of applications such as DNS / HTTP / E-mail / Multi-user chat

SEMESTER – III			
ELECTIVE II - OBJECT ORIENTED SOFTWARE ENGINEERING			
Code : 19PCSE32	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 2**

Vision:

To be a professional developer of software products

Mission:

To understand different conventions in software modelling

To perform software testing and validation

Course Outcome:

CO.No	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	Design and implement a software system to meet desired needs.	3,6	**Cr**
CO-2	Identify requirements of systems and applications.	3	**An**
CO-3	Use modern software systems and tools.	1,6	**Ap**
CO-4	Understand different software life cycle concept.	7	**Un**
CO-5	Study and design SRS documents for software projects.	3,8	**An**
CO-6	Study and model software projects using different modelling techniques.	3,8	**An**
CO-7	Understand different techniques to map models to code	7	**Un**
CO-8	Discuss about project organisation and communication	8	**Ev**

Unit I

Software Life Cycle Models: System concepts – Project Organisation – Communication – Life cycle models – Unified Process – Iterative and Incremental – Workflow – Agile Processes-Project Planning and Estimation.

Unit II

SRS Documentation: Requirements Elicitation – Requirement Documentation – Use Cases – Unified Modeling language-Introduction.

UML Diagram: - Class diagrams – Sequence diagrams – Object diagrams – Deployment diagrams – Use case diagrams –State diagrams, Activity diagram, Component diagrams, Case Study, Identifying Classes – Noun Phrase Approach, Common class Pattern Approach, Use-CaseDriven Approach, CRC.

Unit III

Analysis Phase: Analysis Object Model (Domain Model)- Analysis Dynamic Models- Non-functional requirements – Analysis Patterns.

Design Phase: System Design Architecture – Design Principles – Design Concepts – Design Patterns – Architectural Styles – Dynamic Object Modeling – Static Object Modeling – Interface Specification – Object Constraint Language.

Unit IV

Mapping: Mapping Design(Models) to Code – Model Transformation – Refactoring – Mapping Associations – Mapping Activities.

Testing & Implementation: Testing – Configuration Management – Maintenance process – System documentation –program evolution dynamics.

Unit V:

Project Organization and Communication: Introduction: A Rocket Example - An Overview of Projects - Project Organization Concepts - Project Communication Concepts - Organizational Activities.

Methodologies: Introduction: The First Ascent of K2 - Project Environment - Methodology Issues - A Spectrum of Methodologies - Case Studies.

Reference Books

1. Bernd Bruegge, Alan H Dutoit, "Object Oriented Software Engineering" Second edition, Pearson Education, 2004.
2. Craig Larman, "Applying UML and Patterns" Third edition, Pearson Education, 2005.
3. Object-Oriented Software Engineering Using UML, Patterns, and Java, 3rd Edition By Bernd Bruegge, Allen H. Dutoit Published by Pearson
4. Stephen Schach, "Software Engineering" Seventh edition. McGraw-Hill, 2007.
5. Ivar Jacobson, GrandyBooch, James Rumbaugh, "The Unified Software development Process", Pearson Education, 1999.
6. Alistair Cockburn, "Agile Software Development" Second edition, Pearson
7. Education, 2007.

SEMESTER –I			
CORE I - DESIGN AND ANALYSIS OF ALGORITHMS			
Course Code:21PCSC11	**Hrs/week:5**	**Hrs/Semester:75**	**Credits:4**

Course Objectives:

- To be technologically adept, innovative and be able to develop new algorithms.
- To understand the course of the algorithm, its features and complexity
- To compare different algorithms for the same problem.

Course Outcomes:

CO.No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	analyze the running time and space complexity of algorithms using asymptotic analysis.	1,3	An
CO-2	understand different tree traversals, graph traversals and spanning tress.	1,3	Un
CO-3	apply divide and conquer to binary search, quick sort, merge sort.	3	Ap
CO-4	apply greedy method to knapsack problem, prims, kruskal algorithms.	3	Ap
CO-5	apply dynamic programming to optimal binary search trees,0/1 knapsack problem, etc.	3	Ap
CO-6	apply Backtracking ton-queen problem, sum of subsets problem, graph coloring etc.	3	Ap
CO-7	apply branch and bound to Travelling sales person problem, 0/1 knapsack problem.	3	Ap
CO-8	classify the notions of P, NP, NP-complete, and NP-hard	3	An

UNIT- I

Introduction – Performance Analysis - Divide and conquer Method: Binary Search, Finding Maximum and Minimum, Merge Sort and Quick Sort.

UNIT - II

Greedy Methods: Knapsack Problem, Minimum Cost Spanning Trees, Optimal Storage on Tapes and Single Source Shortest Path Problem-**Net Exam Related Problems**.

UNIT - III

Dynamic Programming: Multistage Graphs, 0/1 knapsack and Traveling Salesman Problem. Basic Traversal and Search Techniques: Techniques for Binary Tree,
Techniques for Graphs: Depth First Search and Breadth First Search - Connected Components and Spanning Tree-**Net Exam Related Problems**

UNIT - IV

Backtracking: 8 Queens Problems, Sum of Subsets, Graph Colouring, Hamiltonian Cycle and Knapsack Problem.

UNIT - V

Branch and Bound: Least Cost Search. Bounding: FIFO Branch and Bound and LC Branch and Bound.0/1 Knapsack Problem, Travelling Salesman Problem.

Text Book

1. E.Horowitz, S.Sahni and Sanguthevarrajasekaran. *Fundamentals of Computer Algorithms*,
   2nd edition, Universities Press, 2008.

Reference Books:

1. S. K. Basu. Design *Methods and Analysis of Algorithms*. PHI, 2005.
2. Goodman and S. T. Hedetniem. *Introduction to the Design and Analysis of Algorithms*. MGH, 1977.
3. A.V. Aho, J.D. Ullman and J.E.Hospcraft. *The Design and Analysis of Computer Algorithms*, Pearson Education.

SEMESTER I			
CORE II – DIGITAL IMAGE PROCESSING USING MATLAB			
Course Code: 21PCSC12	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Course Objectives:

- To interpret images mathematically and process them for the extraction of data using MATLAB.
- To familiarize students with image enhancement and restoration techniques.
- To introduce the concepts of image processing and basic analytical methods to be used in image processing.

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	develop programming skills and techniques to solve mathematical problem.	1	Ap
CO-2	learn graphic features of MATLAB and they are able to use this feature effectively in the various applications	1	Ap
CO-3	distinguish the need for image transforms different types of image transforms and their properties.	2,3	An
CO-4	learn different techniques employed for the enhancement of images.	3	Un
CO-5	analyze images in the frequency domain using various transforms.	3	An
CO-6	interpret Image compression, segmentation and representation standards	3	An
CO-7	choose image filtering in various applications	2	Ap
CO-8	analyze different causes for image degradation and overview of image restoration techniques.	3	An

UNIT I: MATLAB

Introduction: MATLAB Environment - Types of files - Search - Constants , Variables and Expressions - Vectors and Matrices - Polynomials - Input / Output statements-MATLAB graphics-Control Structures - Writing Programmes and functions.
(Text Book 1 - Chapter 1, 2, 3, 4, 5,6,7,8)

UNIT II: INTRODUCTION & IMAGE ENHANCEMENT

Introduction – steps in image processing, Image acquisition, representation, sampling and quantization, relationship between pixels. – color models – basics of color image processing. Image enhancement in spatial domain – some basic gray level transformations – histogram processing – enhancement using arithmetic, logic operations – basics of spatial filtering and smoothing.

UNIT III: INTENSITY TRANSFORMATIONSAND SPATIAL FILTERING& FREQUENCY DOMAIN PROCESSING

Intensity Transformation Functions- Histogram Processing and Function Plotting- Spatial Filtering- Image Processing Toolbox Standard Spatial Filters

The 2-DDiscrete Fourier Transform- Computing andVisualizing the 2-D DFT in MATLAB- Filtering in the Frequency Domain- Obtaining Frequency Domain Filters from Spatial Filters -Generating Filters Directly in the Frequency Domain- Sharpening Frequency Domain Fillers.

UNIT IV: IMAGE RESTORATION & COLOR IMAGE PROCESSING

A Model of the Image Degradation/Restoration Process - Noise Models - Restoration in the Presence of Noise Only-Spatial Filtering- Periodic Noise Reduction by Frequency Domain Filtering-Modeling the Degradation Function **-**Direct Inverse Filtering -Wiener Filtering

Color Image Representation in MATLAB- Converting to Other Color Spaces -The Basics of Color Image Processing Color Transformations**.**

UNIT V: IMAGE COMPRESSION & IMAGE SEGMENTATION

Coding Redundancy -Huffman Codes - Huffman Encoding - Huffman Decoding - Interpixel Redundancy -Psychovisual Redundancy- JPEG Compression.

Point, Line, and Edge Detection- Thresholding- Region-Based Segmentation.

(Text Book 2 - Chapter 2, 3, 4, 5,6,8,10)

Text Books:

1. Rajkumar Bansal, Ashok Kumar Goel and Manoj Kumar Sharma. *MATLAB and its Applications in Engineering*. Pearsons Publications, 2016.
2. Rafael C. Gonzalez. *Digital Image Processing using MATLAB*. 2nd Edition, 2010.

Reference Books:

1. R.C. Gonzalez and R.E.Woods. *Digital Image Processing*, 3rd Edition, Pearson Education. 2002,by Peter Issa Kattan

SEMESTER – I			
CORE III - MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE			
Course Code : 21PCSC13	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Course Objectives:

- To understand and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- Apply the concept of two dimensional random variables to correlation, regression and Central limit theorem
- Analyze whether given graphs are isomorphic and apply different algorithms to find the shortest path.

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	test the complementary relationship of skewness with measures of central tendency and dispersion in describing a set of data.	2	An
CO-2	apply 'moments' as a convenient and unifying method for summarizing several descriptive statistical measures.	2	Ap
CO-3	analyze the strength and direction of a linear relationship between two variables using Correlation.	2	An
CO-4	demonstrate how much a dependent variable changes based on adjustments to an independent variable using regression.	2	Ap
CO-5	discover the logical operations and predicate calculus needed for computing skill.	2	An
CO-6	understand the application of various type of graphs in real life problem.	2	Un
CO-7	apply abstract concepts of graph theory in modeling and solving non-trivial problems in different field of study.	2	Ap
CO-8	apply theories and concepts to test and validate intuition and independent mathematical thinking in problem solving.	2	Ap
CO-9	integrate core theoretical knowledge of graph theory to solve problems.	2	Ap

UNIT - I

Moments-Skewness and kurtosis-Curve Fitting-Method of least squares-fitting lines-parabolic, exponential & logarithmic curves

UNIT - II

Correlation & regression –Scatter diagram- Karl Pearson's coefficient of correlation-lines of regression coefficient - rank correlation.

UNIT - III

Mathematical Logic: Propositions and Predicate logic - Truth table - Propositional Equivalence- Normal forms - Predicate and Quantifiers-Rules of Inference.

UNIT – IV

Graph Theory:Introduction – Paths and Circuits: Isomorphism – Sub graphs – Walks, Paths, Circuits Connected Graphs, Disconnected Graphs and Components – Euler Graphs – Operations on Graph – Hamiltonian Paths and Circuits - Trees and Fundamental Circuits: Trees – Some properties of Trees – Distance and Centers in a Tree – Rooted and Binary Trees – Spanning Trees – Fundamental Circuits – Finding all Spanning Trees of a Graph – Spanning Tress in a weighted Graph

UNIT – V

Cut-Sets and Cut-Vertices: Cut-Sets – Properties of Cut-Sets – All Cut-Sets in a Graph – Fundamental Circuits and Cut-Sets – Connectivity and Separability – Combinational vs geometric graphs – Planer graphs – Different representation of a planer graph – Matrix: Incidence, Submatrices, Circuit – Matchings – Coloring – The four color problem - Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

Text Books:

1. Dr.M.K.Venkatraman, Dr. N. Sridharan and N.Chandrasekaran. *Discrete Mathematics*. 2012
2. S. Arumugam and A. Issac. *Statistics*. New Gamma publishing House. Palayamkottai, 2011.
3. NarsinghDeo. *Graph Theory with Application to Engineering and Computer Science*. Prentice-Hall of India Pvt.Ltd, 2003.

Reference Books:

1. Tremblay and Manohar. *Discrete Mathematical Structures with applications to Computer Science*, Tata McGraw Hill.
2. Kenneth H.Rosen. *Discrete Mathematics and Its Applications*, Tata McGraw Hill, 4th Edition, 2002.
3. A.Tamilarasi and A.M.Natarajan. *Discrete Mathematics and its Application.* Khanna Publishers, 2nd Edition 2005.
4. Bondy, J. A. and Murty, U.S.R. *Graph Theory with Applications.* North Holland Publication, 2008.

SEMESTER –I			
CORE IV- COMPILER DESIGN			
Course Code:21PCSC14	**Hrs/week:4**	**Hrs/Semester:60**	**Credits:4**

Course Objectives:

- To learn the process of translating a modern high-level language to executable code.
- To identify the methods and strategies of parsing techniques.
- To generate intermediate code, and to design syntax directed translation scheme and apply code optimization techniques.

Course Outcomes:

CO. No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the basic principles of compiler in high level programming language	1,5	Un
CO-2	represent language tokens using regular expressions, finite automata	5	An
CO-3	apply parsing techniques and able to write Context Free Grammars for various languages	5	Ap
CO-4	apply the knowledge of intermediate code generation to build efficient systems	5	Ap
CO-5	develop the knowledge on Run-time Environment	5	Ap
CO-6	understand the need of intermediate representation for the generation of target code	5	Ap
CO-7	design code generator and apply code optimization techniques	5	Ap
CO-8	apply optimization techniques to intermediate code and generate machine code for high level language program	5	Ap

UNIT – I: Lexical Analysis

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens –Finite Automata – Regular Expressions to Automata – Minimizing the number of states of a DFA.

UNIT – II: Syntax Analysis

Introduction – Context-free Grammars – Writing a Grammar – Top-Down Parsing – Bottom-Up parsing – LR Parsing – Ambiguous Grammar – Parser Generators

UNIT – III: Intermediate Code Generation

Syntax Directed Definitions - Evaluation Orders for Syntax Directed Definitions - Variants of Syntax trees – Three-Address Code – Types and Declarations – Translation of

Expressions – Type Checking

UNIT – IV: Run Time Environments and Code Generation

Storage Organization – Stack Allocation of Space - Access to Nonlocal Data on the Stack - Issues in the Design of a Code Generator – Target Language – Address in the Target Language - A Simple Code Generator

UNIT – V: Code Optimization

Basic Blocks and Flow Graphs - Optimization of Basic Blocks - Peephole Optimization - Machine-Independent Optimizations: Introduction to Data-Flow Analysis

Text Book:

1. Alfred V. Aho, Monica S. Lam, RaviSethi and Jeffery D.Ullman. *Compilers: Principles, Techniques and Tools*. Pearson, 2nd Edition, 2014.

Reference Books:

1. J.P. Tremblay and P.G. Sorrenson. *The Theory and Practice of Compiler Writing*. McGraw Hill, 1985.
2. David Galles. *Modern Compiler Design.* Pearson Education Asia, 2007.
3. Steven S. Muchnick. *Advanced Compiler Design & Implementation*. Morgan Kaufmann Pulishers, 2000.

SEMESTER – II			
CORE V- J2EE			
Course Code : 21PCSC21	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Course Objectives:

- To acquire knowledge on the usage of recent platforms in developing web applications.
- Enhancing the student's skills to design and develop interactive, client-side, server-side executable web applications.
- Able to apply the skill learnt for projects.

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	make use of a high-level overview of the J2EE architecture	1	Ap
CO-2	identify the services and components which comprise the J2EE specification	1	Ap
CO-3	explain how J2EE technology applications are packaged	1	Ap
CO-4	acquire the knowledge of EJB and its types	1	An
CO-5	build server side java application called Servlet to catch form data sent from client and store it on database	1	Cr
CO-6	build server side java application called JSP to catch form data sent from client, process it and store it on database.	1	Cr
CO-7	differentiate Servlet and JSP	1	An
CO-8	understand Struts to develop MVC based web applications that are easy to develop and maintain.	1	Un

UNIT I: J2EE Introduction

J2EE introduction – J2EE Architecture (J2EE Tiers, Containers, Roles) –J2EE Servers and services –Services of EJB Container – J2EE Technology – Packaging – Web services – Advantages of J2EE Applications

UNIT II: Enterprise Java Bean Introduction

Enterprise Bean introduction – Benefits of Enterprise Beans - Types of Enterprise Beans – Session Bean – Entity Bean – Message-Driven Bean – The Contents of a Enterprise Bean – The Life Cycles of Enterprise Beans.

UNIT III: Servlet

Servlet - Servlet Lifecycle - Servlet API -Object model of Servlet framework - Understanding web.xml, servlet tags and directory structure of web application - Generic Servlet and HttpServlet, ServletConfig & ServletContext - Handling Form data with get and post request - Initializing a servlet - Request Dispatcher, Redirecting Request -

Session Management -Filters in servlet -programs in servlet to read all parameters from form, database handling program, reading cookies values.

UNIT IV: JSP

JSP - What is JSP page? Compare it with servlet - Lifecycle of JSP page - JSP syntax using Directive, Declaration , Expression , Scriplet, Comment - Using JavaBean and Action Tag in JSP - JSP implicit objects - Using JSP standard tag library (JSTL) - Session management - Exception handling - Custom tag - Transferring Control to Another Web Component - Using JDBC in JSP -Programs in JSP -Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.

UNIT V: Struts

Basic of Struts2 - Understanding MVC architecture - Struts2 framework - Understanding default-stack - comparing struts with other framework - Working with Struts2 Actions - Introducing Struts 2 actions - Packaging your actions - Implementing actions Adding workflow with interceptors - Why intercept requests? - Interceptors in action - Surveying the built-in Struts 2 interceptors - Declaring interceptors - Building your own interceptor Data transfer: OGNL and type conversion - Data transfer and type conversion: common tasks of the web application domain - OGNL and Struts 2 - Built-in type converters - Customizing type conversion Validation framework - RequiredFieldValidator Class - RequiredStringValidator Class - ExpressionValidator Class - Email Validator Class - RegexFieldValidator Class - DateRangeFieldValidator Class Struts.

Text Books:

1. Stephanie Bodoff, Dale Green, Kim Hasse ,Eric Jendrock, Monica Pawlan and Beth Stearns.*J2EE Tutorial*.Addison-Wesley, 2002.
2. Keogh.*J2EE: The Complete Reference*, .McGraw Hill India, 2002.
3. Phil Hanna.*The Complete Reference JSP*. Osborne/McGraw-Hill Publication, 2003.
4. Donald Brown,Chad Michael Davis and ScottStanlick. *Struts 2 in Action*. Manning
   Publications, 2008.
5. Budi Kurniawan.*Java for Web with Servlets,JSP and EJB: ADeveloper's Guide to J2EE Solutions*.New Riders Publishing.

Reference Books:

1. Bryan Basham , Kathy Sierra and Bert Bates.*Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam*.2nd Edition.
2. Jonathan Wetherbee , Massimo Nardone , Chirag Rathod and Raghu Kodali.*Beginning EJB in Java EE 8: Building Applications with Enterprise JavaBeans.* 3rd Edition.

SEMESTER- II			
CORE VI– DATA MINING & R PROGRAMMING			
Course Code: 21PCSC22	**Hrs / week :5**	**Hrs / Semester: 75**	**Credits :4**

Course Objectives:

- Extract patterns of usable data using appropriate algorithms
- To study the basic and advanced concepts in Data Mining Techniques.
- To understand the various algorithms involved in data mining and its applications.

Course outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	classify different data mining tasks and the algorithms most appropriate for addressing them.	1,3	An
CO-2	discover Strengths & Limitations of Data Mining Methods	1,4	An
CO-3	display interesting patterns from large data, to extract and analyse, make predictions and solve problems	1, 4	An
CO-4	evaluate models/algorithms with respect to their accuracy	3	Ev
CO-5	demonstrate capacity to perform a self-directed piece of practical work that requires the application of data mining techniques.	1,4	Ev
CO-6	develop hypotheses based on the analysis of the results obtained and test them.	1	Ev
CO-7	learn to Set Up Data for Experiments	1,4	Ap
CO-8	conceptualize a data mining solution to a practical problem.	1,4	Ap

UNIT I:

Introduction: Basic Data Mining Tasks- Data Mining Versus Knowledge Discovery in Databases. Data Mining Techniques: Introduction-A Statistical Perspective on Data Mining-Similarity Measures- Decision Trees-Neural Networks-Genetic Algorithms

UNIT II:

Classification: Introduction- Statistical Based Algorithms-Distance Based Algorithms-Decision Tree Based Algorithms-Neural Network Based Algorithms- Rule Based Algorithms-Combining Techniques.

UNIT III:

Clustering: Introduction-Similarity and Distance Measures-Outliers Hierarchical Algorithms- Partitional Algorithms.

UNIT IV:

Introduction: Overview and History of R, Getting Help, Data Types, Subsetting, Vectorized Operations, Reading and Writing Data. (5L) Control Structures, Functions, lapply, tapply, split, mapply, apply, Coding Standards. (5L) Scoping Rules, Debugging Tools, Simulation, R Profiler.

UNIT V:

Association rules-frequent itemsets-Basic Association Rules-Web Mining-Introduction-Content Mining-Social Network Analysis-HITS and Page rank-Usage Mining

Text Books:

1. Margaret H. Dunham. Data *Mining Introductory and Advanced Topics.* Pearson publications, Ninth Impression, 2002.
2. Roger .D.Peng. R *programming for Data Science*,2015.

Reference Books:

1. K. P. Soman, ShyamDivakar and V. Ajay. *Insight in to Data Mining Theory and Practice.* PHI Learning Pvt. Ltd, 2006.
2. Jiawei Han, MichelineKamber and Jian Pei. *Data Mining Concepts and Techniques.* Morgan Kaufmann Publishers, 3rd Edition.
3. Bing Liu. *Web Data Mining: Exploring Hyperlinks, Contents and Usage Data*.Springer, 2006.

SEMESTER – II			
CORE VII - DISTRIBUTED DATABASE MANAGEMENT SYSTEM			
Course Code : 21PCSC23	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Course Objectives:

- Identify the introductory distributed database concepts and its structures.
- Describe terms related to distributed object database design and management.
- Produce the transaction management and query processing techniques in DDBMS.
- Relate the importance and application of emerging database technology.

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	understand the concept of Distributed DBMS	4	Un
CO-2	apply various architectures of DDBMS	4	Ap
CO-3	apply various fragmentation techniques in a given problem	4	Ap
CO-4	visualize the steps of query processing	4	Ap
CO-5	finding how optimization techniques are applies to Distributed Database	1,4	An
CO-6	compare various Query Optimization Algorithms	3	An
CO-7	identify various approaches to concurrency control in Distributed database	4	An
CO-8	apply various algorithms and techniques for deadlock and recovery in Distributed database	3,4	Ap

UNIT I: Introduction to DDBMS

Introduction: Distributed Data Processing, Distributed Database Systems, Promises of DDBSs, Complicating factors - Distributed DBMS Architecture Models- Autonomy, Distribution, Heterogeneity DDBMS Architecture – Client/Server, Peer to peer, MDBS

UNIT II: Data Distribution Alternatives

Design Alternatives – localized data, distributed data Fragmentation – Vertical, Horizontal (primary & derived), hybrid, general guidelines, correctness rules
Distribution transparency – location, fragmentation, replication - Impact of distribution on user queries.

UNIT III: Query Processing

Query Processing Problem, Layers of Query Processing Query Processing in Centralized Systems – Parsing & Translation, Optimization, Code generation, Example Query Processing in Distributed Systems – Mapping global query to local.

Optimization of Distributed Queries: Query Optimization, Centralized Query Optimization, Join Ordering Distributed Query Optimization Algorithms.

UNIT IV: Distributed Transaction Management & Concurrency Control

Transaction concept, ACID property, Objectives of transaction management, Types of transactions, Objectives of Distributed Concurrency Control, Concurrency Control anomalies, Methods of concurrency control, Serializability and recoverability, Distributed Serializability, Enhanced lock based and timestamp-based protocols, Multiple granularity, Multi version schemes, Optimistic Concurrency Control techniques

UNIT V: Distributed Deadlock & Recovery Deadlock concept, Deadlock in Centralized systems

Deadlock in Distributed Systems – Detection, Prevention, Avoidance, Wait-Die Algorithm, Wound-Wait algorithm Recovery in DBMS - Types of Failure, Methods to control failure, Different techniques of recoverability, Write- Ahead logging Protocol, Advanced recovery techniques- Shadow Paging, Fuzzy checkpoint, ARIES, RAID levels, Two Phase and Three Phase commit protocols.

Text Book:

1. Ozsu. *Principles of Distributed Database Systems*.Pearson Publication, 2020.

Reference Books:

1. Rahimi and Haug. *Distributed Database Mangement Systems*. Wiley publication.
2. A. Silberschatz, H.F. Korth and S. Sudharshan. *Database System Concepts.* New Delhi, Tata
McGraw Hill,5th Edition,2006.

SEMESTER- II			
CORE VIII - SINGLE BOARD COMPUTERS AND IOT			
Course Code: 21PCSC24	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Course Objectives:

- To deliver a deep knowledge of Internet of Things and Single Board Computers.
- To understand the architecture of Single Board Computers and ability on setup Raspberry Pi .
- To recognize the concepts of Internet of Things and its security measures.

Course Outcomes:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO-1	code program and develop applications using single board computers	8	Ap
CO-2	create a good working setup of Raspberry Pi	8	Cr
CO-3	understand the concepts of Internet of Things	8	Un
CO-4	identify andapplying different IoT technologies	8	Ap
CO-5	inculcate knowledge on communication middleware and Information security in IoT	7,8	Un
CO-6	analyze basic protocols in wireless sensor network	7	An
CO-7	implement State of the Art - IoT Architecture	8	Ap
CO-8	examine the security and privacy issues in IoT	7,8	An

UNIT - I: Introduction to Single Board Computers

Introduction - history of Single Board Computers - Classification - Comparison - Evolution - Architecture - applications - Overview on Raspberry Pi - GPIO - shields - overview on Beaglebone - features.

UNIT - II: Setting up RASPBERRY Pi

Installing and preparing Raspberry Pi **-** flashing SD Card **-** Booting up - Configuring Pi **-** Troubleshooting **-** Using Command Line interface - Linux commands - configuring network connection- Arduino and Pi- Basic Input and Output

UNIT – III: Introduction to Internet of Things

Internet of Things: Introduction-Definition & Characteristics of IoT-Physical design of IoT and logical design of IoT- IoT Enabling Technologies: WSNs, Cloud Computing, Big Data Analytics, Communication Protocols and Embedded Systems. IoT and M2M: Introduction-M2M-Difference between IoT and M2M Scenario.

UNIT – IV: Internet of Things Concepts

IoT concepts: IoT architectures-Resource management-IoT data management and analytics-Communication protocols-Applications-Programming frameworks for Internet of Things: Overview-Embedded Device Programming Languages-Message passing in Devices-Stream processing in IoT-Introduction-The foundations of stream processing in IoT- Continuous Logic Processing System-Challenges and future directions.

UNIT – V: Security and Privacy in the Internet of Things

Concepts- IoT Security Overview-Security Frameworks for IoT-Privacy in IoT Networks-Obfuscation and Diversification for Securing the Internet of Things: Introduction-Distinguishing Characteristics of IoT-Obfuscation and Diversification Techniques

Text Books:

1. Matt Richardson and Shawn Wallace.*Getting started with Raspberry Pi.* O'ReillyMedia, Inc, 1st edition, 2012.
2. ArshdeepBahga and Vijay Madisetti.*Internet of Things-A Hands-on Approach*. Universities Press Amir (India), 2015.

Reference Books:

1. RajkumarBuyya and VahidDastjerdi. *Internet of Things: Principles and Paradigms.* Cloud Computing and Distributed Systems (Clouds) Laboratory, Manja Soft Pty Ltd., Australia, 2016.
2. Fei Hu. *Security and Privacy in Internet of Things (IoTs): Models, algorithms, and Implementations.* CRC Press, 2016 .
3. Tim Cox. *Raspberry Pi Cookbook for Python Programmers*. 2014.

Semester III			
CORE IX - SOFTWARE TESTING			
Course Code: 21PCSC31	**Hrs / week : 4**	**Hrs / Sem: 60**	**Credits :4**

Course Objectives:

- To provide basic understanding of the software development life cycle including testing, test planning &design and test team organization.
- To study the various types of test in the life cycle of the software product.
- To build design concepts for system testing and execution

Course Outcomes:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the fundamental concepts and techniques in Software Testing	1	Un
CO-2	identify and apply the functional and system testing methods in commercial environment	3	Ap
CO-3	design Test Planning	3	Ap
CO-4	understand the categories of the system testing methods	3	Un
CO-5	distinguish between methods of judging test case adequacy and how to design tests that will accomplish the obligations of such methods.	1	An
CO-6	apply and manage the test process in real-time applications	1	Ap
CO-7	demonstrate the process of validation and verification and write code to automate test execution and analysis	1	Ap
CO-8	implement various test processes for quality improvement	1	Ap

UNIT- I Basic Concepts, Issues and Techniques

Quality Revolution- Verification and Validation-Failure, Error, Fault, and Defect- Objectives of Testing- Testing Activities-Sources of Information for test Case Selection -White-Box and Black-Box Testing-Test Planning and design-Test Tools and Automation- Test Team Organization and Management.

UNIT - II System Testing

System Integration Testing: System Integration Techniques- Software and Hardware Integration-Test Plan for System Integration-Built- in Testing. Functional Testing:Testing a Function in Context- Boundary Value Analysis- Decision Tables. Acceptance Testing - Selection of Acceptance Criteria-Acceptance Test Plan-Acceptance Test Execution. Software Reliability: Fault and Failure-Factors Influencing Software Reliability- Reliability Models.

UNIT - III System Test Categories

System Test Categories: Taxonomy of System Tests-Command Line Interface Tests, Functionality Tests- GUI Tests-Security Tests-Feature Tests, Robustness Tests- Boundary Value Tests, Power Cycling Tests, Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests. Test Generation from FSM models: State-Oriented Model- Finite-State Machine Transition Tour Method-Testing with State Verification-Test Architectures.

UNIT – IV System Test Design and Execution

System Test Design: Test Design Factors-Requirement Identification-Modeling a Test Design Process-Test Design Preparedness Metrics- Test Case Design Effectiveness. System Test Execution: Modeling Defects- Metrics for Tracking System Test-Metrics for Monitoring Test Execution- Metrics for Monitoring Defect Reports-Defect Causal Analysis-Beta testing-Measuring Test Effectiveness.

UNIT - V Software Quality

Software quality: Five Views of Software Quality-McCall's Quality Factors and Criteria- ISO 9000:2000 Software Quality Standard .Maturity Models: Capability Maturity Model-Test Process Improvement-Testing Maturity Model

Text Book:

1. Kshirasagar.*Software Testing and Quality Assurance, Theory and Practice*. John Wiley & Sons, Inc., Hoboken, New Jersey,2008.

Reference Books:

1. Srinivasan Desikan and Gopalswami Ramesh.*Software Testing: Principles and Practices*. Pearson Education, 1st Edition, 2008.
2. Paul C. Jorgensen.*Software Testing: A Craftman's Approach*., Auerbach Publications, 4th Edition, 2008.

SEMESTER – III			
CORE X - CLOUD COMPUTING AND BIG DATA			
Course Code : 21PCSC32	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Course Objectives:

- To explore the fundamental concepts of big data analytics.
- To learn to analyze the big data using intelligent techniques.
- To know about the Cloud Computing architecture and services.
- To learn to design the trusted Cloud Computing system.
- To understand the concept of Virtualization and design of Cloud Services.

Course Outcomes :

CO. No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO-1	carrying out the decisions based on data analytics.	4	Ap
CO-2	analyze the big data analytic techniques for useful business applications.	4	An
CO-3	identifying the data models in relation to Big Data Storage and Analytics.	4	Re
CO-4	implementing Big Data applications Using Pig and Hive	4	Ap
CO-5	plan to work with big data platform	4	Cr
CO-6	identify the architecture, infrastructure and delivery models of cloud computing.	7	Re
CO-7	apply suitable virtualization concept.	7	Ap
CO-8	organize the core issues of cloud computing such as security, privacy and interoperability	7	An
CO-9	design Cloud Services and Set a private cloud	7	Cr
CO-10	identifying the significant concepts on Parallel and Distributed Programming.	4	Re

UNIT I

Big data introduction – Characteristics of Big data – Structure of Big data – Evolution of Analytical Scalability – Map Reduce – Cluster Analysis –
Real time analytics platform applications – Case studies for real time Sentiment analysis, Stock market predictions.

UNIT II

Introduction to NoSQL – Aggregate data models – HBase – Pig – Grunt - Hive .

UNIT III

Vision of Cloud computing – Cloud Definition – Characteristics and Benefits – Virtualization – Cloud computing Architecture – Cloud Reference Model, Types of Clouds – Cloud Platforms in Industry.

UNIT IV

Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine,
Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim

UNIT V

Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data
Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

Text Books:

1. Rajkumar Buyya, Christian Vecchiola and S.Thamarai Selvi. *Mastering Cloud Computing.* TMGH,2013.
2. Kai Hwang, Geoffrey C Fox and Jack G Dongarra.*Distributed and Cloud Computing, From Parallel Processing to the Internet of Things*. Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome.*Cloud Computing: Implementation, Management, and Security.* CRC Press, 2010.
4. Arshdeep Bahga and Vijay Madisetti.*Big Data Science & Analytics A Hands -On Approach.*2019.

Reference Books:

1. Viktor Mayer-Schonberger and Kenneth Cukier.*Big Data: A Revolution That Will Transform How We Live, Work and Think* .
2. Venkat Ankam .*Big Data Analytics.* 2016.
3. PeteWarden.*Big Data Glossary.* O'Reilly, 2011.
4. Toby Velte, Anthony Velte and Robert Elsenpeter.Cloud *Computing, A Practical Approach.* TMH, 2009.
5. George Reese.*Cloud Application Architectures: Building Applications and Infrastructure in the Cloud.* O'Reilly.
6. Ronald L. Krutz, Russell and Dean Vines.*Cloud Security – A comprehensive Guide to Secure Cloud Computing.* India ,Wiley ,2010.

SEMESTER III			
CORE XI - DATA SCIENCE USING PYTHON			
Course Code: 21PCSC33	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits : 4**

Course Objectives:

- To enable the students to understand the concepts of data science and apply data analysis in various application areas
- To provide comprehensive knowledge of python programming paradigms required for Data Science.
- To perform a wide variety of mathematical operations on arrays using NumPy

Course Outcomes:

CO.No	Upon Completion of this course, students will be able to	PSO Addressed	CL
CO-1	explore the fundamental concepts of data science	4	An
CO-2	explain how data is collected, managed and stored for data science	4	Un
CO-3	visualize and present the inference using various tools	4	Ap
CO-4	evaluate the data analysis techniques for applications handling large data	4	Ap
CO-5	implement numerical programming, data handling and visualization through NumPy and Pandas	1	Ap
CO-6	understand and demonstrate the usage of universal functions and list of Arrays in Python	1	Ap
CO-7	understand the working of different data types and their related functions	1	Ap
CO-8	analyze the significance of python program development environment and apply it to solve real world applications	1,3	Un

UNIT – I

Introduction: What Is Data Science?- How Does Data Science Relate to Other Fields?- The Relationship between Data Science and Information Science- Data: Introduction- Data Types- Data Collections- Data Pre-processing–Techniques: Introduction – Data analysis and Data analytics- Descriptive Analysis- Diagnostic analytics-predictive analytics- prescriptive analytics- exploratory analysis – mechanistic analysis

UNIT – II

Tools for Data Science: UNIX: Introduction- Getting access to UNIX- Connecting to a UNIX server- Basic commands- Editing on UNIX- Redirecting and piping-Python: Introduction- Getting access to Python- Examples- Control structures- statistics essentials

UNIT – III

Introduction to NumPy: Understanding Data Types in Python- The Basics of NumPy Arrays- Computation on NumPy Arrays: Universal Functions- Aggregations: Min, Max, and Everything in Between- Computation on Arrays: Broadcasting- Comparisons, Masks, and Boolean Logic- Fancy Indexing- Sorting Arrays- Structured Data: NumPy's Structured Arrays

UNIT – IV

Data Manipulation with Pandas: Installing and using Pandas- Data Indexing and Selection- Operating on Data in Pandas- Handling Missing Data-Hierarchical Indexing-Combining Datasets-

UNIT – V

Data Manipulation with Pandas: Aggregation and Grouping – Pivot Tables – Vectorized String Operations- Working with Time Series- High performance Pandas: eval( ) and query( )

Text Books:

1. Chirag Shah. *A Hands-on Introduction to Data Science*. Cambridge University Press, 1st Edition 2020.
2. Jake VanderPlas. *Python Data Science Handbook Essential Tools for Working with Data*, O'Reilly Media, Inc., 1st Edition, 2016.

Reference Books:

1. Wes McKinney. *Python for Data Analysis.* O'Reilly Media, Inc., 1st Edition 2012.
2. Luca Massaron and John Paul Mueller. *Python for Data Science for dummies* .John Wiley & Sons, 2019.
3. Davy Cielen, Arno D.B. Meysman and Mohamed Ali. *Introducing Data Science: Big Data, Machine Learning, and More, using Python Tools.* Manning Publications, 2016.

SEMESTER – III			
CORE XII - RESEARCH METHODOLOGY			
Course Code : 21PCSC34	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Course Objectives:

- To achieve outstanding scientific research in various areas of knowledge.
- To encourage distinguished research work through the creation of an attractive and stimulating environment to achieve goals.

Course Outcomes:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	demonstrate knowledge of research processes	8	An
CO-2	compare between methodologies and methods used in research work	8	An
CO-3	understand the fundamental concepts of research problem and research design	8	Un
CO-4	explain the concepts and procedures of sampling, data collection, analysis and reporting	3	Ap
CO-5	assess the basic function and working of analytical research tools used in computer science research	3	Re
CO-6	discuss different methodologies and techniques used in research work	8	An
CO-7	prepare a research report and examine the plagiarism and its types.	8	Ap
CO-8	apply the knowledge of teaching methods for its wide applicability.	8	Ap

Unit - I

Research Methodology– Introduction - Meaning of research – Objectives of research – Types of Research – Research Approaches – Significance of Research – Research Methods versus Methodology – Research and Scientific Method – Research Process - Criteria of Good Research.

Unit – II

Research Problem – Selecting the Problem – Necessity of Defining the Problem – Technique involved in defining a problem – Meaning of Research Design – Features of a good design.

Unit – III

Sampling Design - Methods of Data Collection –Research Tools: Introduction – SPSS –

MATLAB – LaTeX – NS2 – R tool - Case Study: Presentation by students on their area of research

Unit – IV

Report writing and Thesis writing – Citations – Plagiarism – Types of Plagiarism – Tools for detecting Plagiarism – Ethical Issues within the research process – Intellectual Property Rights

Unit – V

Methodology of teaching – Objectives for teaching – Structure of teaching – Phases of teaching - Various teaching methods.

Text Book:

1. Kothari, C.R. *Research Methodology: Methods and Techniques.* New Delhi, New Age International, 2nd Edition, 2012.

Reference Books:

1. Janathan Anderson, Berry H. Durston and Millicent Poole. *Thesis and Assignment Writing*. Wiley Eastern Limited, 1992.
2. EhtiramRaza Khan and Huma Anwar. *Research Methods of Computer Science.* University Science Press, 1st Edition, 2016.
3. Dr.Prabhat Pandey and Dr.Meenu Mishra Pandey. *Research Methodology: Tools and Techniques*. Bridge Center, 1st Edition, 2015.

SEMESTER –I			
CORE PRACTICAL I - DESIGN AND ANALYSIS OF ALGORITHMS LAB			
Course Code:21PCSCR1	**Hrs/week: 4**	**Hrs/Semester:60**	**Credits:2**

Using C++ programming write programs for the following:

1. Sorting
2. Graph traversal
3. Prim's Algorithm-Greedy Method
4. N queen problem
5. Knapsack problem
6. Single Source Shortest Path
7. Sum of Subsets
8. Binary Search Tree
9. Graph Coloring
10. BiConnected Components
11. Travelling Salesman Problem

SEMESTER –I			
CORE PRACTICAL II – DIGITAL IMAGE PROCESSING USING MATLAB LAB			
Course Code:21PCSCR2	**Hrs/week:4**	**Hrs/Semester:60**	**Credits:2**

Using MATLAB write programs for the following:

1. Resizing and Rotating Images
2. To extract different attributes of an Image.
3. Image Enhancement- Contrast and Brightness
4. Image Enhancement- Calculate Histogram
5. Blurring and Smoothing
6. Edge Detection
7. Image Sharpening
8. Object Segmentation via Thresholding
9. Noise Filtering
10. Image Negation

SEMESTER – II			
CORE PRACTICAL - III - J2EE LAB			
Course Code : 21PCSCR3	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 2**

1. Write a Servlet to display all the headers available from request.
2. Write a Servlet to display parameters available on request
3. Write a Servlet to display all the attributes available from request and context
4. Write a Servlet which displays a message and also displays how many times the message has been displayed (how many times the page has been visited).
5. Assume that the information regarding the marks for all the subjects of a student in the last exam are available in a database, Develop a Servlet which takes the enrollment number of a student as a request parameter and displays the mark sheet for the student
6. Develop a Servlet which looks for cookies for username and password, and forwards to a home.jsp in case the cookies are valid and forwards to login.jsp, in case the cookies are not found or the cookies are not valid.
7. Develop a Servlet to authenticate a user, where the loginid and password are available as request parameters. In case the authentication is successful, it should setup a new session and store the user's information in the session before forwarding to home.jsp, which displays the user's information like full name, address, etc.
8. Write a simple JSP page to display a simple message (It may be a simple html page).
9. Write a JSP page, which uses the include directive to show its header and footer.
10. Create a Java class called Product with the following properties: name, description, price. Create a listener that notifies (through System.out) whenever a user adds a product to a shopping cart (i.e. adds an object to the session object) or removes it again. Hint: check out the class HttpSessionAttributeListener. Make it print the name and price of the object (hint: access the session through the HttpBindingEvent object). Also, let the listener print the total price of all objects saved in the session so far (one way to accomplish this could be to keep a collection of all objects saved to the session – or just their keys – in the listener or an associated class).
11. Create a servlet filter that logs all access to and from servlets in an application and prints the following to System.out:
    a. the time the request was received
    b. the time the response was sent
    c. how much time it took to process the request
    d. the URL of the resource requested e. the IP address of the visitor
12. Develop a interest calculation application in which user will provide all FACULTY OF COMPUTER APPLICATIONS information in HTML form and that will be processed by servlet and response will be generated back to the user.
13. Develop an application to demonstrate how the client (browser) can remember the last time it visited a page and displays the duration of time since its last visit. (Hint: use Cookie)
14. Develop an application to keep track of one user across several servlet invocations within the same browser session.

SEMESTER- II			
CORE - PRACTICAL IV - DATA MINING LAB (R LAB)			
Course Code: 21PCSCR4	**Hrs / week :4**	**Hrs / Semester: 60**	**Credits :2**

Using R programming language write programs for the following concepts:

1. Vectorization
2. Data frames and Matrices.
3. Functions-Calculator Designing
4. Scoping Rules
5. Loop functions
6. Basic statistics and graphics
7. Grammar of data manipulation (dplyr and related tools)
8. Debugging/profiling
9. Subsetting R objects

SEMESTER – III			
CORE PRACTICAL V DATA SCIENCE USING PYTHON LAB			
Course Code : 21PCSCR5	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 2**

1. Given two NumPy arrays as matrices, output the result of multiplying the two matrices and its transpose of a matrix (as a NumPy array).
2. Calculate the difference between the maximum and the minimum values of a given NumPy array along the second axis.
3. Calculate the Average, Variance and Standard Deviation using NumPy.
4. Using a NumPy module create array and check the following:
    - Reshape 3x4 array to 2x2x3 array
    - Sequence of integers from 0 to 30 with steps of 5
    - Join two Arrays.
    - Split two Arrays.
5. Write a NumPy program that allows you to read and convert written data in a file into an array.
6. Create a Data Frame and List the attributes of a Data Frame.
7. Create a Data frame and list the functions that help in selecting the subset of the Data Frame.
8. Write a program to read .CSV file into the Data Frame and then convert it into Pandas Series.
9. Write a Pandas program for Handling Missing Data, i.e. is NaN.
10. Write a program to create data frame for 3 student including name and roll numbers. and add new columns for 5 subjects and 1 column to calculate percentage. It should include random numbers in marks of all subjects.
11. Draw the histogram based on the Production of Wheat in different Years
    Year:2000,2002,2004,2006,2008,2010,2012,2014,2016,2018
    Production:4,6,7,15,24,2,19,5,16,
12. Write Panda function for Data Analysis and Manipulation.

SEMESTER – I			
ELECTIVE I A- ADVANCED COMPUTER ARCHITECTURE			
Course Code : 21PCSE11	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objectives:

- To give the students a deep insight on the hardware organisation of a computer system.
- To understand various addressing modes.
- Learn the computer arithmetic principles and super scalar techniques
- Understand data storage and memory organisation

Course Outcomes:

CO. No	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	understand the fundamental of computer structure.	3	Un
CO-2	perform computer arithmetic operations.	3,2	Ap
CO-3	apply the concept of cache mapping techniques.	3,1	Ap
CO-4	correlate the performance of I/O device	3	An
CO-5	conceptualize instruction level parallelism	3	An
CO-6	analyze different types of pipeline hazard	3	An
CO-7	apply various data transfer techniques in digital computer.	3,1	Ap
CO-8	analyze performance issues in processor and memory design of a digital computer.	5	An

UNIT I: Review of basics and ISA design

CISC vs RISC - Performance measure of a computer: Performance measures, Performance parameters –Measuring the performance –Amdahl's Law and CPU performance. Benchmarks for evaluating the performance.

Design factors - operand and opcode types – Instruction formats and addressing modes – compiler Issues – structure of modern compilers.

UNIT II: Pipelining

Pipelining: Definition – Basic characteristics of pipelined processing – Functional structure of pipelined computer – pipelined processor design principles - Performance issues-different types of Pipeline hazards.

UNIT III: Parallelism

Definition and types of parallelisms – Instruction level parallelism – Different typed of dependencies in programs. – Dynamic scheduling –Score boarding– Tomasulo‟s approach- Branch prediction. Software Solution to ILP: Super Scalar architecture – static and dynamic scheduling on a super scalar architecture. VLIW architecture

UNIT IV: Shared Memory Architecture and Memory Organization

Parallel processing Configurations – Flynn's classification – Centralized and distributed memory models. Communication models and memory architectures – Performance metrics for communication mechanisms- challenge- Cache coherence – Directory based cache coherence protocols. Memory hierarchy –strategies of Cache write – cache performance and improvements –Main Memory performance issues –Interleaved memory- Virtual Memory

UNIT V: Buses and I/O issues

I/O: Storage types, Busses –Bus transactions – I/O device Performance metrics – Queuing theory –Bus Standards –I/O transfer using memory bus -Connecting bus to Cache – **Net Exam Related Problems**

Text Book:

1. K.A.Parthasarathy. *Advanced Computer Architecture*. Thomson Learning, Indian 2nd Edition, 2006.

Reference Books:

1. K. Hwang & F. A. Briggs. *Computer Architecture and Parallel Processing*. TMH, New Delhi 2004.
2. Kai Hwang & Naresh Jotwani. *Advanced Computer Architecture Parallelism, Scalability, Programmability*. McGraw Hill, 2nd Edition,2011
3. D. Sima, T. Fountain & P. Kacsuk. *Advanced Computer Architectures*. Pearson Education.

SEMESTER- I			
ELECTIVE I B- CRYPTOGRAPHY AND NETWORK SECURITY			
Course Code: 21PCSE12	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Objectives:

- To make the students to learn the fundamental concepts of cryptography and network security and utilize these techniques in computing system.
- To understand cryptography and network security concepts
- To develop the knowledge in cryptography theories, algorithms and systems

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	understand the fundamental concepts of various encryption techniques	1,2	Un
CO-2	demonstrate the process to maintain the Confidentiality, Integrity and Availability of data	7	Ap
CO-3	distinguish between various algorithms for network security to protect against the threats in the networks	7	An
CO-4	apply the concept of Public key cryptography	1,7	Ap
CO-5	analyze solutions for effective key management and distribution	2,7	An
CO-6	apply and manage to secure a message over insecure channel by various means	7	Ap
CO-7	identify and apply the functional IP network security to protect against the threats in the networks	7	Ap
CO-8	explain the configuration of simple firewall architectures	7	Ap

UNIT - I

Introduction: Information OSI Security Architecture - Security Attacks-Passive Attacks-Active Attacks-Security Services – Authentication-Access Control-Data Confidentiality-DataIntegrity-Nonrepudiation-AvailabilityService-Security Mechanisms- Model for Network security

UNIT - II

Classical Encryption Techniques -Symmetric Cipher Model- Substitution Techniques - Transposition Techniques - Block Ciphers and the Data Encryption Standard-Block Cipher Principles - The Data Encryption Standard -Strength of DES-Advanced Encryption Standard -Evaluation Criteria for AES- The AES Cipher

UNIT- III

Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems - The RSA Algorithm- Key Management - Diffie-Hellman Key Exchange- Message Authentication and Hash Functions: Authentication Requirements-Authentication Functions -Message Authentication Codes - Hash Functions

UNIT - IV

IP Security: IP security overview, IP security architecture, Authentication header, Encapsulating security pay load, combining security association, Key management-Web security considerations, Secure socket layer, Secure electronic transaction.

UNIT - V

System Security: Intruders - Intrusion Detection - Password Management-Malicious software, Viruses and related threats, virus counter measures-Firewalls: Firewall Design Principles-Trusted Systems - Common Criteria for Information Technology Security Evaluation

Text Book:

1. William Stallings. *Cryptography and Network Security Principles and Practices*. 6th Edition, 2013.

References Books:

1. Behrouz A. Ferouzan. *Cryptography & Network Security*, Tata McGraw Hill, 2007.

2. Charlie Kaufman, Radia Perlman and Mike Speciner. *Network Security.* Prentice Hall of India, 2002.

SEMESTER- II			
ELECTIVE II A – ADVANCED COMPUTER NETWORKS			
Course Code: 21PCSE21	**Hrs / week :4**	**Hrs / Semester: 60**	**Credits :4**

Course Objectives:

- To understand modern computer networks
- To familiarize routing algorithms
- To detect the technical problems in networking

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	describe the evolution and History of Wireless technology	7	Un
CO-2	analyse the wireless propagation channels.	7	An
CO-3	examine the Performance of ARQ Protocols, Ethernet LAN, Token Ring, RIP, TCP and UDP.	7	Ap
CO-4	identify the networking technologies and associated network standards.	7	An
CO-5	solve technical problems in ARQ protocols, MAC protocols and Routing Algorithm.	3,7	Ap
CO-6	construct the route discovery algorithm to determine the shortest path in an internet represented as a weighted graph.	2,7	Ap
CO-7	design and implement network architecture	7	An
CO-8	implementation of protocols like TCP, UDP and IP using OPNET and NS-2	7	Ap

UNIT- I: Wireless Services and Technical Challenges

Types of Services- Requirements for the services,-Multipath propagation-Spectrum Limitations-Noise and Interference limited systems-Principles of Cellular networks,-Multiple Access Schemes.

UNIT- II: Wireless Propagation Channels

Propagation Mechanisms (Qualitative treatment)- Propagation effects with mobile radio- Channel Classification- Link calculations-Narrowband and Wideband models.

Unit III: Internetworking devices and Data Link Layer

Repeaters – Hubs – Switches – Bridges: Transparent and Source Routing– Routers-Logical Link Control – Error Detection Techniques – ARQ protocols – Framing – HDLC –

Point to Point protocol. Medium Access Control – Random access Protocols – Scheduling approaches to MAC.

Unit IV: Local Area Networks& Wide Area Networks and Network Layer:

Ethernet- Token Bus/Ring , FDDI – Virtual LAN ,WAN Technologies – Frame Relay, ATM, Wireless LAN. Internetworking – IP Addressing – Subnetting – IPv4 and IPv6– Routing – Distance Vector and Link State Routing – Routing Protocols.

Unit V: Transport Layer and Application Layer

Connection oriented and Connectionless Service – User Datagram Protocol – Transmission Control Protocol – Congestion Control –Domain Name System – Simple Mail Transfer Protocol – File Transfer Protocol – Hypertext Transfer Protocol .

Text Books:

1. Andreas.F. Molisch. *Wireless Communications.* John Wiley – India, 2006.
2. Alberto Leon-Garcia. *Communication Networks*. Tata McGraw-Hill, 2012.

Reference Books:

1. Simon Haykin and Michael Moher. *Modern Wireless Communications.* Pearson Education, 2007.
2. Rappaport. T.S.*Wireless communications.* Pearson Education, 2003.
3. W. Stallings. *Data and Computer Communications*. Prentice Hall, 2007.
4. Fred Halsall. *Data communications, Computer Networks and Open systems.* Addis Wesley 2006.
5. Behrouz A. Forouzan .*Data Communications and Networking*.McGraw Hill Companies, Inc., 4th Edition ,2007.

SEMESTER- II			
ELECTIVE II	B - SOFT COMPUTING		
Course Code: 21PCSE22	Hrs / week :4	Hrs / Sem: 60	Credits :4

Course Objectives:

- To solve real-world problems by providing approximate results that conventional and analytical models cannot solve.
- To understand the features, advantages and applications of Artificial Intelligence.
- To realize the revolution of artificial intelligence to develop hybrid systems for the industrial problems.

Course Outcomes:

CO. No.	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	understand the concepts of Artificial Intelligence and neural networks,	1	Un
CO-2	categorize different learning algorithms	3	An
CO-3	analyze the classification taxonomy of NN	3	An
CO-4	compare different network models	7	An
CO-5	comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.	2	Ap
CO-6	implement the concepts of fuzzy sets, knowledge representation using fuzzy rules	2	An
CO-7	identify and define approximate reasoning, fuzzy inference systems, and fuzzy logic	1	An
CO-8	analyze the genetic algorithms and their applications	3	An

UNIT – I: NEURAL NETWORKS FUNDAMENTALS

Fundamentals of ANN: The Biological Neural Network, Artificial Neural Networks - Building Blocks of ANN and ANN terminologies: Architecture, setting of weights, activation functions-McCulloch-pitts Neuron Model-Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules – Hebbian Learning rule- Perceptron learning rule-Delta Learning Rule.

UNIT – II: CATEGORIES OF NEURAL NETWORKS

Models of ANN: Single layer perceptron- Architecture, Algorithm, application procedure. Feedback Networks: Hopfield Net and BAM - Feed Forward Networks: Back propagation Network (BPN) and Radial Basis Function Network (RBFN) - Self Organizing Feature Maps: SOM and LVQ.

UNIT – III: BASIC CONCEPTS OF FUZZY SET

Fuzzy Sets, properties and operations - Fuzzy relations, cardinality, operations and properties of fuzzy relations, fuzzy composition

UNIT – IV: MEMBERSHIP FUNCTION & FIS

Fuzzy variables - Types of membership functions - fuzzy rules: Takagi and Mamdani - fuzzy inference systems: fuzzification, inference, rule base, defuzzification.

UNIT-V: GENETIC ALGORITHMS

Genetic Algorithm (GA): Biological terminology – elements of GA: encoding, types of selection, types of crossover, mutation, reinsertion – a simple genetic algorithm –General Genetic algorithm -The Schema Theorem - Classification of Genetic Algorithm - Applications of Genetic Algorithm.

Text Books:

1. S. N. Sivanandam, S. Sumathi and S.N. Deepa. *Introduction to Neural Networks using MATLAB 6.0*. Tata McGraw-Hill, New Delhi, 2006.
2. S. N. Sivanandam and S.N. Deepa. *Principles of Soft Computing.* Wiley-India, 2008.

Reference Books:

1. Simon Haykin.*Neural networks A Comprehensive Foundation*. Pearson Prentice Hall,2005
2. S.Rajasekaran and G.A.V.Pai*. Neural Networks, Fuzzy Logic and Genetic Algorithms.* PHI, 2004.
3. S.N.Sivanandam and S.N.Deepa.*Introduction to Genetic Algorithms.* Springer, 2007.
4. Timothy J.Ross.*Fuzzy Logic with Engineering Application.* McGraw Hill, 2000.
5. Davis E.Goldberg.*Genetic Algorithms: Search, Optimization and Machine Learning.* Addison Wesley, N.Y., 2003.

SEMESTER- III			
ELECTIVE I A- ORGANIZATIONAL BEHAVIOUR			
Course Code: 21PCSE31	**Hrs / week :4**	**Hrs / Sem: 60**	**Credits :4**

Course Objectives:

- To develop a basic understanding of individual behaviour and organisational change.
- To help the students to develop cognizance of the importance of human behaviour.
- To provide the students with the tools to understand and evaluate individual, group and organizational processes.

Course Outcomes:

CO.No	Upon Completion of this course, students will be able to	PSO addressed	CL
CO-1	analyse the behaviour of individuals and groups in organisations in terms of the key factors that influence organizational behaviour	7	An
CO-2	evaluate personality types, perception and learning process on human behavior	7	Ap
CO-3	analyze the importance of Attitudes, Values, Job satisfaction	7	An
CO-4	describe the key components of Group formation and Group behaviour	7	An
CO-5	identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings	7	Un
CO-6	analyze about human stress and the consequences of stress in an organization	7	An
CO-7	identify the various leadership styles and the role of leaders in a decision making process	7	Un
CO-8	assess the potential effects of organizational-level factors (structure and culture) on organizational behaviour	7	An

UNIT – I

Introduction: Definition – Key Elements of OB – Nature and Scope of OB – Need for studying Organisational Behaviour – Evolution of OB – Development of OB – Foundations of Individual Behaviour – Personality

UNIT – II

Perception: Introduction – Perception – Perception Differs from Sensation – Perceptual Process – Factors Affecting Perception – Impression Management – Attitudes: Concept – Formation – Types – Measurements – Change – Values: Concept – Types – Formation – Values and Behaviour – Job Satisfaction: Concept – Determinants – Measuring – Effects – Job Dissatisfaction – Learning

UNIT – III

Motivation: Meaning –Nature – Motivation Cycle or Process – Need – Theories - Foundation of Group Behaviour: Definition and Characteristics of Group – Types of Groups – Stages of Group formation – Group Behaviour – Group Decision-Making – Organisational Conflicts

UNIT – IV

Stress Management: Stress – Symptoms of Stress – Measurement of Stress – Causes or Sources of Stress – Consequences of Stress – Communication – Nature and Need for Communication – Process of Communication – Channels of Communication – Communication Networks – Leadership – Power and Politics

UNIT – V

Organisation: Organisational Structure – Organisational Theory – Organisational Culture – Organisational Development – Organisational Effectiveness – Quality of Working Life

Text Book:

1. S. S. Khanka.*OrganisationalBehaviour.* S. Chand Publishing, 2003.

Reference Books:

1. Stephen P. Robins.*Organisational Behavior.* PHI Learning / Pearson Education, 11th edition, 2008.
2. Aswathappa, K.*OrganisationalBehaviour.* Himalaya Publication, 7th Edition, 2007.
3. Mrs. Amruta S. Oke, Sunil P. Ujagare, Mrs. Gauri M. Kulkarni and Vilas D. Nandavadekar. *Principles & Practice of Management&Organizational Behaviour*.Nirali publication, 2015.
4. Fred Luthans. *Organisational Behavior*.McGraw Hill, 11th Edition, 2001.

SEMESTER – III			
ELECTIVE I B - OBJECT ORIENTED SOFTWARE ENGINEERING			
Course Code : 21PCSE32	**Hrs / Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Course Objectives:

- To be a professional developer of software products
- To understand different conventions in software modelling
- To perform software testing and validation

Course Outcomes:

CO.No	Upon Completion of this course, students will be able to	PSOs Addressed	CL
CO-1	design and implement a software system to meet desired needs.	3,6	**Cr**
CO-2	identify requirements of systems and applications.	3	**An**
CO-3	use modern software systems and tools.	3	**Ap**
CO-4	understand different software life cycle concept.	3	**Un**
CO-5	study and design SRS documents for software projects.	3	**An**
CO-6	study and model software projects using different modelling techniques.	3	**An**
CO-7	understand different techniques to map models to code	7	**Un**
CO-8	discuss about project organisation and communication	7	**Ev**

UNIT I Software Life Cycle Models

System concepts – Project Organisation – Life cycle models – Unified Process – Iterative and Incremental – Workflow – Agile Processes-Project Planning and Estimation.

UNIT II SRS Documentation and UML Diagram

Requirements Elicitation – Requirement Documentation – Use Cases – Unified Modeling language-Introduction.

Class diagrams – Sequence diagrams – Object diagrams – Deployment diagrams – Use case diagrams –State diagrams, Activity diagram, Component diagrams, Case Study, Identifying Classes – Noun Phrase Approach, Common class Pattern Approach, Use- Case Driven Approach, CRC.

UNIT III Analysis Phase and Design Phase

Analysis Object Model (Domain Model)- Analysis Dynamic Models- Non-functional requirements – Analysis Patterns.

System Design Architecture – Design Principles – Design Concepts – Design Patterns – Architectural Styles – Dynamic Object Modeling – Static Object Modeling – Interface Specification – Object Constraint Language.

UNIT IV Mapping and Testing & Implementation

Mapping Design(Models) to Code – Model Transformation – Refactoring – Mapping Associations – Mapping Activities.

Testing – Configuration Management – Maintenance process – System documentation –program evolution dynamics.

UNIT V: Project Organization and Communication & Methodologies

Introduction: A Rocket Example - An Overview of Projects - Project Organization Concepts - Project Communication Concepts - Organizational Activities.-Introduction: The First Ascent of K2 - Project Environment - Methodology Issues - A Spectrum of Methodologies - Case Studies.

Text Book:

1. Bernd Bruegge, Allen H. Dutoit .*Object-Oriented Software Engineering Using UML, Patterns, and Java,* 3rd Edition ,Pearson.

Reference Books:

1. Bernd Bruegge and Alan H Dutoit. *Object Oriented Software Engineering*. Pearson Education, 2nd edition ,2004.
2. Craig Larman. *Applying UML and Patterns*. Pearson Education, 3rd edition 2005.
3. Stephen Schach.*Software Engineering*. McGraw-Hill, 7th edition 2007.
4. Ivar Jacobson, GrandyBooch and James Rumbaugh. *The Unified Software development Process.* Pearson Education, 1999.

Semester III	
SELF-STUDY COURSE – COURSE ON COMPETITIVE EXAMS	
Course Code: 21PCSSS1	**Credits: 2**

Course Objectives:

- To provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy
- Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the government sector

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	Solve real life problems requiring interpretation and comparison of various representations of ratios.	2,6	Ap
CO-2	Distinguish between proportional and non-proportional situations and when appropriate apply proportional reasoning	6	An
CO-3	Solve problems applying probabilistic reasoning to make decisions	2	Ap
CO-4	Evaluate claims based on empirical, theoretical and subjective probabilities	6,4	Re
CO-5	Create and use visual displays of data	4	Cr
CO-6	Solve problems using high speed mental calculations	6	Ap
CO-7	Understand the basic concepts of logical reasoning skills.	1,4	Un
CO-8	Acquire satisfactory competency in use of data analysis	7	Un

UNIT - I

Number System (Including divisibility) – HCF and LCM (Including Factors, Multiples and Prime Factorization)

(Chapter: 1&2, pages 1 – 46)

UNIT - II

Fractions and Decimals – Square and Square roots, Cube and Cube Roots, Indices and Surds.

(Chapter: 3 &4, pages 47 – 94)

UNIT - III

Time, Work and Wages (Including Pipes & Cistern) – Time, Speed and Distance (Including Trains, Boats and Stream, Circular Motion, Races and Games.

(Chapter: 15 & 16, pages 317 - 374)

UNIT - IV

Permutations & combinations and Probability.

(Chapter: 18, pages 391 - 416)

UNIT - V

Set Theory (Including Venn Diagram) – Data Analysis and Data Interpretation (Including Caselet, Table, Line Graph, Bar Graph, Mixed Bar)

(Chapter: 24 & 27, pages 559 – 570, 615 – 648)

Text Book:

1. Er.Deepak Agarwal and Mr.D.P.Gupta:Rapid Quantitative Aptitude with Shortcuts and Tricks for Competitive Exam, Disha Publication.

Reference Books:

1. Dr.R.S.Aggarwal: Quantitative Aptitude for Competitive Examinations, S.Chand Publication.
2. Rajesh Verma, Fast Track Objective Arithemetic, Arihant Publication.

Semester II			
Core – VII - Mechanics			
Code: 17PMAC23	**Hrs/Week:6**	**Hrs/Sem: 90**	**Credits : 5**

Objective

- To learn about the generalized coordinates, Lagrange's equations, different Variational Principles, Canonical transformations and its applications in Classical Mechanics.

Unit I

Some Definitions-Lagrange's Equations for a Holonomic System- Lagrange's Equations of Motion for Conservative, Non- Holonomic system – Physical Significance of λ_l .

(Chapter 1: Sections 1.1, 1.2,1.3,1.4)

Unit II

Variational Principle – Calculus of Variations- Hamilton's Principle – Derivation of Hamilton's Principle from Lagrange's Equations- Derivation of Lagrange's Equations from Hamilton's Principle-Extension of Hamilton's Principle- Cyclic or Ignorable Coordinates-Conservation Theorems.

(Chapter 2: Sections 2.1, 2.2,2.3,2.4,2.5,2.6,2.7,2.8)

Unit III

Equations of Motion of a Rigid Body- Generalised Coordinates of a Rigid body- Eulerian Angles – Components of Angular Velocity along the Body Set of Axes- Rate of Change of a Vector-Coriolis force-Euler's Equations of motion for a rigid body-Motion of a Heavy Symmetrical Top.

(Chapter 3: Sections 3.1, 3.2,3.3,3.4,3.5,3.6,3.7,3.8)

Unit IV

Derivations of Hamilton's Equations of Motion – Routh's procedure – Equations of motion – Derivation of Hamilton's equations from Hamilton's principle – Principle of least action.

(Chapter 4: Sections 4.1, 4.2,4.3,4.4)

Unit V

Canonical coordinates and canonical transformations – Hamilton's Equations of Motion in poisson's Bracket – Infinitesimal contact Transformation - Relation between Infintesimal contact Transformation and Poisson's Bracket – Hamilton – Jacobi theory.

(Chapter 5: Sections 5.1, 5.2, 5.3, 5.4 ,5.5)

Text Book:

C.R.Mondal: Classical Mechanics, Prentice Hall of India,2007.

Reference Books:

1. K. SankaraRao: Classical Mechanics, Prentice Hall of India,2005.
2. Herbert Goldstein: Classical Mechanics, Second Edition ,Narosa, 1994.

Semester I			
Core IV	**Mathematical Statistics**		
Course Code: 21PMAC14	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Course Objectives

- To enable the use of statistical techniques whenever relevant.
- To have a proper understanding of statistical applications in real life.

Course Outcome

CO.NO.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the concepts of distributions and apply them.	2,8	Un
CO-2	examine the method used for analysis, including a discussion of advantages, disadvantages and necessary assumptions.	1,2	An
CO-3	apply discrete and continuous probability to evaluate the probability of real world events.	2,7	Ap
CO-4	Compare the distribution with one another.	2,8	An
CO-5	test statistical hypothesis.	2	An
CO-6	illustrate the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables	2,7,8	Ap
CO-7	define a probability generating function, a moment generating function and derive them in simple cases.	5,8	Re
CO-8	write the central limit theorem, and apply it.	1,5	Cr

Semester I			
Core IV	**Mathematical Statistics**		
Course Code: 21PMAC14	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Unit I

Distribution of Two Random Variables – Conditional Distributions and Expectations-The correlation coefficient-Independent Random Variables-Extension to Several Random Variables.

(Chapter 2: Sections 2.1, 2.2, 2.3, 2.4, 2.5)

Unit II

Some special Distributions: The Binomial and Related Distributions – The Poisson Distribution - The Gamma and Chi-square Distributions – The Normal Distribution – The Bivariate Normal Distribution.

(Chapter 3: Sections 3.1, 3.2, 3.3, 3.4, 3.5)

Unit III

Distributions of functions of Random variables: Sampling theory – Transformations of variables of the discrete type – Transformations of variables of the continuous type – The Beta, t, and F Distributions.

(Chapter 4: Sections 4.1, 4.2, 4.3, 4.4)

Unit IV

Extensions of the Change of variable technique – Distributions of Order statistics – The Moment generating function technique – The Distributions of$\bar{X}$ and nS^2/σ^2 – Expectations of functions of random variables.

(Chapter 4: Sections 4.5, 4.6, 4.7, 4.8, 4.9)

Unit V

Limiting Distributions: Convergence in Distribution – Convergence in Probability – Limiting Moment Generating Function – The central limit theorem – Some theorems on Limiting Distributions.

(Chapter 5: Sections 5.1, 5.2, 5.3, 5.4, 5.5)

Text Book

1. Robert V. Hogg and AllenT.Craig. *Introduction to Mathematical Statistics*. Pearson Education Asia. Fifth edition, 2004.

Books for Reference

1. J.N.kapur, H.C. Saxena. *Mathematical Statistics*. S.Chand& Co, 2013.
2. Keith Knight. *Mathematical Statistics*. New York. Chapman & Hall/CRC, 2000.

Semester II			
Core VII	**Classical Mechanics**		
Course Code:21PMAC23	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Course Objectives

- To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation.
- To develop math skills as applied to physics.

Course Outcome

Co. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyze the dynamics of system near equilibrium and find the normal modes of oscillation.	2	An
CO-2	understand D' Alembert's Principle and simple applications of the Lagrangian formulation.	2,6	Un
CO-3	test the principle co-ordinates and the principle moment of inertia for arbitrary rigid body.	2	An
CO-4	evaluate Hamilton's equations of motion.	5	Ev
CO-5	explain Hamiltonian principles and establish the Hamiltonian equations.	2,5	Un
CO-6	write the magnitude of selected mechanical properties of materials.	2	Cr
CO-7	distinguish the concept of the Hamilton equation of motion and the Principle of least Action.	6	An
CO-8	illustrate the Canonical transformation and Hamilton Jacobi theory.	5	Ap

Semester II			
Core VII	**Classical Mechanics**		
Course Code:21PMAC23	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Unit I

Some Definitions-Lagrange's Equations for a Holonomic System- Lagrange's Equations of Motion for Conservative, Non –Holonomic system - Physical Significance of λ_l - Problems related to SET/NET.

(Chapter 1: Sections 1.1, 1.2, 1.3, 1.4)

Unit II

Variational Principle - Calculus of Variations- Hamilton's Principle - Derivation of Hamilton's Principle from Lagrange's Equations- Derivation of Lagrange's Equations from Hamilton's Principle - Extension of Hamilton's Principle - Cyclic or Ignorable Coordinates- Conservation Theorems - Problems related to SET/NET.

(Chapter 2: Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8)

Unit III

Equations of Motion of a Rigid Body- Generalized Coordinates of a Rigid body- Eulerian Angles - Components of Angular Velocity along the Body Set of Axes- Rate of Change of a Vector-Coriolis force-Euler's Equations of motion for a rigid body-Motion of a Heavy Symmetrical Top.

(Chapter 3: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8)

Unit IV

Derivations of Hamilton's Equations of Motion - Routh's procedure - Equations of motion - Derivation of Hamilton's equations from Hamilton's principle - Principle of least action.

(Chapter 4: Sections 4.1, 4.2, 4.3, 4.4)

Unit V

Canonical coordinates and canonical transformations - Hamilton's Equations of Motion in Poisson's Bracket - Infinitesimal contact Transformation - Relation between Infintesimal contact Transformation and Poisson's Bracket - Hamilton - Jacobi theory.

(Chapter 5: Sections 5.1, 5.2, 5.3, 5.4, 5.5)

Problems related to SET/NET is only for Internal Examination.

Text Book

1. C.R.Mondal. *Classical Mechanics*. Prentice Hall of India, 2007.

Books for Reference

1. K. SankaraRao. *Classical Mechanics*. Prentice Hall of India, 2005.
2. Herbert Goldstein. *Classical Mechanics*. Narosa Second Edition, 1994.

Semester - II			
Core IX	**Stochastic Processes**		
Course Code: 21PMAC25	**Hrs/week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Course Objectives

- To acquire knowledge about stochastic process relying on the probability theory and mathematical analysis.
- To develop comprehensive knowledge of Probability Distribution, Transition Probabilities, Markov Chains, Birth – Death Process.

Course Outcome:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	illustrate the stochastic model.	8	Ap
CO-2	explain the well known models like birth-death and queueing to reorient their knowledge of stochastic analysis.	7	Un
CO-3	list the random walk associated with real life situation to solve.	1	Re
CO-4	analyzethe transition probabilities and its classifications.	2	An
CO-5	discusserlang process and execute it.	5	Un
CO-6	compare the different stochastic models.	1,8	An
CO-7	understand the notions of stochastic process.	5	Un
CO-8	apply markov chains to practical problems	4	Ap

Semester - II			
Core IX	**Stochastic Processes**		
Course Code: 21PMAC25	**Hrs/week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Unit I

Generating functions - Laplace Transforms - Laplace Transforms of a Probability Distribution or of a Random variable - Difference Equations - Difference Equations in Probability Theory.

(Chapter1: Sections: 1.1 - 1.5)

Unit II

Differential- Difference Equations - Matrix analysis. Stochastic Process: Notion of Stochastic process - Specification of Stochastic Process.

(Chapter 1: Sections: 1.6, 1.7 and Chapter 2: Sections: 2.1 - 2.3)

Unit III

Higher transition probabilities and classification of states - Higher transition probabilities - Classification of states and chains - Determination of Higher transition probabilities -Stability of Markov system: Limiting Behavior.

(Chapter 3: Sections: 3.1 - 3.5)

Unit IV

Statistical inference for Markov Chains-Markov chains with continuous state space-Non-stationary or Non-homogeneous chains-Poisson process-Poisson process and Related Distributions.

(Chapter 3: Sections: 3.6-3.8 and Chapter4: Sections: 4.1 - 4.2)

Unit V

Generalizations of Poisson Process-Birth and Death process-Markov Processes-Discrete State Spaces-Erlang Process.

(Chapter 4: Sections: 4.3 - 4.6)

Text Book:

1. J.Medhi. *Stochastic Process*. Wiley Eastern Limited, 1982.

Books for Reference:

1. SrinivasanMehata. *Stochastic Process*. New Delhi: Tata McGraw-Hill Publishing Company Limited, 1976.
2. Tapas kumar Chandra and SreelaGangopadhyay. *Introduction to Stochastic Process*, Narosa Publishing House, 2018.

Semester II			
Elective II A	**Operations Research**		
Course Code: 21PMAE21	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Course Objectives

- To use quantitative methods and techniques for effective decision –making; model formulation and applications that are applied to problems in business, industry and society.
- To provide a theoretical introduction and implementation of optimization techniques in order to get best results from a set of serial possible solution of different problems.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	classify and formulate integer programming problems and solve them with Cutting Plane Algorithm, Branch and Bound Algorithm.	2,4	Un
CO-2	formulate and solve classical dynamic programming problems.	2,6	Ap
CO-3	compare inventory models and other related models.	2	An
CO-4	understand and identify the generalized inventory models in real life situation	2	Un
CO-5	analyze a network of queues with Poisson external arrival, exponential service requirements and independent routing.	1,6	An
CO-6	evaluate the concept of complementary slackness and its role in solving prime and dual problems	2	Ev
CO-7	create the most optimal order quantity and minimal costs while ordering materials.	2,6	Cr
CO-8	define probabilistic inventory models that accounts for all variations in real systems.	2	Re

Semester II			
Elective II A	**Operations Research**		
Course Code: 21PMAE21	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Unit I

Integer Programming: Some Applications of Integer Programming Solution Algorithms-Methods of Integer Programming - Cutting Plane Algorithm - Branch and Bound Algorithm.

(Chapter 8: Sections 8.1, 8.2, 8.3, 8.4)

Unit II

Dynamic Programming: Elements of DP Model - The Capital Budgeting Example - Cargo-Loading Problem- Reliability Problem - Work Force Size Problem - Forward and Backward Recursive equations.

(Chapter 9: Sections 9.1, 9.2, 9.3)

Unit III

Inventory Models: The ABC Inventory System - A generalized inventory model - Deterministic models: Single item static model and multiple item static model.

(Chapter 13: Sections 13.1, 13.2, 13.3)

Unit IV

Inventory Models: Probabilistic models– A continuous review model-Single Period Models: Instantaneous Demand, No Setup Cost and s-S Policy

(Chapter 13: Sections 13.4(13.4.1, 13.4.2))

Unit V

Queueing Theory: Elements of Queueing model - Roles of the Poisson and Exponential Distributions - Arrivals Process- Departures Process

(Chapter 15: Sections 15.1, 15.2)

Text Book

1. Hamdy A. Taha. *Operations Research an Introduction*. New York: Macmillan Publishing Company, Fourth Edition, 1987.

Books for Reference

1. J.K.Sharma. *Operations Research.* Macmillan Publishers India Ltd, 2007.
2. KantiSwarup, P.K.Kupta and Man Mohan. *Operations Research*. Sultan Chand & Sons Publications, 2013.

Semester III			
Elective III A	**Fluid Mechanics**		
Course Code: 21PMAE31	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Course Objectives

- To introduce fundamental aspects of fluid flow behaviour and to develop steady state mechanical energy balance equation for fluid flow systems.
- To estimate pressure drop in fluid flow systems and determine performance characteristics of fluid machinery.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	explain fundamentals of fluid mechanics, which is used in the applications of Hydraulics.	1,8	Un
CO-2	employ Archimedes principle to solve numerical examples on Buoyancy.	2,5	Ap
CO-3	develop understanding about hydrostatic law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.	2	Ap
CO-4	imbibe basic laws and equations used for analysis of static and dynamic fluids.	1,8	Un
CO-5	examine stability of submerged and floating bodies.	6	An
CO-6	differentiate horizontal motion and vertical motion.	1	An
CO-7	describe methods of implementing fluid mechanics laws and phenomena.	5,6	Re
CO-8	calculate and optimize operational parameters of hydraulic problems, systems and machines	2	Cr,Ap

Semester III			
Elective III A	**Fluid Mechanics**		
Course Code: 21PMAE31	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 3**

Unit I

Properties of Fluids: Viscosity - Thermodynamic properties- Compressibility and Bulk modulus - Surface Tension and Capillarity - Vapour Pressure and Cavitation.

(Chapter 1: Sec 1.1 – 1.7)

Unit II

Pressure and its measurement: Fluid pressure of a point - Pascal's Law - Pressure variation in a fluid at rest - Absolute, Gauge, Atmospheric and Vacuum Pressure - Measurement of pressure - Simple manometer - Differential Manometer - Pressure at a point in Compressible fluid.

(Chapter 2: Sec 2.1 – 2.8)

Unit III

Hydrostatic forces on Surfaces: Total pressure and Centre of Pressure- Vertical Plane Surfaces submerged in liquid - Horizontal Plane Surfaces submerged in liquid -Inclined Plane Surface submerged in liquid - Curved Surface submerged in liquid

(**Chapter 3: Sec 3.1-3.6)**

Unit IV

Total Pressure and Centre of pressure on lock gates - Pressure Distribution in a liquidsubjected to Horizontal/Vertical Acceleration.

(Chapter3:Sec3.7-3.9)

Unit V

Buoyancy and flotation: Buoyancy - Centre of Buoyancy - Metacentre - Metacentric height - Conditions of Equilibrium of a Floating and Submerged bodies - Experimental Method of Determination of Meta - centric Height - Oscillation of a floating body.

(Chapter 4 Sec 4.1 – 4.9)

Text Book

1. Dr.R.K. Bansal. *A text book of Fluid Mechanics*. Laxmi Publication private limited, Tenth edition.

Books for Reference

1. Joseph H.Spurk, NuriAksel. *Fluid Mechanics*. Springer- Verlag Berlin Heidelberg, Second Edition, 2008.
2. Ranald V. Giles. *Fluid Mechanics and Hydraulics*. McGraw - Hill Book Company, Second Edition.

Semester III	
Self-Study Course	**Course on Competitive Exams**
Course Code: 21PMSS31	**Credits: 2**

Course Objectives

- To provide a platform to the students for building the fundamentals of basic mathematics for competitive examinations preparation strategy
- Establish a framework to help students acquire knowledge and expertise necessary to secure employment opportunities in the government sector

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	solve real life problems requiring interpretation and comparison of various representations of ratios.	2,6	Ap
CO-2	distinguish between proportional and non-proportional situations and when appropriate apply proportional reasoning	6	An
CO-3	solve problems applying probabilistic reasoning to make decisions	2	Ap
CO-4	evaluate claims based on empirical, theoretical and subjective probabilities	6,4	Re
CO-5	create and use visual displays of data	4	Cr
CO-6	solve problems using high speed mental calculations	6	Ap
CO-7	understand the basic concepts of logical reasoning skills.	1,4	Un
CO-8	acquire satisfactory competency in use of data analysis	7	Un

Semester III	
Self-Study Course	**Course on Competitive Exams**
Course Code: 21PMSS31	**Credits: 2**

Unit I

Number System (Including divisibility) - HCF and LCM (Including Factors, Multiples and Prime Factorization)

(Chapter: 1&2, pages 1 – 46)

Unit II

Fractions and Decimals - Square and Square roots, Cube and Cube Roots, Indices and Surds.

(Chapter: 3 &4, pages 47 – 94)

Unit III

Time, Work and Wages (Including Pipes & Cistern) - Time, Speed and Distance (Including Trains, Boats and Stream, Circular Motion, Races and Games.

(Chapter: 15 & 16, pages 317 - 374)

Unit IV

Permutations & combinations and Probability.

(Chapter: 18, pages 391 - 416)

Unit V

Set Theory (Including Venn Diagram) - Data Analysis and Data Interpretation (Including Caselet, Table, Line Graph, Bar Graph, Mixed Bar)

(Chapter: 24 & 27, pages 559 – 570, 615 – 648)

Text Book

1. Er.DeepakAgarwal and Mr.D.P.Gupta. *Rapid Quantitative Aptitude with Shortcuts and Tricks for Competitive Exam.* Disha Publication.

Books for Reference

1. Dr.R.S.Aggarwal. *Quantitative Aptitude for Competitive Examinations*. S.Chand Publication.
2. Rajesh Verma. *Fast Track Objective Arithemetic*. Arihant Publication.

SEMESTER – II			
CORE VI MEDICAL MICROBIOLOGY			
Code : 17PMIC23	**Hrs/ Week: 6**	**Hrs/ Sem: 60**	**Credit: 5**

OBJECTIVES

To impart advanced level information in the subject of Medical Microbiology.

UNIT I

Basics in Medical microbiology - Infectious diseases overview. Medically important microbes. Microbial diseases - sources, ***route*** of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors - Signs and symptoms of microbial diseases. Treatment, Prevention and control of microbial infections. Immunity of microbial diseases.Bacteriology - *Staphylococci, Bacillus, Clostridium, Corynebacterium, Salmonella, Klebsiella, Vibrio, Pseudomonas, Mycobacteria.*

UNIT II

Virology - Structure, multiplication, classification and medical importance of DNA viruses - General properities of viruses host interaction- Pox virus(small pox,)- Herpes virus-(Chicken pox, Herpes loster,)—Adenovirus—Orthomyxovirus(Infleunzavirus,Swine Flu)- Paramycovirus,-Enterovirus(Poliovirus)- Arbovirus-(Chikungunga virus, Dengue)- Hepatitis virus- Rotavirus- Rubella virus – Ebolla virus –AIDS-SARS

UNIT:III

Mycology - Human mycotic infections caused by Dermatophytes, Histoplasma, Cryptococcus, Candida, opportunistic mycoses.

Parasitology - Medical importance of Entamoeba, Giardia, ,Taenia, Ascaris, . Laboratory techniques in parasitology.

UNIT:IV

Chemotherapy – Basics of chemotherapy, history and development chemotherapy, general properties of antimicrobial agents and attributes of an ideal antimicrobial agents – Principal groups of antibacterial agents and mechanism of action : Inhibitors of cell wall – Inhibitors of protein synthesis – Inhibitors of nucleic acid synthesis – Inhibitors of DNA replication and inhibitors of RNA polymerase – Inhibitors of cytoplasmic membrane function .

Unit – V

Antibacterial, antifungal and antiviral agents – Drug resistance (Origin, mechanisms and transmission) – Selection and testing Factors influencing the selection of drugs – Resistant Staphylococci and testing of antibiotics; (Checker board assay, Schlichter's Test and E-test). **References:**

1. Ananthanarayanan, R. and Panicker. J. (2000). Text Book of Microbiology. Orient Longmans.
2. Rajan. S. (2007). Medical Microbiology. MJP Publisher, Chennai. Bernard. D. Davis, Renato Dulbecco, Herman N. Eisen and Harold, S. Ginsberg. (1990). Microbiology (4th Edition) J.B. Lippincott Company, New York.
3. Prescott L.M. Harley J.P., and klein D.A (2008). Microbiology (7th Edition) McGraw Hill, New York.

4. Madigan M., T., Martinko. J.M., and Parker J., Brock TD. (1997). Biology of Microorganisms. (8th Edition). Prentice Hall International Inc, New York.
5. Nester, E.W. Roberts, C.V. and Nester, M.T. (1995). Microbiology, A Human perspective. IWOA, U.S.A.
6. Pelczar Jr. M.J. Chan E.C.S. and Kreig N.R (1993). Microbiology – Mc Graw Hill, Inc., New York.
7. Stainer R.Y., Ingra ham J.L., Wheelis M.L., and Painter P.R. (1986). General Microbiology, Macmillan Education Ltd., London.
8. Tortora, Funke, Case Addison 2001, Microbiology – An Introduction – 7th Edition, Wesley Longman Inc.
9. Dubey R.C. and Maheswari, S. 2003 A Text Book of Microbiology. S. Chand & Co., New Delhi.
10. John L. In graham and Catherine A Ingrahani. (2000) Introduction to Microbiology. Books / Cole Thomas Learning, New York.

SEMESTER- III			
CORE – VII AGRICULTURAL AND ENVIRONMENTAL MICROBIOLOGY			
Code:17PMIC31	**HRS/WEEK: 6**	**HRS/SEM: 90**	**CREDITS: 5**

OBJECTIVES

1. To inculcate the knowledge on interaction between microbes and environment.
2. To impart advanced information in Agricultural Microbiology.

UNIT I :

Based on oxygen requirement, nutrition, temperature, habitat (soil, water & air). Physio-chemical properties of soil -Rhizosphere and rhizoplane organisms. Mineralization and Immobilization. Biogeochemical cycling: Carbon, Nitrogen, Phosphorus & Sulphur.

UNIT II :

Microbial analysis of drinking water: Tests for coliforms (presumptive, confirmed and completed tests). Purification of water: Sedimentation, Filtration (slow and rapid sand filters) and Disinfection. Aeromicrobiology – Phylloplane microflora (morphological, physiological characters: nutrition, radiation, relative humidity and temperature) – Air Pollution – aerosol, droplet nuclei and infectious dust. Examination of air microflora.

UNIT III :

Nature of sewage and its composition. Physical, chemical and biological properties of sewage (BOD, COD etc). Sewage systems and types. Sewage Treatment: Single Dwelling Unit, municipal sewage treatment – primary, secondary and tertiary treatments (Trickling filters, Activated sludge process, Oxidation lagoons and Imhoff tank).

UNIT – IV

Biological Nitrogen fixation- The range of nitrogen fixing organisms- mechanism of nitrogen fixation (biochemistry of nitrogenase) - genetics of nitrogen-fixation - Rhizobium-Legume Association - N_2 fixation by non-leguminous plants.

UNIT – V

Microbial products and plant health: PGPR (plant growth promoting rhizobacteria) - significance of mycorrhizae - Role of biofertilizers and biopesticides- Biofertilizers- (*Rhizobium*, *Azospirillum*, *Azotobacter, Cyanobacteria, Phosphobacteria and Azolla*)- Inoculants, mass production and method of application and its Quality Control (BIS specification).

REFERENCE BOOKS:

1. Shiva Aithal, C. (2010). Mordern approaches in Soil,Agricultural and Environmental Microbiology. Himalaya Publishers, New Delhi.
2. Atlas,R.M., and Bartha.M. (2003). Microbial Ecology –Fundamentals and applications. Benjamin – Cummings, Mento Park, California.
3. Martin Alexander (1983).Introduction to Soil Microbiology, Wiley eastern Ltd., NewDelhi.
4. SubbaRao,N.S.(1997). Biofertilizers in Agriculture and Forestry III Ed,Oxford and IBH Publishing Co, Pvt. Ltd, NewDelhi.

5. SubbaRao,N.S.(1995). Soil Microorganisms and Plant growth. Ed,Oxford and IBH Publishing Co, Pvt. Ltd, NewDelhi
6. Wheeler, B.E. (1976). An introduction to Plant disease. ELBS and John Wiley and sons, Ltd.
7. Rangaswamy.g., and Bagyaraj.D.J. (1996). Agricultural Microbiology. Prentice-Hall of India Pvt Ltd., New Delhi.
8. Dirk, J. Elasas, V., Trevors,.T., and Wellington, E.M.H. (1997). Modern Soil Mirobiology. Marcel Dekker INC, New York, HongKong.
9. Dubey R.C. (2001).A Text Book of Biotechnology. S Chand & Co. New Delhi.
10. Gupta,S.K.(2014).Approaches and trends in plant disease management. Scientific publishers.Jodhpur,India.
11. Jammaluddin et al (2013). Microbes and sustainable plant productivity. Scientific Publishers Jodhpur,India,G.
12. Purohit, S.S.Kothari,P.R.andMathur (1993). Basic and Agricultural Biotechnology, Agrobotanical Publishers (India).Bikaner.

SEMESTER - III			
CORE –IX INDUSTRIAL AND PHARMACEUTICAL MICROBIOLOGY			
Code: 17PMIC33	**HRS/WEEK: 6**	**HRS/SEM: 90**	**CREDITS: 5**

OBJECTIVES:

1. To inculcate the knowledge of Industrial and Pharmaceutical Microbiology
2. To impart the students with the knowledge of various processes involved in Pharmaceutical industry.

UNIT-I

Isolation, preservation and improvement of industrially important microorganisms; Raw materials and media design for fermentation processes; Sterilization; Development of inoculums for industrial fermentations; Types of fermentation: Batch, Continous, Dual or Multiple, Surface, Submerged, Aerobic and Anaerobic.

UNIT-II

Fermenter- Design and types, Instrumentation and control-aeration and agitation. Recovery and purification of fermentation products. Enzymes and cell immobilization, Production of recombinant proteins having therapeutic and diagnostic applications: Insulin, Interferon, Somatotropin, Single cell protein.

UNIT-III

Biology of industrial microorganisms.*Streptomyces*, Yeasts (*Saccharomyces, Hansenula)Spirulina* and *Penicillium*. Mushroom cultivation. Biosensors and Biochips. Biofuels from microbial sources.

UNIT-IV

Alcohols (Ethanol and Butanol); Beverages (Beer and Wine); Aminoacids (Glutamic acid and Lysine); Organic acids (Citric acid and acetic acid); Vaccines (Plant – *Agrobacterium tumefaciens*, Animal – Leptospirosis, Microbes - DPT).

UNIT-V

Antibiotics (Penicillin, Cephalosporin and Streptomycin); Vitamins (Riboflavin and Cyanocobalamin); Production of enzymes (Protease, Amylase and Lipase); Biopolymers (Xanthan gum and PHB); Biopreservatives (Nisin); Production of Hormones (Testosterone and Androstenedione).

REFERENCE BOOKS:

1. WulfCrueger (2000).A Text Book of IndustrialMicrobiologyII.Ed. Panima Publishing Corporation,NewDelhi.
2. Peter F.Stanbury., Whittaker, A. and Hali,S.J.(1997).Principles of Fermentation Technology,II Ed., Pergamon Press.
3. A.H.Patel, Industrial Microbiology (1996).Macmillan India Limited.
4. Reed.G.(Editor),Industrial Microbiology, CBS Publishers
5. Prescott &Dunn(1997). Industrial Microbiology.CBS publishers and Distributors.
6. Casida,L.E.(1986).Industrial Microbiology. Eastern Limited, NewYork.
7. Michael J.Waites, Neil L.Morgan, John S.Rockey and GrayHigton(2001). Industrial Microbiology An Introduction, Replika press Pvt.NewDelhi.
8. S. S. Purohit, H.N. Kakrani, A.K. Saluja, Pharmaceutical Biotechnology (2006). Student edition, Jodhpur.
9. U. Satyanarayana, Biotechnology (2013). Books and Allied (P) Ltd, Kolkata.

SEMESTER – I			
ELECTIVE – I COMPUTERS AND BIOSTATISTICS			
Code:17PMIE11	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credit: 5**

OBJECTIVES:

1. To inculcate knowledge on the basics of computers.
2. To furnish the students with the knowledge of biostatistics.

UNIT I

Introduction to Computers : Classification of computers – personal, mini, main frame and super computers, their characteristics and application, Computer generation,Compliers and Interpreters, BIT, BYTE, WORD, Computer memory and its types, Data representation and storage.

UNIT II

Hardware and software: Input, output, and secondary storage devices, central processing unit; types of software; meaning, functions and types of operating system; computer languages. Understanding computer networks: LAN, WAN and MAN -Types of topologies - transmission media.

UNIT III

Working with software packages: An introduction to PC-software packages; MS Word-working with text, tables, checking spelling and grammar, printing a document; MS Excel-working with worksheet, formulas and functions, inserting charts; MS Powerpoint presentation-working with different views and designing presentation.

UNIT IV

Introduction, population and samples – variables- collection of Data- Classification and tabulation of data- Diagrams and graphs-Measures of central tendency &Disperssion.

UNIT V

Hypothesis testing, Test of hypothesis involving one sample – Test of hypothesis involving two samples – The analysis of variance. Excel software- SPSS, STATA.

Reference Books:

1.How computers work, 2000 Ron White, Techmedia.
2.How the internet works 2000, Preston GrallaTechmedia.
3.Alexis leon& Mathews leon:Introduction to computers 2008, McGraw-Hill.
4.B.L. Juneja&A.Seth; Computer fundamentals &C Programming 2012 Cengage Learning India
5.Thomas Glover, Kevin Mitchell; An Introduction to Biostatistics
2002 bythe McGraw Hill.
6.Steve Selvin Biostatistics How it works 2004 by Pearson education.
7. Dr.N.Gurumani; An Introduction to biostatistics 2005 by MJP publisher
8. Arora P.N. Malhan P.K. Biostatistics, Delhi: Himalaya Publishing House, 1996.
Gupta C.B. An introduction to statistical methods New delhi; Vikas Publishers, 1992.
9. Palanichamy S. and ManoharanM.Statistical methods for biologists.

Casella G. and Berger R. L., Statistical Inference (The Wadsworth and Brooks / Cole Statistics / Probability Series), Brooks / Cole Pub Company.
10. Spiegel M. R., Schiller J.J., Srinivasan R. A. , A. SrinivasanSchaum's Outline of Probability and Statistics.McGraw-Hill Trade.
11.B.Thigarajan& PA Rajalakshmi;Computational biology 2009.

SEMESTER- I			
Core I - Fundamentals of Microbiology			
Course Code : 21PMIC11	**Hrs/ Week: 5**	**Hrs/ Sem: 75**	**Credits: 4**

Objectives:

To highlight the basic concepts and principles about the different aspects of microbiology and advanced level information in the subject of General Microbiology.

To enhance the students with the basic knowledge on various techniques involved in culturing microorganisms.

Course Outcome:

CO. No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	get an idea about the historical events in microbiology.	1	Kn
CO-2	know the scope of microbiology	1,2	Kn
CO-3	know parts of microscope, type and its principle	1,2	Kn
CO-4	distinguish different methods of staining techniques	3	Un
CO-5	understand various physical and chemical means of sterilization.	1,5	Un
CO-6	know various culture media and its application	4	Kn
CO-7	analyse nutritional requirements of microbes.	5,6	Ev
CO-8	understand the techniques for isolation of pure culture of microorganisms.	1,5,6	Un

SEMESTER- I			
Core I - Fundamentals of Microbiology			
Course Code: 21PMIC11	**Hrs/ Week: 5**	**Hrs/ Sem: 75**	**Credits: 4**

Unit I - Evolution of Microbiology

Contributions of Van Leeuwenhoek, Joseph Lister, Louis Pasteur, Robert Koch, Edward Jenner, Winogradsky and Beijerinck– Further developments in Microbiology **(Self Study)** – identification, characterization and classification of microorganisms – Distinguishing characteristics between prokaryotic and eukaryotic cells – Phenotypic characters – Taxonomic characters – Distinctive characters of major groups of microorganisms – Principles of classification .

Unit II - Microscopy

Microscopy – It's principles and applications in the field of microbiology including the following; Dark field, phase contrast, fluorescence microscopy, transmission and scanning electron microscopy, confocal microscopy – colorimeter, spectrophotometer and lyophilizers – Staining methods- Gram's, acid-fast, meta chromatic granules, nuclear, capsule, flagella, silver impregnation and Giemsa staining methods.

Unit III – Sterilization and Media

Methods of sterilization: Physical and chemical agents, radiation and filtration **(Self Study)** – Indicator microorganisms for sterilization methods- Cultivation of microorganisms – Microbiological media, enrichment media, enriched media, transport media, selective media and pure culture technique – Methods of preservation and maintenance of cultures – Role of disinfectants.

Unit IV - Bacterial anatomy and growth

Bacterial anatomy, structure, properties and biosynthesis of cellular components of bacteria – Sporulation and it's mechanism – Growth and nutrition – Nutritional requirements – Autotrophs – Heterotrophs – Enrichment cultures – Growth curve – Kinetics of growth – Batch culture – Synchronous growth – Measurement of growth and enumeration of cells – Techniques of pure culture.

Unit V – Microbe - Human interaction

Microbe-Human interaction: infection and disease- Resident flora- pathogenicity and virulence. Varied pattern of infection-epidemiology- infectious diseases-recognition of an infectious disease in a population- recognition of an epidemic- the infectious disease cycle-study of disease - virulence and the mode of transmission- the emergence of new disease-control of epidemics.

Books for Reference:

1. Madigan M., T., Martinko. J.M. and Parker J. Brock TD. *Biology of Microorganisms.* London: Hall International Inc. 8th Edition Prentice 1997.
2. Salle, A.J. *Fundamental Principles of Bacteriology*. New Delhi: Tata McGraw – Hill Publishing Company Ltd, 7th Edition. 1996.
3. Stainer R.Y. Ingra ham J.L. Wheelis M.L. and Painter P.R. London: *General Microbiology,* Mac Millan Education Ltd 1986.
4. Tortora, Funke, Case Addison, *Microbiology – An Introduction* –Wesley Longman Inc. 7th Edition 2001.
5. Dubey R.C. and Maheswari,S. *A Text Book of Microbiology.* New Delhi: S. Chand & Co, 2003
6. Talaro K.P. and Talaro.A. *Foundations in Microbiology*. New York: WCP McGraw – Hill, 1999
7. Dubey and Maheshwari.. *A text book of Biotechnology*. Chand publications, 2006
8. Jeffrey C. Pommerville., *Alcamo's Fundamentals of Microbiology* Jones & Bartlett learning 9th edition, 2010.
9. Prescott L.M. Harley J.P. and Klein D.A *Microbiology* New York: McGraw Hill, 7th Edition, 2008.
10. Pelzar Jr. M.J.Chan E.C.S. and Kreig N.R. *Microbiology* – New York: McGraw Hill, Inc 1993.

SEMESTER I			
Core – II Microbial Diversity and Classification			
Course Code : 21PMIC12	**Hrs/ Week: 5**	**Hrs/ Sem: 75**	**Credits: 4**

Objectives:

To understand about the evolution of organisms on earth and variability among living organisms.

To study about the microbial population and its habitat and about microbial communities which are excellent models for understanding biological interactions and evolutionary history.

Course Outcome:

C O No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	understand the ubiquitous nature of microbes.	1	Un
CO -2	explain the basic concept of microbial diversity and classification.	3	Re
CO -3	discuss the knowledge about the various diversification in microorganism	4	Cr
CO -4	explain the knowledge of reproduction in microbes	5	Un
CO- 5	describe genetic characters of microbes.	5	Un
CO -6	understand the general classification of microbes	4	Un
CO -7	explain the characters of protozoa	4	Un
CO -8	understand the characters of arthropod vectors	3	Un

SEMESTER I			
Core – II Microbial Diversity and Classification			
Course Code : 21PMIC12	**Hrs/ Week: 5**	**Hrs/ Sem: 75**	**Credits: 4**

Unit I: Biodiversity and Classification

Classification of microorganisms – Introduction – Haeckel's three kingdom concept – Whittaker' five kingdom concept – Three domain concept of Carl Woese basis of microbial classification, Salient features of bacteria according to Bergey's manual of determinative bacteriology. Identification of Microorganisms –phenotypic classification, phylogenetic classification, genotypic classification, taxonomic ranks – Techniques for determining microbial taxonomy & phylogeny: Classical & molecular characteristics - Genetic relationship - DNA homology -16S r RNA sequencing.

Unit II: Bacteria

General characters, Classification, nomenclature and properties. Structure and characteristics: Gram positive cocci– *Staphylococci, Streptococci*. Gram negative cocci– *Gonococci*. Gram positive non spore forming bacilli: aerobic – *Corynebacteria* and anaerobic- *Actinomyces*. Gram positive spore forming bacilli: aerobic- *Bacillus anthracis* and anaerobic *Clostridia.*

Unit III: Fungi and Algae

General characters, Morphology, taxonomy and classification, structure and cell differentiation of *Aspergillus sp, Candida sp, Agaricus sp*. Mycorrhiza – Ectomycorrhizae, Endomycorrhizae, Vesicular Arbuscular Mycorrhizae. Algae: Distribution, general characters, thallus and its structure, classification, nutrition and reproduction – Characters of selected groups – Blue green algae, Euglenophyta, Chrysophyta, Phaeophyta and Rhodophyta – Economic importance of algal biotechnology.

Unit IV: Virus

Classification, nomenclature and properties. Structure and characteristics of Plant virus (CaMV ,TMV) Animal virus (Adeno virus, HIV, Rhabdo virus) Insect virus (NPV,CPV) Brief outline on virion and Prions.

Unit V: Protozoa

Distinguishing characters, classification, host-parasite relationship, pathogenic mechanism, transmission, life cycle, lab diagnosis, treatment for the following: *Entamoeba sp, Leishmania sp, Giardia sp and Trichomonas sp*. Helminthes: Classification, lifecycle, pathogenesis, transmission, lab diagnosis treatment for Cestodes (*Taenia solium*) – Nematodes (*Ascaris lumbricoides*) – Arthropod vectors: Tick and mosquitoes.

Books for Reference:

1. Prescott L.M., Harley J.P., and Klein D.A *Microbiology* New York: Mc Graw Hill, 7th Edition, 2008.
2. Madigan M.T. Martinko. J.M. Parker .J. and brock T.D. London: *Biology of Microorganisms*.. Prentice Hall International Inc, 8th Edition, 1997.
3. Alexopoulos, C.J., and Mims, C.W. New York. *IntroductoryMycology*,Wiley, 1979.
4. Stainer R.Y., In graham J.L., wheelis M.L., and Painter P.R. London: *General Microbiology*, Macmillan Education Lt., 1986.
5. Starr, M.P., Stolp, H., Truper, H.C.Balows, A., and Schlegel, H.C. *The Prokaryotes.A Hand Book of Habitats, Isolation and Identification of Bacteria.* Springer Verleg. 1991.
6. Tortora, Funke, and Case Addison *Microbiology - An Introduction* – Wesley Longman Inc 7th Edition, 2001.
7. JohnL.Ingraham and Catherine A. Ingrahani *Introduction to Microbiology*. , UK: Books/Cole Thompson Learning, 2000.
8. Talaro. K.P. and A.Talaro. *Foundations in Microbiology*. New York: WCP McGraw-Hill, 1999.
9. Jagadish Chandar. *A Text Book of Medical Mycology.* New Delhi: Inter Print. 1996
10. Powar C.B and Daginawala H.F *General Microbiology, Volume I & II,* Mumbai Himalaya Publishing House, 8th Edition, 2005.
11. Dubey. R.C. and Maheswari, S. *A Text Book of Microbiology* – New Delhi: Chand & Co, 2000.
12. Pelczar Jr. M.J., Chan E.C.S., and Kreig N.R. *Microbiology* – New York: McGraw Hill, Inc., 1993.
13. Salle, A.J. *Fundamental Principles of Bacteriology*. New Delhi.. Tata McGraw- Hill Publishing Company Ltd., 7th edition. 1996.
14. Holt, J.S. Kreig, N.R., Sneath, P.H.A. and Williams, S.T.. *Bergey's Manual of Determinative Bacteriology.*– Balimore: Williams & Wilkins, 9th edition 1994.

SEMESTER I			
Core III- Biochemistry			
Course Code : 21PMIC13	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives:

To be recognized as a centre for excellence in biochemistry that provide an atmosphere to acquire skills in identifying the link between biological and human resources and transform it to enhance the quality of life

To enhance the students with a broad-based knowledge in concepts and principles of biochemistry.

Course Outcome :

CO No	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	compare and contrast the structure, classification and function of the carbohydrates.	1,2	Un, Kn
CO-2	understand the structure, classification and function of lipids.	1,3	Un
CO-3	compare and contrast saturated, mono-saturated and poly-saturated fatty acids.	1	Kn
CO-4	know the structure and classification of proteins	5	Kn
CO-5	know the classification and properties of amino acids.	5	Kn
CO-6	recognize the importance of nucleic acids and its role.	6	Un
CO-7	know the dna, rna structure, function, types and importance	6	Kn
CO-8	understand the functions of enzymes, coenzymes and cofactors	5,6	Un

SEMESTER I			
Core III- Biochemistry			
Course Code : 21PMIC13	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I - Nucleic acid

Nucleic acid- structure of nitrogen bases and base pairing, structure of nucleosides, nucleotides, Ribose, Deoxyribose sugar. DNA, RNA structure, function, types and importance.

Unit II - Proteins

Proteins- classification, structure of primary, secondary, tertiary and quarternary protein, classification of amino acids, properties, peptide bond, formation and types

Unit III - Enzymes

Enzymes- concept, definition, nature, active site, properties, classification, physico-chemical properties. Factors affecting the enzyme synthesis and activity. Allosterism – Determination of Michaelis Menten constant – Factors affecting Km Value – Mode of Enzyme action (Lock and Key model and Induced fit model)- coenzymes – Cofactors – Isozymes and Inhibitors.

Unit IV - Carbohydrates

Carbohydrates- definition and classification- properties- optical and chemical structure of glucose, ring structure, Haworth and Fischer's projection, pyranose, furanose isomers, mutarotation, triose, pentose, hexose, heptose,- examples and structures, derived monosaccharide, glycosides, furanoacids, sugar, phosphates, uronic acids, sugar alcohol, disaccharides, glycosidic linkage, lactose, maltose, sucrose, oligosaccharide, trisaccharides, structure of raffinose- polysaccharide- homo polysaccharide, hetero polysaccharide structure, starch, cellulose, mucopolysaccharide,and biological significance.

Unit V - Lipids

Lipids- classification, chemistry of fatty acids- unsaturated, saturated fatty acids, triglycerides, saponification, sterols, cholesterol, prostaglandins, glycolipids and function of lipids.

Books for Reference :

1. Stryer,L.. *Biochemistry.* Newyork: Ed.W.H. Freeman and company, 1995.
2. J.L.Jain, *Fundamental of Biochemistry*- New Delhi: S.Chand & company Ltd,, 1999.
3. A.C.Deb *Concepts of Biochemistry.* Kolkata Books and Allied (P) Ltd. 7th Edition, 1999.
4. Hubert, Styer,. *Biochemistry*– Newyork: Freeman and Company, 1995.
5. Lehninger,. *Principle of Biochemistry.* by Nelson and Cox (Worth) 3rd edition, 2009
6. A.C.Deb. *Concepts of Biochemistry.* Kolkata: Books and Allied (P) Ltd., thEdition, 1999

SEMESTER – I			
Core – IV Microbial Physiology			
Course Code : 21PMIC14	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Objectives:

To give the students knowledge about the physiological processes of micro organisms.

To impart advanced level information in the subject of microbial physiology.

Course outcome:

CO No	Upon completion of this course students will be able to	PSO addressed	CL
CO -1	illustrate the basic knowledge about the microbial physiology fuctions and its various metabolism	3	Re
CO - 2	define various components of electron transport chain and their functions.	4,3	Re
CO -3	elaborate the bacterial growth curve and the measurement of their cell growth	4	Cr
CO - 4	explain the various bacterial transport mechanisms and their secretion system	2	Un
CO - 5	discuss about various electron transport takes place under aerobic and anaerobic condition.	1,3	Cr
CO- 6	interpret the list of fermentation mechanisms for atp regeneration.	7	Un
CO -7	prioritize various aerobic and anaerobic phototrophic bacteria with examples	1,2	E v
CO - 8	know about various pigments of the photosynthetic apparatus and learn about photosynthesis in *halobacteria* bioluminescence.	2,6	K n

SEMESTER – I			
Core – IV Microbial Physiology			
Course Code : 21PMIC14	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I – Respiration and its related pathways

Definition, terminology – types - specific functions and general pattern of metabolism - anabolism Vs catabolism - metabolic pathways - linear, irreversible and branched metabolic pathways. Aerobic respiration – glycolysis - TCA cycle, gluconeogenesis and Calvin-Benson cycle.

Unit II – Microbial growth and transport

Microbial growth- Growth curve of bacteria- Measurement of cell growth - factors affecting microbial growth: physical, chemical and biological

Bacterial Transport: Simple, passive, active transport: Symport and Antiport and Group translocation mechanisms – Role of siderophores.

Unit III- Electron transport chain

Electron transport chain: Functions and components ; NAD, NADP, FAD, FMN, Coenzyme Q, Cytochromes, Ferredoxin and Iron Sulphur protein – Mechanism of electron movement in aerobic and anaerobic organism - Chemiosmotic theory. Substrate level phosphorylation, Oxidative phosphorylation.

Electron transport under anaerobic conditions - nitrate respiration, sulphate respiration, sulphur respiration, carbonate respiration, fumarate respiration and iron respiration.

Unit IV- Fermentation

Outline mechanisms and ATP regeneration by fermentation- alcoholic fermentation by yeasts and bacteria- ethanol formation. Lactic acid fermentation- homo-fermentation, hetero-fermentation - propionic acid fermentation - formic acid fermentation – butyric acid- butanol fermentation - homo acetate fermentation- Bioluminescence.

Unit V- Photosynthesis

Aerobic and anaerobic phototropic bacteria-purple sulphur, non-sulphur purple bacteria, green sulphur bacteria and Cyanobacteria-pigments of the photosynthetic apparatus-bacterio-chlorophylls, carotenoids and bacterirhodopsin- localization of the pigments-regulation of pigments. Anoxygenic photosynthesis-Oxygenic photosynthesis-photosynthesis in halobacteria.

Books for Reference:

1. Santhyanarayana. U.. *Essentials of Biochemistry*. Kolkata Books and Allied (P) Ltd., 1st Edition, 2002.
2. A.C.Deb. *Concepts of Biochemistry.* Kolkata: 7th Edition, Books and Allied (P)Ltd.,. 1999.
3. Prescott, Lansing M, Harley, John P, Klein Donald A, ,*Microbiology*. McGraw-Hill, New York, 1999.
4. David L. Nelson. *Lehninger Principle of Biochemistry*. .7th edition. 2017.
5. Stryer,. *Biochemistry* 5th edn W.H. Freeman. 2001.
6. Dr.J.L.Jain, Dr.Sunjay Jain and Nitin Jain, *Fundamentals of Biochemistry.* S.Chand Publisher, VI Edition. 2005.

SEMESTER – II			
Core – V Immunology			
Course Code : 21PMIC21	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Objectives:

To impact advanced level information in the study of the immune system.

To study about the various immune responses of the human system towards the pathogens.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	interpret the basic system of immune response.	1	Un
CO - 2	recall about the classification of various immune cells and their functions in elevating immune response.	4	R e
CO - 3	improve knowledge about the nature , functions and characteristics of antigen and antibodies involved in immune response.	3,2	C r
CO - 4	assess the detailed information about the mhc and hla.	4	Ev
CO - 5	illustrate various complement fixation pathways and their basic mechanisms.	6	U n
CO - 6	interpret the knowledge about various antigen and antibody reactions with their principle.	1	Un
CO - 7	improve the knowledge about various hypersensitivity reactions and transplantation immunology.	3,4	Cr
CO - 8	prioritize various applications of monoclonal antibodies and types of vaccines.	1	E v

SEMESTER – II			
Core – V Immunology			
Course Code : 21PMIC21	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit: I– Basics of Immunology

History and development of immunology - Immunity: Innate & Acquired. An over view on the cells of immune system. Organs & tissues of immune system. Clonal selection theory. Immune response: HIR & CMI. Phagocytosis.

Unit: II–Immune response and its components

Antigens and antibody – structure, types and functions. Antibody diversity: isotypes, allotypes and idiotypes. Biology of T & B cell. Major Histo compatibility Complex (MHC). Human leucocyte antigen (HLA). Complement pathways: classical, alternative.

Unit: III – Applied Immunology

Agglutination. Precipitation. Complement fixation. Immunoblotting. Immuno-fluorescence. Immunodiffusion: SRID, ODD & Immnoelectrophoresis - RIEP. Flow cytometry. Radio Immuno Assay.

Unit: IV - Clinical Immunology

Hypersensitivity - immediate & delayed type. Autoimmunity. Transplantation immunology. Tumor immunology. Immuno deficiency diseases - AIDS

Unit: V -- Immunization

Monoclonal antibody: production & applications. Vaccination: types, principle & applications. Current basic immunization schedule.

Books for Reference:

1. Stefan, H. and Kaufmann, E*Immunology of infectious diseases.* USA : ASM Press,. .2002.
2. Abbas, A.K., Lichtman, A.H. and Pober, J.S.. *Cellular and Molecular Immunology.* (2nd edition). USA: WB Saunders,. 1994
3. Humphrey, J.H, and Wite, R.G. *Immunology for students of Medicine,* (5th edition) ELBS, London: 1995.
4. Weir, D.M. *Experimental Techniques in Immunology*. London : Blackwell Scientific Publishers,. 1995.
5. Donald M. Weir and John Sterward . *Immunology* (7theditoin). ELBS, London: 1993.
6. Hue Davis.. *Introductory Immunology* (1st edition). London : Chapman and Hall Publisher,. 1997.
7. Ivan M. Roit . *Essential Immunology* – London : Blackwell Scientific.Publishers,. 1998.
8. Paul .. *Fundamental Immunology,* (2nd edition). New York: Raver Press,. 1998.

9. Peter J. Delves and Ivan M. Roit (Eds). *Encyclopedia of immunology* -(2nd edition). Academic Press. 1998.
10. Ridklad, M. Aydl . *Immunology,* (2nd edition), Baltimore, Hong Kong, NMS Publication. 1995.
11. Roit, J.M., Brostaff, J.J and male, D.K. . *Immunology* (4th edition). C.V. Mosby Publisher, St. Loius. 1996.
12. Stewart Sell.. *Immunology, immunopathology and immunity.* (6th edition). USA: ASM Press,. 2001
13. Rajan, S.. *Medical microbiology*, Chennai : MJP Publishers,. 2007
14. Fathimunisa Begum.. *Monoclonal antibodies: The hopeful drugs.* Chennai: MJP Publishers,. 2008
15. Kannan, I. Immunology. Chennai: MJP Publishers, 2007.
16. Ananthanrayanan, R., and Panicker, J. *Text Book of Microbiology*. Orient longmans. 2000.

SEMESTER-II			
Core-VI Medical Microbiology			
Course Code: 21PMIC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Objectives:

A centre of excellence for training and research in medical microbiology.

To train quality healthcare professionals carry out creative innovative and inventive research and provide reliable diagnostic services in the field of medical microbiology.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	recall the clinical microbiology concept to patient care	1	Re
CO -2	analyse the level information in the subject of medical microbiology	6	An
CO -3	illustrate the different classes of microbes	3	Un
CO -4	describe the applied microbiology aspects of clinical technique**.**	1	Un
CO- 5	describe the role of chemotherapic technique	4	Un
CO -6	explain the drug resistance capacity of microbes	4	Un
CO -7	outline the concepts of chemotherapy and its mode of action	4	Un
CO -8	explain the knowledge of mycology and parasitology	5	Un

SEMESTER-II			
Core-VI Medical Microbiology			
Course Code: 21PMIC22	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits:4**

Unit-I : Infection and transmission

Microbial diseases - sources, route of transmission. Pathogenesis - adhesion, invasion, host cell damage, release of pathogens. Microbial virulence and virulence factors - Signs and symptoms of microbial diseases. Treatment, Prevention and control of microbial infections. Immunity of microbial diseases. Diagnosis of microbial diseases - Collection, transport, preliminary processing of clinical pathogens.

Unit- II: Bacterial diseases

Characteristics, classification, pathogenesis, pathology, diagnosis, treatment, prevention and control of diseases caused by *Staphylococci, Bacillus, Clostridium, Corynebacterium, Salmonella, Klebsiella, Vibrio, Pseudomonas, Mycobacteria.*

Unit- III: Viral diseases

Etiology, Clinical symptoms, laboratory diagnosis and treatment-Pox virus(small pox,)-Herpes virus-(HSVI&II), Orthomyxovirus (Infleunza virus, Swine Flu) - Paramyxovirus (Measles and Mumps), Enterovirus (Poliovirus), Arbovirus- (Chikungunga virus, Dengue, rubella), Hepatitis virus(HAV, HBV, HCV, HDV), HIV,SARS.

Unit-IV: Mycology and Parasitology

Human mycotic infections caused by Dermatophytes*, Histoplasma, Cryptococcus, Candida,* opportunistic mycoses. Medical importance of *Entamoeba, Giardia, Taenia, Ascaris*, Laboratory techniques in parasitology.

Unit-V: Antimicrobial agents

Classification of antimicrobial agents, Mechanism of drug action –antibacterial (Bacteriostatic and bactericidal) antifungal and antiprotozoans. Methods of testing drug sensitivity (*in vitro* and *in vivo*), antibiotic assay in body fluids. Mechanism of drug resistance and dissemination of multi drug resistance. Probiotics as therapeutic agents.

Books for Reference:

1. Chaechter M. Medoff G. and Eisenstein BC. *Mechanism of Microbial Diseases* 2nd edition. Baltimore: Williams and Wilkins,. 1993.
2. David Greenwood, Richard CD, Slack, John Forrest Peutherer. *Medical Microbiology*. 14th edition. ELBS with Churchill Livingstone. 1992.
3. Hugo WB and Russell AD. *Pharmaceutical Microbiology* 4th edition. Oxford : Blackwell Scientific Publication,. 1989.

4. Joan Stokes E, Ridgway GL and Wren MWD. *Clinical Microbiology*, 7th edition. Edward Arnold. A division of Hodder and Stoughton. 1993.
5. Ronald M. Atlas. *Microbiology. Fundamentals and Applications*. 2nd edition, Maxwell Macmillan international editions. 1989.
6. Topley and Wilsons's. *Principles of Bacteriology, Virology and Immunity,* London: 8th edition, Vol. III Bacterial Diseases, Edward Arnold,. 1990.
7. Connie R Mahon. *Textbook of Diagnostic Microbiology*. 3rd edition. Pearson. 2010.
8. Fritz H. Kayser. *Medical microbiology*. Thieme Verlag. 2005.
9. Credric, A. Mims. *Medical microbiology*. 3rd edition. Moshy Inc. 2004.
10. Frank, Steven A. *Immunology and Evolution of Infectious Disease*. Princeton University Press. 2002.

Web References:

1. http://dmoz.org/Science/Biology/Microbiology/
2. http://microbiology.mtsinai.on.ca/manual/default.asp
3. http://cal.vet.upenn.edu/parasite/links.html
4. http.www.suite101.com/links.cfm/microbiology
5. http://www.biosci.ohio-state.edu/-zoology/parasite/home.html

SEMESTER – II			
Core –VII Microbial Genetics and Molecular Biology			
Course Code: 21PMIC23	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Objectives:

To make the students knowledgeable in the field of Microbial Genetics and Molecular Biology.

To make the students aware of the concepts of Microbial Genetics and Molecular Biology.

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	relate the genetics of microorganisms	1	Re
CO-2	recall the molecular mechanisms of microorganisms	1	Re
CO-3	explain all important topics to prepare for competitive exams	5	Un
CO-4	examine the history of molecular biology	2	An
CO-5	analyse about nucleic acids, their damage and repair mechanism	6	An
CO-6	compare all gene transfer methods	2	Ev
CO-7	interpret the central dogma of molecular biology	1	Un
CO-8	agree the concept of mutation	2	Ev

SEMESTER – II			
Core –VII Microbial Genetics and Molecular Biology			
Course Code: 21PMIC23	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Unit I: DNA-The Genetic Engineering

Historical aspects and current concepts of Molecular Biology - Experimental evidence for Nucleic acids as genetic information carriers - DNA features: Superhelicity, linking number, topological properties – Melting of DNA - DNA replication: General principles, Experimental proof for modes of replication, proof reading – Enzymology of DNA replication.

Unit II: DNA Damage and Repair

Relationships between replication and cell cycle- Inhibitors of DNA replication (Blocking precursor synthesis, nucleotide polymerization and altering DNA structure),- DNA damage and repair – Types of DNA damage (Dimeration, oxidative damage, alkylation pyrimidine dimers) – Repair pathways : Methyl directed very short patch repair, nucleotide excision repair, base excision repair, recombinational repair and SOS repair.

Unit III: Central Dogma of Molecular Biology

Transcription in Prokaryotes - General principles, basic apparatus, types of RNA polymerases, steps in initiation, elongation and termination, inhibitors of RNA synthesis – Polycistronic and monocistronic RNAs – Control of transcription by RNA polymerases, promoter regions, sigma factors – Controlled termination: Attenuation and anti – termination– Protein synthesis: Steps, details of initiation elongation and termination, role of various factors, inhibitors – Signal hypothesis.

Regulation of gene expression: Operation concept, catabolite repression, instability of bacterial RNA, negative regulation *(E.coli,* lac operon), Positive regulation (*E.coli* ara operon) – Regulation by attenuation (trp operon). Maturation and processing of RNA: Methylation, trimming of rRNA - Capping, Poly adenylation and splicing of mRNA – Cutting and modification of tRNA.

Unit IV: Gene as a Unit of Mutation and Recombination

Mutants and mutation, mutagens, revertants, spontaneous mutation, mutant isolation, mutagenesis and it's types, suppression – Plasmids: Types, detection, transfer, replication and properties. Transposable elements – Nomenclature, classes, IS elements, Transposons – Composite structure and complex transposon structure, mechanism of transposition.

Unit V: Gene Transfer Mechanisms

Transformation modes, transformation, natural and artificial competence, DNA uptake, molecular mechanisms of transformation in *Bacillus* sp and *E.coli* recombination and genetic mapping, Bacterial conjugation – F plasmid, structure and function, origin of conjugation (Hfr and F+) Interrupted and uninterrupted mating, time map and recombination map, conjugation in *E.coli*, colicins and col factors. Transduction – Generalized and Specialized – Lambda phage and P1 Mechanism of gene transfer through lambda and P1 Phages – HFT and LFT lysate – Co transduction – Transduction mapping.

Books for Reference:

1. David Freifelder, George M. Malacinski. *Molecular Biology*. Narosa Publishing House. 1993.
2. Avinash ., Kakoli Upadhyay MolBio - *Fundamentals of Molecular Biology* . Himalaya Publishing House. 2005.
3. Satyanarayana. U. .*Biotechnnology* – Books and Allied (P) Ltd. 2013
4. Mohan P. Arora., Gurdarshan.,Sandhu. S.*Genetics*.5th edition. Himalaya Publishing House.' 2004
5. Sambamurty.A.V.S.S . *Molecular Biology*. Narosa Publishing House. 2011.
6. Veer Bala Rastogi. *Fundamentals of Molecular Biology*. India : Ane Books. 2010
7. Jeyanthi,G.P . *Molecular Biology.* Chennai: MJP Publisher, 2009
8. Raja Pandian.K., Shanthi. S. *Molecular Biology and Microbial Genetics*. PBS Book Enterprises. 2011.

SEMESTER – II			
Core VIII -Marine Microbiology			
Course Code :21PMIC24	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits:4**

Objectives:

To provide the learners with the best learning experience in Marine Microbiology by providing standard education and enabling the students to become entrepreneurs and socially responsible.

To develop young students with active and creative minds in the field of microbiology. To motivate learners to contribute to sustainable development of nation through environmental protection and social responsibility

Course Outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	describe the basic knowledge on marine ecosystem.	1	Re
CO -2	acquire the knowledge about diversity of marine ecosystem	1,2	Kn
CO-3	can analyses the aware of bio fouling and prevention.	2,3,4	Ev
CO-4	interpret the knowledge on marine microorganisms.	1,2	Ap
CO-5	determines the microbial indicator organisms.	1	Kn
CO-6	explain the concept of marine pollution	2,3,4	Co
CO-7	grasp the knowledge about bioactive compounds.	2,3,4	An
CO-8	know the wealth of the sea	2	Kn

SEMESTER – II			
Core VIII -Marine Microbiology			
Course Code :21PMIC24	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credits: 4**

Unit I : Marine Environment – Zonation and Biota

Classification of marine environment. – Plankton– classification (size, life, habitat) and adaptations. Physical properties: waves, tides, currents- types, causes, and their impact on marine organisms. light, temperature, pressure. Chemical properties: nutrients, (major, minor, and trace elements), salinity, pH, density, dissolved gases (oxygen, carbon-di-oxide).

Unit II: Marine Diversity

Ecology of coastal, shallow and deep sea microorganism - importance and their significance. Diversity of microorganism - Nutrient cycles- Role of microorganisms in carbon, nitrogen, phosphorous and sulphur cycles in the sea under different environments including mangroves.

Unit III: Marine Ecosystems

Estuaries, salt marshes, mangroves. Coral reef -– ecology and types, species interaction, adaptations and importance. Threats and conservation of coastal ecosystems (coral reef and mangroves). Actinomycetes in the mangroves and coral environment.

Unit IV: Marine Pollution

Sources, effects and control measures of heavy metal, radioactive, oil, and thermal pollutions. Microbial indicators of pollution. Role of microbes in pollution abatement, Bio fouling. Microbial biodegradation - hydrocarbon. Bioremediation of heavy metal.

Unit V :Wealth of the sea

Living resources: Fishery products- fish meal and fish oil. Phycocolloids; agar-agar and algin. Microbial diseases diagnosis and control. Marine microorganisms as a source of biomedical resources - dinoflagellates as a source of bioactive molecules - chemistry and pharmacology of marine toxins - saxitoxin -tetradotoxin.

Books for Reference:

1. Gross, G.,.*Oceanography: A view of the Earth*. 6th edition. New Jersey: Prentice Hall Inc.,. 1993

2. McCormick, J.M. and Thiruvathaakal J.V., *Elements of Oceanography.* Philadelphia: W.B. Saunders Company,. 1976.

3. Nybakken, J.W.. *Marine Biology – An Ecological Approach*. California: Addison Weslay Longman, Inc., 477pp. 1997

4. Olivia J.Fernando. *Sea water-Properties and dynamics*, Thanjavur : Dhanesh Publications, Ponnagam,. 1999.

5. Russel. *Marine Ecology*, London and New York: Academic Press-. 1970.

6. Nelson and Smith, *Oil pollution and Marine Ecology*-Plenum press. 1973.

7. Daws, C.J.. *Marine Botany.* New York : John Wiley and Sons,. 1981.

8. Austin. B, and D.A Austin. *Bacterial Fish pathogens- Diseases of Farmed and Wild Fish.* Springer Publisher. 1999.

9. Munn and Munn. *Marine Microbiology: Ecology and Applications*. BIOS Scientific publisher. 1996.

10. Rheinheimer, G., *Aquatic Microbiology-an Ecological Approach*. Blackwell Scientific Publications. 1980.

SEMESTER-III			
Core-IX- Industrial and Pharmaceutical Microbiology			
Course Code:21PMIC31	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Objectives:

1. To impart the professional ability and skill by increasing the global knowledge, Understanding and application in Industrial and Pharmaceutical Microbiology.
2. To empower the learners to address current and future challenges faced by the humanity using Industrial and Pharmaceutical Microbiology.

Course outcome:

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	revise the idea about the usage of microorganisms in the field of industrial microbiology	3	An
CO -2	analyse the knowledge of various industrial and pharmaceutical products and its impacts on the society.	4	Un
CO -3	knowledgeable in industrial fermentation	3	Un
CO -4	have an insight on industrial microbiological techniques	2	Re
CO -5	understands in the field of pharmaceutical microbiology	1	Un
CO-6	Knowledge of basics and applied microbiological aspects of industries.	1	Un
CO-7	acquire the knowledge about production of various industrial and pharmaceutical products	4,5	Un
CO-8	know the detail knowledge about antibiotics and production of hormones	2,3,4	Un, Ap

SEMESTER-III			
Core-IX- Industrial and Pharmaceutical Microbiology			
Course Code: 21PMIC31	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Unit-I- Basics of Industrial Microbiology

Historical account of microbes in industrial Microbiology; Screening, isolation, preservation and improvement of industrially important microorganisms; Strain improvement; Fermenter - principles and design - types of Fermenter, Instrumentation and control- aeration and agitation. Raw materials and media formulation for fermentation processes; Industrial Sterilization; Microbial growth kinetics in Batch, Continuous and Fed batch fermentation. Downstream processing.

Unit-II- Microbial products

Microbial production of industrially important products: Solvents (Alcohol and Acetone); Aminoacids (Glutamic acid and Lysine); Organic acids (Citric acid and Acetic acid); Enzymes (Microbial rennet, Amylase, Protease); Biopolymers (Xanthan gum and PHB); Biopreservatives (Nisin); Antibiotics - (Penicillin, Cephalosporin and Streptomycin); Vitamins (Riboflavin and Cyanocobalamin); Production of Hormones (Auxins and Gibberellins). Production of protein in bacteria and yeast (Chymosin production) – Synthetic and recombinant vaccines.

Unit-III- Bio pesticides and Bio fertilizers

Bio pesticides – history of development, production of bio pesticides from bacteria (BT), fungi (*Trichoderma viride*), virus (NPV) and their applications against different types of pathogens. Bio fertilizer – mass production of bio fertilizer (*Rhizobium*, *Azotobacte*r), quality control and field applications.

Unit-IV- Basics of Pharmaceutical Microbiology

Properties of antimicrobial agents, types of chemotherapeutic agents – Synthetic, Semi synthetic, Natural therapeutic agents. Types of antibiotics and their mode of action: antibacterial, antifungal, antiviral, antiprotozoal. Pharmaceutical Formulation (Tablets, Capsule, Oinments, Syrup, Gel), stages of pharmaceutical product development.

Unit-V- Spoilage and preservation of Pharmaceutical products

Types of spoilage, factors affecting the microbial spoilage of pharmaceutical products, sources and types of microbial contaminants, assessment of microbial contamination and spoilage. Objectives of preservation, the ideal preservative, preservative system. Antimicrobial preservatives and their properties. Preservative stability and efficacy.

Text books:

1) Dubey, R.C. *A Textbook of Biotechnol*ogy. New Delhi: S Chand and Company Limited. 4th Rev. Edition 2006.

2) Gupta, P.K. *Elements of Biotechnology.* Meerut: Rastogi Publications, 2005.

3) Jogdand, S. N. *Gene Biotechnology.* New Delhi: Himalaya publishing house. 4th Edition, 2016.

4) Reed, G Prescott and Dunn. *Industrial Microbiology.* US: Macmillan Publication. 1982.

Books for Reference:

1) Wulf Crueger. *A Text Book of Industrial Microbiology.* New Delhi: Panima Publishing Corporation. 1st edition 2000

2) Patel A.H. *Industrial Microbiology.* India: Macmillan Limited. 2017.

3) Casida L.E. *Industrial Microbiolog*y. NewYork: Eastern Limited. 1986.

SEMESTER-III			
Core-X- Genetic Engineering			
Course Code -21PMIC32	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Objectives:

1. To promote applicable genetics, bioengineering, and bio technological knowledge through education and state of the art technologies

2. Educate students for technical competence and knowledge management in different areas of Genetic engineering.

Course outcomes:

C O No	Upon completion of this course, students will be able to	PSO's Addressed	CL
CO- 1	Explain the knowledge about cloning	2	An,Un
CO -2	Perceive the applications of genetic engineering in various fields	4	Un, Re
CO- 3	Understands the hazardous and potential risk in releasing transgenic into environment	5	Un
CO -4	Create the techniques used in genetic engineering	2	An, Re
CO -5	Understands the concepts of blotting techniques and its applications	3	Un
CO -6	Discuss the cloning techniques and the production of transgenic materials	4	Un,An
CO -7	Understand the synthesis of genetically modified commercial products	4	Un
CO- 8	Make use of enzymology in genetic engineering	1	Cr

SEMESTER-III			
Core-X- Genetic Engineering			
Course Code -21PMIC32	**Hrs/Week:5**	**Hrs/Sem:75**	**Credits:4**

Unit – I: Gene cloning and vectors

Biology of vectors – Cosmids, phasmids, specialized vectors – Plant viral vectors, Animal viral vectors, Virus vectors and other plasmid vectors – Biology of host – *Escherichia coli* , *Saccharomyces cerevisiae*. Cloning strategies: Cloning of genomic DNA, cDNA cloning

Unit II: Enzymology of genetic engineering

Restriction enzymes – Types - Nomenclature – Recognition sequences – Cleavage patterns. Other enzymes used in Genetic engineering – DNA Ligase, Nuclease, Alkaline phosphatase, Kinase, Reverse transcriptase, Taq DNA polymerase, Thermal transferase, DPN1 enzyme.

Unit-III: Recombinant techniques

Blotting techniques – Southern, Northern and Western Blotting – Transformation of E.coli- PCR – types and variation- RFLP – AFLP – RAPD – SSCP and VNTR- Construction of cDNA library – Molecular mapping of genome – Genetic and physical maps.

Unit- IV: Synthesis of commercial products by Recombinant microorganisms

Antibiotics, Vitamins, Amino acids, Recombinant vaccines, Hormones, Monoclonal antibodies, Biopolymers. Genetic engineering of bio-degradative pathways – Manipulation by Transfer of plasmids and Gene alteration.

Unit – V: Cloning in plants and animals

Transgenic plant (Golden rice, Tearless onion, Colourful cauliflower, FlavrSavr Tomato) – Transgenic animal (Transgenic Fish, Transgenic Mouse, Transgenic Pig, Dolly) – GEM (Super bug) – Ethical aspects of Biotechnology

Books for Reference:

1. Burrel, M.M. *Enzymes of Molecular Biology*, Humana press. 1993.
2. Chirikjian, J.G. *Biotechnology- Theory and Techniques.*Vol.II, Jones and Burtlett Publishers. 1995.
3. Gerhardt, P., Murray, R.G., Wood, W.A., and Kreig, N.R. *Methods for General and Molecular Bacteriology*. Washington D.C: ASM Press, 1994.
4. Cafferty. Mc. J., Hoogenboom, H.R. and Chiswell, D.J. *Antibody Engineering- A Practical Approach,* Oxford University Press, 1996.
5. Lewin, B. *Genes VII*, Oxford: Oxford University Press,. 2000.
6. Murray Moo Young . *Plant Biotechnology*. Pergamon Press. 1992.
7. Radledge, C. and Kristiansen, B. *Basic Biotechnology*.2nd Edition.Cambridge University Press. 2001.
8. Das. H.K. *Text Book of Biotechnology*. New Delhi: Wiley Dreamtech India (P) Ltd., 2005.
9. Rigby. P.W.J.Ed. *Genetic Engineering*. London: 6thAcadamic press, 1987.
10. Wiseman.A. *Principles of Biotechnology*. New York: Chapman and Hall, 1983.
11. Desmond.S.T., Nicholl. *An Introduction to Genetic Engineering.* Cambridge Press. 1994.
12. Winnacker, E.L. *From Genes to Clones. Introduction to Gene technology*. New Delhi: Panima Publishing Corporation, 1st Edition. 1987.
13. Brown, T.A. *Gene Cloning – An Introduction*. Chapman and Hall, UK: 3rd Edition. 1995.
14. Glick, B.K. and Pasternik, J.J. *Molecular Biotechnology. Principles and applications of recombinant DNA.* ASM Press. 2nd Edition. 1998.
15. Mitra. *Genetic engineering*. Chennai: Published by Macmillan India Ltd., 2005.
16. Jogdand S.N . *Gene biotechnology*. Mumbai: Himalaya Publishing House, 2005.
17. Satyanarayan, *Biotechnology*. Kolkata: Books and Allied (P) Ltd., 1st edition, 2005.
18. Preeti Joshi, *Genetic engineering and its application*. Agrobios. India: 1st edition, 2002.
19. Bernad R Glick, *Molecular Biotechnology - Principles and Applications of Recombinant DNA*. Washington, D.C: ASM Press, 3rd edition, 2003.
20. Ramawat K and Shaily Goyal, *Molecular Biology and Biotechnology*. New Delhi: S.Chand and company Ltd., 1st edition, 2010.

SEMESTER –III			
Core- XI - Food and Dairy Microbiology			
Course Code : 21PMIC33	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Objectives:

To impart the advanced level knowledge in the subject of food microbiology

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	Recall the techniques in food microbiology.	1	An
CO- 2	Explain the about microorganisms important in food	2,5	Un
CO -3	Knowledge about the microbial contamination of food.	1,2,4	Un
CO- 4	knows about the techniques in food preservation and fermented foods	3,4,6	Re
CO -5	Knowledge about beneficial and harmful aspects of microbes in dairy products	2,4,5,6	Cr
CO -6	Communicate the recent techniques on good manufacturing.	2,4,5,6	Un
CO-7	Grasp the quality and safety assurance in food industry and the hazard analysis and critical control point	2,3	Re, Un
CO-8	Grasp microbial examinations in food	4,5	Un,Ap

SEMESTER –III			
Core- XI-Food and Dairy Microbiology			
Course Code : 21PMIC33	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Unit I : Introduction to Food Microbiology

Food as a substrate for microorganisms – Microorganisms important in food microbiology – Molds, yeasts and bacteria –General characteristics, classification and importance –Factors influencing microbial growth in food – Extrinsic and intrinsic factors (Nutrient content, pH, redox potential, relative humidity, temperature, gaseous atmosphere).

Unit II: Microbial contamination of foods

Microbial contamination of foods - spoilage of food by microbes in cereals and cereal products- fruits, vegetables and its dried products- Eggs and poultry – meat- fish – canned foods.

Unit III: Food Preservation

Principles of food preservation: Methods of food preservation – Aseptic handling, pasteurization of milk, refrigeration and freezing, dehydration, Radiation - UV, Smoking chemicals – organic acids, nitrates, nitrites, sulphur di oxide and sulphites. Food fermentation: Bread, Tempeh, Fermented dairy products (Kefir, Koumiss, Acidophilus milk).

Unit IV: Dairy Microbiology

Dairy Introduction – Sources of microorganisms in milk – Classification of microbes – Biochemical types, characteristics and pathology. Milk borne diseases – bacterial (Mastitis, Anthrax, Brucellosis, Diphtheria, Tetanus) and viral diseases (Food and mouth disease, Rinderpest, Cowpox, and Virus diarrhoea) in cattle's – Control measures.

Unit V: Microbiological examination of foods

Microbiological examination of foods – Estimation and examination of specific microorganisms, Bacteriological examination of milk – microbial standard and milk grading- MBRT and Resazurin method. Good manufacturing practice, hazard analysis critical control point (HACCP) concept. BIS Laboratoryservice.

Textbook:

1. FrazierW.C., and Westhoff D.C., *Food Microbiology.* New Delhi: Tata McGraw Hill Publishing Co. Ltd,. 4th edition, 2008

Books for Reference:

1. Adams M.R., and Moss M.O., *Food Microbiology*. Cambridge: The Royal Society of chemistry, 1995.
2. Atlas. R.M., *Microbiology–Fundamentals and Applications*, MacmillianPublishing Company. 1989.
3. Banwart G.J., *Basic Food Microbiology*. NewYork: Chapman & Hall. 1989.
4. Board R.C., *A modern Introduction to food Microbiology.* Oxford: Blackwell Scientific Publication,. 1983.
5. Robinson .R.K., *Dairy Microbiology*. London: Elsevier Applied Sciences, 1990.
6. Jay J.M. *Modern Food Microbiology*. New Delhi: CBS Publishers and Distributors, 1987.

SEMESTER – IV			
Core – XIII- Environmental Microbiology			
Course Code :21PMIC41	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Objectives:

1. To provide the learners with the best learning experience in Microbiology by providing standard education and enabling the students to become entrepreneurs and socially responsible.
2. Developing young students with active and creative minds in the field of microbiology enabling the students to become entrepreneur by applying the microbial technology.
3. Motivating learners to contribute to sustainable development of nation through environmental protection and social responsibility.

Course Outcome:

CO.No	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	recall the ecological groups of microbes	1	Re,
CO -2	have knowledge about the interaction between microbes and organisms at other tropic level.	1,2	Un, An
CO-3	interpret the microbiology of sewage and its treatment	2,3	Co
CO-4	explain about aero microbiology and microbial ecology	2	Un, An
CO-5	acquire basic knowledge about water purification	2	Ap
CO-6	gets knowledge about biogeochemical cycles	2,4	Co
CO-7	understanding about biodegradation.	2	Sy
CO-8	develop the application of biodegradation and bioremediation.	5	Ap, Cr

SEMESTER – IV			
Core – XIII- Environmental Microbiology			
Course Code :21PMIC41	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Unit I: Microbial Ecology

Interaction between abiotic and biotic factors in an ecosystem, ecological niche, limiting factor, concept of community, fluctuation and succession. Basic concept of food chain, food web and energy flow. Microbial symbiosis: commensalism, mutualism, parasitism and predation with examples.

Unit II: Biogeochemical cycles

Types of biogeochemical cycles: Water cycle, gaseous cycle (Oxygen, Carbon & Nitrogen), and sedimentary cycles (Sulphur & Phosphorus). Biogeochemical cycles of micronutrients.

Unit III: Aerobiology

Air space in different layers of atmosphere, bioaerosol, assessment of air quality - sedimentation, impaction impingement, suction, and filtration. Brief account of transmission of airborne microbes (Bacteria, Virus & Fungi). Microbiology of indoor and outdoor. Allergy: causes and tests for detection of allergy.

Unit IV: Aquatic Microbiology

The aquatic ecosystem (Pond)– factors governing micro flora and their distribution in natural water. Water pollution and its sources. Role of organic pollutants in water, concepts of C-BOD, N-BOD & COD. Treatment of waste water by aerobic and anaerobic processes (like trickling filter, activated sludge, oxidative pond, anaerobic digestion and chemical disinfection).

Unit V: Advancement in Bioremediation

Concept, principle and mechanism of bioremediation, factors affecting bioremediation, types of bioremediation. Bioremediation of metals with examples. Biodegradation and biotransformation of xenbiotics including pesticides, chlorinated and nitrated aromatic compounds, phenolic compounds and polycyclic aromatic compounds.

Books for Reference:

1. Atlas,R.M and Bartha.M. *Microbial Ecology –Fundamentals and applications.* California: *Benjamin – Cummings*, Mento Park, 2003.
2. SubbaRao, N.S. *Soil Microorganisms and Plant growth*. NewDelhi Oxford and IBH Publishing Co, Pvt. Ltd, 3rdEdition, 1995.
3. Gupta,S.K. *Approaches and trends in plant disease management*. India: Scientificpublishers.Jodhpur, 5th Edition, 2014.
4. Jammaluddin et al. . *Microbes and sustainable plant productivity* India*:* Jodhpur: Scientific Publishers,. 3rdEdition, 2013.
5. G.Purohit, S.S.Kothari,P.R.andMathur. *Basic and Agricultural Biotechnology*, India: Agrobotanical Publishers Bikaner. 1993.
6. Prescott, L.M., Harley, J.P. and Helin, D.A.. *Microbiology*, , New York. McGraw Hill, 5th Edition, 2008.
7. Schlegal, H.G.. *General Microbiology*, Cambridge: Cambridge Univeristy. 7th edition, 1995.
8. Prabhakaran, G. *Introduction to Soil and Agricultural Microbiology, New Delhi:* Himalaya Publishing House. 2004.
9. George N. Agrios.. *Plant Pathology*. Academic Press. 5th Edition. 2005
10. Raina M. Maier, Ian A. Pepper and Charles Gerba. *Environmental Microbiology*. Academic Press. 2nd edition. 2009.
11. Dubey, R.C. and Maheswari, D.K.. *A text book of Microbiology*, NewDelhi: S. Chand and Company Ltd, 2013.
12. Shiva Aithal, C. *Mordern approaches in Soil,Agricultural and Environmental Microbiology*. NewDelhi: Himalaya Publishers. 2010.
13. Madigan, M.T., Martinka, M., Parker, J. and Brock, T.D.. *Biology Microorganisms*, NewDelhi: Prentice Hall, 12th Edition, 2000.
14. Pelczar, M.J., Schan, E.C. and Kreig, N.R. *Microbiology – An application based approach*, NewDelhi: Tata McGraw Hill Publishing Company Limited, 5th Edition, 2010.

SEMESTER – IV			
Core – XIV- Soil and Agricultural Microbiology			
Course Code :21PMIC42	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Objectives:

1) To provide the learners with the best learning experience in Soil and agricultural Microbiology by providing standard education and enabling the students to become entrepreneurs and socially responsible.

2) To develop young students with active and creative minds in the field of microbiology

3) To enabling the students to become entrepreneur by applying the microbial technology.

4) To motivate learners to contribute to sustainable development of nation through environmental protection and social responsibility

Course Outcome:

CO.No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall the ecological groups of microbes and properties of soil	1	Re, Un
CO -2	have knowledge about the soil fertility	1,2	Un
CO-3	recall the previous basic knowledge about nitrogen fixing	1,2	Re, Co
CO-4	explain about plant microbe interaction.	2	Un
CO-5	acquire basic knowledge about important of plant microbe interaction for different layers (rhizosphere, phyllosphere)	2	Ap ,Un
CO-6	gets knowledge about recombinant microbes in agriculture.	2,4	Un, Co
CO-7	demonstrate an understanding of bio fertilizer	2	Sy
CO-8	develop the application of bio fertilizers in agricultural	5	Ap, Cr

SEMESTER – IV			
Core – XIV- Soil and Agricultural Microbiology			
Course Code :21PMIC42	**Hrs/ Week: 4**	**Hrs/ Sem: 60**	**Credit: 4**

Unit I : Microbes and soil fertility

Introduction and concepts of agricultural microbiology- soil microorganisms – bacteria (Cyanobacteria and Actinobacteria), algae, fungi, protozoans, nematodes and viruses Soil formation - Soil properties – Physical and chemical - Role of microbes in soil fertility. Soil fertility evaluation and improvement.

Unit II: Biogeochemical cycling and microbes

Biogeochemical cycles – Carbon, Phosphorus, Sulphur, Iron, Nitrogen - Symbiotic nitrogen fixation (*Rhizobium, Frankia*), non- symbiotic nitrogen fixation (*Azotobacter, Azospirillum*); Nitrogenase enzyme, *nif*genes and molecular mechanism of nitrogen fixation. Role of nodulin genes in nodule development and symbiosis. Genetic engineering of BNF.

Unit III: Plant-microbial interaction

Interrelationships between plants and microorganisms and their interactions with plants. Microbial associations in Spermosphere, Phytosphere, Rhizosphere (Mycorrhiza types and importance to agriculture) –phyllosphere (Anabaena-Azolla) -decomposition of organic Matter by microorganisms - cellulose, hemicellulose, lignin. Humus formation.

Unit IV: Plant Pathology

Plant pathogens: Bacterial – *Xanthomonas, Agrobacterium,*Fungal – *Cercospora, Pyricularia,* Viral – TMV, Bunchy top virus) Mechanisms of plant pathogenicity, symptoms of plant diseases, transmission of plant diseases. signaling events in pathogenesis and resistance to pathogens. Molecular basis of Plant disease control along with cultural practices, chemical and biological control.

Unit V: Bio fertilizers & **Bio pesticides**

Principles of mass production, Quality Control and Field applications - Bacterial bio fertilizer: *Rhizobium, Azotobacter- Azopirillum,*–Phosphobacteria. Algal biofertilizer - Blue green algae, Azolla.Fungal biofertilizers - Mycorrhizae – ecto and endo mycorrhiza. Biopesticides – Viral (NPV, CPV & GV), bacterial (*Bacillus thuringiensis*, *B. papillae* & *Pseudomonas* sp.), Fungal (*Beaveria* sp., *Metarrhizium* sp. & *Verticillium* sp.), Protozoan (*Mattesia* sp., *Nosema* sp., & *Lambornella* sp.)

Text books:

1. Dubey R.C. and Maheswari D.K.*A text book of Microbiology*.New Delhi:S. Chand and Company Ltd. Reprint, 2006.

2. Rangaswamy G and BagyarajD.J. *Agricultural Microbiology*. NewDelhi: Prentice-Hall of India Pvt Ltd.2nd edition, 2004.

Books for Reference:

1. Atlas R.M, and BarthaM. *Microbial Ecology –Fundamentals and applications.* California: Benjamin & Cummings, 2003.

2. Subba RaoN.S. *Soil Microorganisms and Plant growth*. New Delhi: Oxford and IBH Publishing Co, Pvt. Ltd, 3rd edition, 1995.

3. SahaT.K. *Ecology and Environmental Biology*. Kolkata: Books and Allied Pvt. Ltd., 2010.

4. Shiva Aithal, C. *Modern approaches in Soil, Agricultural and Environmental Microbiology*. New Delhi: Himalaya Publishers,.1st edition, 2010.

SEMESTER –IV			
Core Practical VIII - Laboratory in Applied Microbiology			
Course Code: 21PMICR8	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits:3**

Objectives:

To provide the learners with the best learning experience in Applied Microbiology by providing standard education and enabling the students to become entrepreneurs and socially responsible.

Course Outcome:

CO. No	**Upon completion of this course, students will be able to**	**PSO addressed**	**C L**
CO-1	acquire basic knowledge on preparation of vermin bed	4	Un, Ap
CO -2	explain the maintenance of vermicomposting.	4	Un, Ap
CO-3	appreciate the production of biogas from cassava tubes.	4	Ap
CO-4	grasp the knowledge about medicinal values of mushroom.	4	Un
CO-5	acquire knowledge about *spirullina* mass production	2	Ap
CO-6	knowledge about the bio gas production from organic waste.	4,2,5	Un,Ap
CO-7	have knowledge on entrepreneurship skill	2,4	Ap
CO-8	acquire detailed knowledge about production techniques through the industrial visit.	4,5	Un,Ap

SEMESTER –IV			
Core Practical VIII -Laboratory in Applied Microbiology			
Course Code: 21PMICR8	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 3**

1. Preparation of Vermi bed
2. Tissue culture - mushroom.
3. Estimate protein from mushroom.
4. Estimate carbohydrate from mushroom.
5. Estimate lipid from mushroom.
6. Mass production of the Blue-Green Alga *Spirulina.*
7. Mass production of Azolla
8. Cultivation of *Spirulina platensis* in different selective media.
9. Biogas production from Cassava tubers.
10. Biogas production from organic waste.
11. Biodegradation of dye using *Pseudomonas*
12. Isolation of biodegrading bacteria from soil
13. Preparation of bio fertilizer (Demonstration)
14. Industrial visit.

Books for Reference:

1. Satchel, J.E. *Earth worm ecology*. London: Chapman Hall, 1983.
2. Bernard Glick, Jack J. Pasternak., *Molecular Biotechnology*. Washington: ASM press 2^{nd}Edn. 2001.
3. Brown, T.A. *Gene Cloning*. USA: Chapman and Hall Publications,. 3^{rd}Edition. 1999.
4. Rajan.S.,Selvi Christy. R.*Experimental procedure in Life sciences*. Book House. 2012.
5. Cappuccino. J.G., and Sherman. N. *Microbiology – A Laboratory Manual*. NewYork: Benjamin Cummins. 1996.
6. Kannan.N. *Laboratory Manual in General Microbiology*. Palani: Palani Paramount Publication, 1996.
7. Gunasekaran.P. *Laboratory Manual in Microbiology*. New Delhi: New Age International Ltd., Publishers, 1996.

SEMESTER- III	
Self Study Course (Optional) -Probiotics	
Course Code:21PMISS1	**Credit: +2**

Objectives:

1. To provide the learners with the best learning experience in Probiotics by self study education and enabling the students to become entrepreneurs and socially responsible and to develop young students with active and creative minds in the field of microbiology.
2. To motivate learners to contribute to sustainable development of nation through environmental protection and social responsibility

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall the basic knowledge on probiotics	3	Re
CO -2	be acquainted with characteristics of probiotics	1,2	Kn
CO-3	can analyses the aware the probiotics organisms.	2,3,4	Ev
CO-4	interpret the knowledge on the roles of probiotics.	1,2	Ap
CO-5	differentiate the probiotics and prebiotics	1,2	Co
CO-6	explain the concept of mechanisms of probiotics	2,3,4	Un, Ap
CO-7	grasp the knowledge about prebiotics.	2,3	An
CO-8	know the wealth of the probiotics and prebiotic	2	Kn

SEMESTER- III	
Self Study Course (Optional) - Probiotics	
Course Code:21PMISS1	**Credit: +2**

Unit: I Introduction to Probiotics

Introduction and history of Probiotics, Probiotic microorganisms.

Unit : II Characteristics of Probiotics

Tolerance to additives, stability during storage, stability maintenance of probiotic microorganisms.

Unit: III Role of probiotics

Role of probiotics in health and disease: prevention and treatment of gasterointestinal bacterial infection treatment of chronic urinary tract infection, antitumor and cholesterol level

Unit: IV Mechanism of probiotics

Production of antimicrobial substances, modulation of immune system, alteration of intestinal bacterial metabolite action

Unit: V Prebiotics

Concept, definition, criteria, types and sources of prebiotics, prebiotics and gut microflora- Prebiotics and health benefits: mineral absorption,immune response, cancer prevention, elderly health and infant health, prebiotics infoods.

Books for Reference:

1. Salminen. S and Wright , A. V. *Lactic Acid Bacteria*, 1998.
2. Marcel Dekker Glenn R. G. Marcel R. *Handbook of Prebiotics* CRC press. 2008.
3. Lee Y K, Salminen S. *Handbook of Probiotics and Prebiotics*. A John Willey and Sons Inc.Publication. 2009.
4. SandholmT. M. Saarela M.. *Functional Dairy Products* CRC Woodhead Publishing. 2003.

SEMESTER - III			
CORE - IX NUCLEAR AND PARTICLE PHYSICS			
Code :17PPHC33	Hrs/Week: 6	Hrs/Semester: 90	Credits: 5

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	List the basic properties of atomic nuclei	PSO1	R
CO 2	Classify the different types of nuclear reactions	PSO5	U
CO 3	Categorize the different types of nuclear models and their properties	PSO6	An
CO 4	Discuss the nuclear forces and the theories related to it	PSO1	C
CO 5	Classify the types of elementary particles	PSO1	U
CO 6	Discuss the Quark theory of Nuclei	PSO1	A

Unit I:Introduction

Basic Properties of atomic nuclei -Gamow's theory of alpha decay - Fermi theory of beta decay-Shape of the beta ray spectrum-Angular momentum and parity selection rules-Parity violation-detection and properties of neutrino-Gamma decay-Multipole transitions in nuclei-Selections rules-Internal conversion-Nuclear isomerism.

Unit II:Nuclear Reactions

Pick up,break up, knock out and stripping nuclear reactions-Balance of mass and energy in nuclear reactions –Q equation-Solution of the equation- Exoergic and endoergic reactions-Compound nuclear theory-Reciprocity theorem-detailed balance-Breit Wigner one level resonance formula-Optical Model-Hot Nuclei-Statistical theory.

Unit III:Nuclear Models

Liquid drop model-Potential barrier for fission-Bohr Wheeler theory of nuclear fission-Barrier penetration-Decay probabilities for spontaneous fission-Neutron induced fission-Asymmetric fission-Energy released in fission-Fission chain reaction –Nuclear shell model-Evidences that led to the shell model-spin orbit coupling-Angular momenta and parities of nuclear ground states-Magnetic moments-Schmidt line.

Unit IV:Nuclear Forces

Ground and excited states of deuteron-Magnetic dipole and electric quadrupole moments of the deuteron-Exchange forces –Meson theory of nuclear force-Nucleon-nucleon scattering at low energy-Effective range theory-Spin dependence and charge independence of nuclear forces.

Unit V:Elementary Particles

Classification of elementary particles-Conservation laws-Classification of hadrons-SU (2) and SU (3) symmetries-baryon octet-Meson octet-Baryon decuplet - Gellmann-Okubo mass formula-Quark theory of nuclei.

Book for study:

1. D. C. Tayal, Nuclear Physics,Reprint 1985, Himalaya Publishing House.
2. M. L. Pandya and R. P. S. Yadav, Elements of Nuclear Physics, Revised Reprint 2008,Kedar Nath & Ram Nath publications, Meerut.

Unit	Book No.	Sections
I	1	1.3,1.6,1.7,1.8,5.6,6.5,7.4,7.6
	2	8.5,8.6,8.7,9.8
II	1	10.19,10.11,10.14,10.15,10.17
	2	11.2,11.10
III	1	9.3,9.4
	2	12.7,12.8
IV	1	9.4
V	1	16.2,16.4,16.20
	2	13.1,13.9,13.10,13.11

Book for Reference:

1. Irving Kaplan, Nuclear Physics, Nineteenth Reprint, Second Edition,Addision-Wesley publishing company, USA.
2. R.C. Sharma, Nuclear Physics, Sixth revised edition, K.Nath & Co Publications, Meerut.
3. V.Devanathan, Nuclear Physics, Revised Reprint 2008, Narosa Publishing,New Delhi.

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SEMESTER - IV			
CORE XII ATOMIC AND MOLECULAR SPECTROSCOPY			
Code :17PPHC42	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 4**

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Explain the structure of atoms and the origin of the observed spectra	PSO1	U
CO 2	Interpret rotational spectra, get information about molecular dimension and atomic masses	PSO4	U
CO 3	Explain pure rotational Raman spectra and understand the techniques in instrumentation	PSO3	U
CO 4	Apply knowledge of Mossbauer spectroscopy in solid state physics and nanotechnology	PSO4	A
CO 5	Assess how nuclear spins are affected by magnetic field and able to explain what happens when radio frequency radiation is observed	PSO1	E
CO 6	Discuss the techniques of ESR spectroscopy	PSO1	U

Unit I: Atomic Spectra

Introduction-Different Spectral lines of hydrogen-Origin of Atomic Spectra: Rutherford's explanation-Bohr's theory of Hydrogen Spectrum-Critical potential (excitation & ionization potentials)-vector atom model.

Electronic Spectroscopy: Structure of atoms-electronic angular momentum-The angular momentum of many –electron atoms-The Zeeman effect

Unit II: Microwave Spectroscopy

Microwave Spectroscopy: The rotation of molecules – Rotational spectra – Diatomic molecules – Polyatomic molecules –Techniques and instrumentation –Chemical analysis. Applications(Microwave oven)

Unit III:Infra-Red Spectroscopy and Raman Spectroscopy

Infra Red Spectroscopy: The vibrating diatomic molecule – The Diatomic vibrating rotator- The interactions of rotations and vibrations- The vibrations of polyatomic molecules- Techniques and instrumentations.

Raman spectroscopy: Pure rotational Raman Spectra- vibrational Raman spectra- Techniques and instrumentation.

Unit IV: Electronic Spectroscopy of Molecules and Mossbauer Spectroscopy

Vibrational coarse structure: progressions – intensity of vibrational electronic spectra: The Frank – Condon principle – Dissociation energy and Dissociation products – rotational fine structure of electronic- vibration transition.

Mossobaur Spectroscopy: Principles of Mossbauer-Applications of Mossbauer Spectroscopy

Unit V: Resonance Spectroscopy

NMR – Chemical shift – The coupling constant – Nuclear quadrupole effects – Techniques and instrumentation.

ESR – The hyperfine structure – Double resonance – Fine structure - Techniques of ESR spectroscopy.

Books for study:

1. M.K.Dutta, Atomic and Molecular Spectroscopy, Ist Edition 2010, IVY Publishing House, Delhi.

2. C.N.Banwell, Fundamentals of Molecular spectroscopy, 4th Edition, Tata McGraw hill Publishing Company, NewDelhi.

Unit	Book No.	Sections
I	1	1-4
	2	5.1,5.2,5.4,5.6
II	2	2.1-2.7
III	2	3.1,3.2,3.4,3.5,3.8,4.2,4.3,4.6
IV	2	6.1.2-6.1.5,9.1,9.2
V	2	7.2, 7.2.1 - 7.2.2,7.3.4,7.4,7.5.1,7.5.3-7.5.6

Books for Reference:

1. G.M.Barrow, Introduction to Molecular Spectroscopy, 17thprint, MGH Publishing Company.
2. Gary M.Lampman, Donald L.Pavaia, George S.Keiz, James R.Vyvyan, Spectroscopy, 4th Edition, Cengage Learning India P Ltd, Delhi.
3. G.Aruldhas, Molecular structure & Spectroscopy, Second edition,Prentice hall Private Ltd.
4. Suresh Chandra, Molecular Spectroscopy, Narosa Publishing House Ltd, Newdelhi.

SEMESTER - II			
Elective II (IDE) BIO-MEDICAL INSTRUMENTATION			
Code : 17PPHE21	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 5**

Objectives:

- To make the students acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical important.
- To know the fundamental principles of equipments those are actually in use at present day.

Unit I: Human physiological systems and transducers

Cells and their structure-resting and action potentials-design of medical instruments-Design of medical instruments-Components of the bio-medical instrument system

Electrodes: electrode potential-purpose of electrode paste-electrode material-micro electrodes-depth and needle electrodes-surface electrodes.

Transducers Types: active -magnetic induction type-piezoelectric-photovoltaic-thermo electric-passive-resistive-magnetostirctive ultrasonic-pioezoelectric ultrasonic.

Unit II: Bio-Potential Recoders

Introductions-characteristics

ECG: origin-lead configuration-recording setup-practical consideration-analysis

EEG: origin-brain waves-placement of electrodes-recording set up-analysis

EMG: recording set up-determination of conduction velocities in motor nerves

Unit III: Physiological Assist Devices and Operation Theatre Equipments

Pacemakers: energy requirements to excite heat muscle-methods of stimulation-different modes of operation:Ventricular synchronous pacemaker-Atrial synchronous pacemaker

Kidney Machine: Renal function-dialysis-hemodialysis-peritoneal dialysis

Ventilators-anesthesia machine.

Unit IV: Safety Instruments

Radiation Safety Instrumentation-Physiocological Effect due to 50 Hz current passage – Microshock and Macroshock – Electrical accidents in hospitals – Devices to protect against electrical hazards.

Unit V: Advances in Biomedical Instrumentation

Computers in medicine – Lasers in medicine – Endoscopes – cryogenic surgery – Nuclear Imaging techniques – Computer Tomography – Thermography-MRI – Biomaterials.

Book for Study:

1. Biomedical Instrumentation, Dr.M.Arumugam, Tenth reprint 2013, Anuradha publications, Chennai.

Unit	Book no.	Sections
I	1	1.2,1.5,2.2,2.32.4 -2.4.7,2.5-2.5.7.2.5.18,2.5.19
II	1	4.1,4.2,4.3-4.3.5,4.4-4.4.5,4.5-4.5.2
III	1	5.2,5.8,6.8,6.9
IV	1	9.1 – 9.6
V	1	10.1-10.6,10.7, 10.8, 10.10,10.14

SEMESTER - II			
Self study Paper I (Compulsory) Physics for Lectureship-I			
Code :17PPHSS1	**Hrs/Week: -**	**Hrs/Semester: -**	**Credits: 2**

Unit I : Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus. Linear algebra, matrices, Cayley-Hamilton Theorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier and Laplace transforms. Elements of complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

Unit II: Classical Mechanics

Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions-scattering in laboratory and Centre of mass frames. Rigid body dynamics- moment of inertia tensor. Non- inertial frames and pseudoforces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of relativity-Lorentz transformations, relativistic kinematics and mass–energy equivalence.Dynamical systems, Phase space dynamics, stability analysis. Poisson brackets and canonical transformations. Symmetry, invariance and Noether's theorem. Hamilton - Jacobi theory.

Unit III: Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magnetostatics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalar

and vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields. Dispersion relations in plasma. Lorentz invariance of Maxwell's equation. Transmission lines and wave guides. Radiation-from moving charges and dipoles and retarded potentials.

Unit IV: Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro-and macro-states. Micro-canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law.First-and second-order phase transitions. Diamagnetism, paramagnetism, and ferromagnetism. Ising model. Bose-Einstein condensation.

Unit V:Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo-and hetero-junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similarcircuits). A/D and D/A converters. Microprocessor and microcontroller basics. Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting.

Book for Study:

1. Truman’s Series UGC-CSIR JRF/NET Physical Sciences, Danika Publishing Company,New Delhi

SEMESTER - III			
Self study Paper II (Optional) Physics for Lectureship-II			
Code :17PPHSS2	**Hrs/Week: -**	**Hrs/Semester: -**	**Credits: 2**

Unit I: Mathematical Physics

Green's function. Partial differential equations (Laplace, wave and heat equations in two and three dimensions). Elements of computational techniques: root of functions, interpolation, extrapolation, integration by trapezoid and Simpson's rule, Solution of first order differential equation using Runge-Kutta method. Finite difference methods. Tensors. Introductory group theory: SU(2), O(3).

Unit II :Quantum Mechanics

Wave-particle duality. Schrödinger equation (time- dependent and time independent). Eigenvalue problems (particle in a box, harmonic oscillator, etc.). Tunneling through a barrier. Wave-function in coordinate and momentum representations. Commutators and Heisenberg uncertainty principle. Dirac
notation for state vectors. Motion in a central potential: orbital angular momentum, angular momentum algebra, spin, addition of angular momenta; Hydrogen atom. Stern-Gerlach experiment. Time-independent perturbation theory and applications. Variational method. Time dependent perturbation
theory and Fermi's golden rule, selection rules. Identical particles, Pauli exclusion principle, spin-statistics connection.Spin-orbit coupling, fine structure. WKB approximation. Elementary theory of scattering: phase shifts, partial waves, Born approximation. Relativistic quantum mechanics: Klein-Gordon and Dirac equations. Semi-classical theory of radiation.

Unit III: Atomic & Molecular Physics

Quantum states of an electron in an atom. Electron spin. Spectrum of helium and alkali atom. Relativistic corrections for energy levels of hydrogen atom, hyperfine structure and isotopic shift, width of spectrum lines, LS & JJ couplings. Zeeman, Paschen-Bach & Stark effects. Electron spin resonance. Nuclear magnetic resonance, chemicalshift. Frank-Condon principle. Born-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules. Lasers: spontaneous and stimulated emission, Einstein A & B coefficients. Optical pumping, population inversion, rate equation. Modes of resonators and coherence length.

Unit IV: Condensed Matter Physics

Bravais lattices. Reciprocal lattice. Diffraction and the structure factor. Bonding of solids. Elastic properties, phonons, lattice specific heat. Free electron theory and electronic specific heat. Response and relaxation phenomena. Drude model of electrical and thermal conductivity. Hall effect and thermoelectric power. Electron motion in a periodic potential, band theory of solids: metals, insulators and semiconductors. Superconductivity: type-I and type-II superconductors. Josephson junctions. Superfluidity. Defects and dislocations. Ordered phases of matter: translational and orientational order, kinds of liquid crystalline order. Quasi crystals.

Unit V: Nuclear and Particle Physics

Basic nuclear properties: size, shape and charge distribution, spin and parity. Binding energy, semi-empirical mass formula, liquid drop model. Nature of the nuclear force, form of nucleon-nucleon potential, charge-independence and charge-symmetry of nuclear forces. Deuteron problem. Evidence of shell structure, single-particle shell model, its validity and limitations. Rotationalspectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. Fission and fusion. Nuclear reactions, reaction mechanism, compound nuclei and direct reactions.

Classification of fundamental forces. Elementary particles and their quantum numbers (charge, spin, parity, isospin, strangeness, etc.). Gellmann-Nishijima formula. Quark model, baryons and mesons. C, P, and T invariance. Application of symmetry arguments to particle reactions. Parity non-conservation in weak interaction. Relativistic kinematics.

Book for Study:

1. Truman's Series UGC-CSIR JRF/NET Physical Sciences, Danika Publishing Company,New Delhi

SEMESTER - I			
Core - IV	**Crystal Growth & Thin films**		
Code :19PPHC14	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 4**

Vision

To enable the study of different methods of crystal formation for various types of crystals with different symmetries and thin films along with their applications.

Mission

To introduce characterization methods, thin films and other types of materials such as polymers, ceramics & glass.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	generate an understanding of self-assembly during the process of growth	1	Un
CO - 2	apply the process skills of scientific inquiry during experimentation	4	Ap
CO - 3	understand the foundation of SEM, TEM	4	Un
CO - 4	apply the techniques of SEM and TEM to their own research projects	5	Ap
CO - 5	distinguish the differences and similarities between different deposition techniques.	1	An
CO - 6	categorize selection of deposition techniques for various applications	1	An
CO - 7	use more techniques for the preparation of crystals and thin films	4	Ap
CO - 8	recognise appropriate material for the fabrication of a device	4	Un

SEMESTER - I			
Core - IV	**Crystal Growth & Thin films**		
Code :19PPHC14	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 4**

Unit I: Introduction

Crystal growth – significance of Single crystals - crystal growth techniques – chemical physics of crystal growth. Nucleation – Theories of nucleation - classical theory of nucleation – Heterogeneous nucleation.

Unit II: Growth Techniques

Solution growth: Low temperature solution growth – crystal growth system – High temperature solution growth. Gel growth: various types of gel – Experimental procedure.

Unit III: Characterization Technique

Diffraction analysis – X-ray diffraction- electron & neutron diffraction - TEM, instrumental details - SEM – AFM. Microhardness (Nano hardness) – Classification of hardness test – Vickers hardness test – Knoop hardness test.

Unit IV: Thin film

Preparation of thin films: thermal evaporation- flash evaporation -electron gun beam method – cathodic sputtering- chemical vapour deposition. Thickness measurements – ellipsometry – interferometry.

Unit V: Technological application of thin film

Thermistor-varistor-strain gauge element-capacitor - active devices-microelectronics, IC and other applications

Text Books:

1. Dr.P. SanthanaRagavan and P.Ramasamy,Crystal growth processes and methods.
2. V.Rajendran, Material Science, Mcgraw hill, First reprint 2012, New Delhi.
3. A.Goswami, Thin film fundamentals, First Edition 1996, New age international, (p), Ltd. New Delhi.

Unit	Book No.	Section
I	1	1.1, 1.2, 1.4, 1.5, 2.2, 2.2.1- 2.2.3
II	1	4.1, 4.2, 4.8, 5.4.3, 5.4.6
III	2	3.3, 3.19, 3.4.3, 3.11, 3.10, 3.18, 3.13, 3.14, 3.15.1,3.15.2
IV	3	4.1, 4.2, 5, 7, 9.2.2, 9.2.3
V	3	3.1, 3.2, 3.3, 4, 6, 7

Books for Reference:

1. J.C.Brice, Crystal growth processes
2. B.R.Pamplin, Crystal growth, second edition
3. D.T.J.Hurle , Crystal pulling from melt
4. V.Raghavan, Material science & Engineering – A first course
5. William D.Callister,Jr., Martial science & Engineering an introduction ,V edition.

SEMESTER – II			
Core VII	**Nanoscience and Technology**		
Code : 19PPHC21	**Hrs / Week : 5**	**Hrs / Semester : 75**	**Credits : 4**

Vision

To synthesize the nanomaterial by eco-friendly methods, characterize the synthesized nanomaterials and apply in different fields for the welfare of society.

Mission

To introduce and give an insight into the fascinating area of Nanoscience.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO - 1	recall a thorough knowledge of basic underline disciplines of nanoscience and nanotechnology	4	Re
CO - 2	explain the preparation, characterization and properties of nanomaterials	6	Un
CO - 3	analyze the types and properties of carbon nanotubes	1	An
CO - 4	assimilate existing and new concepts, methodology and researches and apply them in their academic research environment	7	Ev
CO - 5	aware of challenges, risks and promises of nano technological development	6	An
CO - 6	synthesise the nanomaterials by physical, chemical and biological methods and evaluate their properties.	6	Ev
CO - 7	characterise the synthesized nanomaterials by various techniques.	5	Ev
CO - 8	apply the nanomaterials in energy storage, food and in day-to-day life.	8	Ap

SEMESTER – II			
Core VII	**Nanoscience and Technology**		
Code : 19PPHC21	**Hrs / Week : 5**	**Hrs / Semester : 75**	**Credits : 4**

Unit I- Synthesis and Characterization of Nanoparticles

History of Nanotechnology- Nano structures - Synthesis of oxide nano particles-Synthesis of metallic nano particles - Synthesis of semiconductor nanoparticles - Aerosol synthesis- Structural characterization (X-Ray Diffraction, Scanning Tunneling Microscopy, Atomic Force Microscopy).

Unit II- Carbon nanotube

Carbon nanotube - Carbon allotropes (Diamond ,Graphite, Carbon nanotubes) - Types of Carbon nanotubes – Graphene sheet to single walled nanotube - Synthesis of carbon nanotubes(Electric arc - Discharge method, Laser method, Fluidised bed CVD method, Solar production of Carbon nanotubes) - Purification and properties of Carbon nanotubes.

Unit III-Quantum well, Quantum wire and Quantum dots

Introduction - preparation of Quantum nanostructures - Fermi gas and Density of states – Calculation of the density of states in 1,2 and 3 dimension- Infrared detector -Quantum wire (Production ,Structure, Use), Quantum dot - Application of Quantum dots – Quantum dot information storage, Infrared photodetectors, Lasers.

Unit IV-Magneto electronics

Magneto electronics **:**Nano crystalline soft magnetic materials-Permanent magnetic materials-Theoritical background-Super para magnetism-Coulomb blockade-Single electron transistor-Spintronics-Giant magneto resistance-Quantum Hall Effect-fractional Quantum Hall Effect .

Unit V- Applications of Nanotechnology

Applications of Nanotechnology:Chemistry and Environment - Energy applications of Nanotechnology -Information and Communication- Heavy industry - Consumer goods - Nano medicine - medical applications of molecular nanotechnology (Nanorobots, Cell repair machines, nanonephrology)

Text Book:

1. Nano Physics, Dr.Sr.GeraldinJayam

Unit	Book no.	Section5,1.7,1.9
I	1	1.1-1.5,1.7,1.9
II	1	2.1,2.2,2.3,2.4,2.6-2.6.1,2.6.2,2.6.5
III	1	4.1-4.5,4.8,4.9,4.12
IV	1	5.1-5.6,5.9,5.10
V	1	5.14,5.15

Books for Reference:

1. Shanmugam S, Nanotechnology, MJP Publishers, Chennai, 2011.
2. Parthasarathy. B.K, Nanostructure and Nanomaterials, Isha Books, Delhi, 2007.
3. Uday Kumar, Concepts in Nanochemistry, Anmol Publications Pvt. Ltd, New Delhi, 2013.
4. Bandyopadhyay A K, Nano Materials, New Age International Publishers, 2nd Edn, 2012.
5. Viswanathan B, Nano Materials, Narosa Publishing House, New Delhi, 2013.

SEMESTER - II			
CORE VI THERMODYNAMICS AND STATISTICAL MECHANICS			
Code : 21PPHC23	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits:5**

Objectives:

- Enable the students to understand different ensembles
- Make them to understand different microscopic system

Course Outcomes:

CO No.	**Upon completion of this course, students will be able to**	**PSOs addressed**	**CL**
CO 1	Understand working knowledge of the zeroth, first, second and third law of thermodynamics	1	Un
CO 2	Apply statistics in different systems containing atoms and molecules	2	Ap
CO 3	Inspect the partition function for the microcanonical, canonical, grand canonical ensemble	1	An
CO 4	Recall the loss of thermodynamics and equipartition theorem from the statistical description using microstates	1	Re
CO 5	Assess about phase transitions and black body radiation	5	Ev
CO 6	Apply energy changes in chemical reaction using the first law of thermodynamics	2	Ap
CO 7	Estimate the Statistical properties of Random Walks and fluctuations in ensembles	1	Cr
CO 8	Determine the physical properties of the system using various correlation functions in Ising Model	6	Ev

SEMESTER - II			
CORE VI THERMODYNAMICS AND STATISTICAL MECHANICS			
Code : 21PPHC23	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits:5**

UNIT I: Thermodynamics

Thermodynamics –System and its surroundings- Zeroth, First, Second and Third law of thermodynamics-applications-Reversible and irreversible process-heat engines-Kelvin Planck statement of the second law – Entropy –change of entropy in a reversible & irreversible process-Joule Thompson expansion– Maxwell's thermodynamic relations – Thermodynamic potentials – Chemical potential and Gibbs Duhem equation

UNIT II: Thermodynamics of Magnetism

Chemical potential – phase equilibrium and the phase rule-dependence of vapour pressure on total pressure-surface tension- vapour pressure of a liquid drop – The Reversible voltaic cell- black body radiation- Thermodynamics of magnetism.

UNIT III: Basis of Statistical Mechanics

Phase space – Ensemble – Liouville theorem – Conservation of extension in phase – Equation of motion – Equal a priori probability – Statistical Equilibrium – Micro canonical Ensemble – Quantisation of Phase space – Symmetry of wave functions – Effect of symmetry of counting – Various distributions using micro canonical ensemble.

UNIT IV: Ensemble & Statistical Thermodynamics

Gibbs paradox – Sackur- Tetrode equation – Entropy of a system in contact with a heat reservoir- Ideal gas in canonical ensemble – Grand canonical ensemble – Ideal gas in grand canonical ensemble – Comparison of various ensembles – Quantum distributions using other ensembles Macro states and microstates – Bose-Einstein distribution function – Fermi-Dirac distribution function – Maxwell-Bolltzman distribution function – Partition function

UNIT V: Ising model and Fluctuations

Phase transitions of the second kind – Ising model – Bragg-Williams approximations – Kirkwood method-One dimensional Ising model-Fluctuations in ensembles – concentration fluctuations in quantum statistics – One dimensional random walk – Brownian motion.

Text Books:

1. Dass V N. *Heat and thermodynamic.*Delhi: Dominant Publishers. 1st Edition 2005.
2. Gupta M C. *Statistical Thermodynamics.* New Delhi: New Age International P Ltd. Reprint 2009.
3. Sears Salinger. *Thermodynamics, Kinetic Theory and Statistical Thermodynamcis.* New Delhi: Narosa publishing house pvt Ltd.3rd Edition 2017.
4. Agarwal B K, Melvin Eisner. *Statistical Mechanic.* New Delhi: New age international P Ltd. Reprint 2002.

Books for reference:

1. Kerson Huang. *Statistical Mechanics.* New York: John Wiley & Sons, Inc. Second edition. 1987.
2. Dasgupta A K. *Fundamentals of Statistical Mechanics. Culcutta:* New Central Book Agency (P) Ltd. 2000.
3. Sears and Zymanski. *Statistical Mechanics.* New York: McGraw Hill Book Company.1961.
4. Federick Reif. *Fundamentals of Statistical and thermal Physics,* Singapore: McGraw Hill International Editions.1985.

SEMESTER – IV			
CORE X	**QUANTUM MECHANICS – II**		
Code: 21PPHC41	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 5**

Objectives:

- To enable students, acquire a thorough understanding about advanced quantum mechanics and their relevance in solving advanced quantum mechanical problems.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Describe time independent perturbation theory and its application to the first order Stark effect in Hydrogen atom	1	Re
CO 2	Discuss time dependent perturbation theory and transition probability	1	Un
CO 3	Derive Fermi- Golden rule	2	An
CO 4	Write the Relativistic theory in quantum mechanics	1	Cr
CO 5	Describe scattering by a square well potential using Born approximation and Partial wave analysis	1	Un
CO 6	Employ WKB approximation in quantum problems	1	Ap
CO 7	Explain Dirac's equation for a free particle	1	Ev
CO 8	Apply approximation methods to solve problems	1	Ap

SEMESTER – IV			
CORE X	**QUANTUM MECHANICS – II**		
Code: 21PPHC41	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 5**

UNIT I: Independent Quantum Approximation Methods I

Stationary perturbation theory – non-degenerate case – I and II order degenerate case-perturbed harmonic oscillator – Zeeman Effect (without electron spin) – first order stark effect in hydrogen atom – Application of variation method: ground state of helium – zero point energy of one dimensional harmonic oscillator.

UNIT II: Approximation Methods II

Application of variation method: ground state of Hydrogen atom- Deuteron problem- Vander Waals interaction- WKB Approximation – principle of the method – connection formulas of penetration of a barrier - Application of WKB method: probability of penetration of barrier – theory of alpha decay, Geiger -Nuttel law – application to bounce state – potential state.

UNIT III: Time Dependent Quantum Approximation Method & Semi-Classical Theory of Radiation

Time dependent perturbation theory – first order perturbation – Fermi Golden rule – harmonic perturbation – second order perturbation theory – absorption and induced emission– electric dipole approximation– transition probability.

UNIT IV: Scattering Theory

Scattering Cross – section– Scattering amplitude- Partial waves– Scattering by central potential– Optical theorem- Ramsaur Townsend Effect- Scattering by an attractive square well potential– Breit – Wignar formula– Scattering length– Phase Shift– Integral equation– Born approximation and its validity – Laboratory and centre of mass co – ordinate systems.

UNIT V: Relativistic Quantum Mechanics

Klein Gordon Equation– Interpretation of Klein Gordon equation– particle in a Coloumb field– Dirac's equation for a free particle– Dirac matrices– Probability density– Negative Energy states– Spin of a Dirac particle– Magnetic Moment of the electron– Spin – Orbit interaction– Radial equation for an electron in a central potential– The Hydrogen atom– Lamb Shift

Text Books:

1. L. Schiff. *Quantum Mechanics.* New Delhi: Tata Mc-Graw Hill Education Private Limited. Second reprint, 4th Edition 2019.
2. G. Aruldhas. *Quantum Mechanics.* Delhi: Prentice Hall of India Learning Private Limited.Twenty First Print,2nd Edition 2019.
3. Satya Praksh. *Advanced Quantum Mechanics*.Meerut: Kedar Nath Ram Nath Publications. 5th Edition 2021

Books for Reference:

1. P. M. Mathews and K. Venkatesan. *A Text Book of Quantum Mechanics*. NewDelhi: Tata McGraw Hill Publishing Company Limited. 16th reprint ,2nd Edition 2007
2. R. Shankar. *Principles of Quantum Mechanics.* New York: Plenum Publishers. 2nd Edition 1994.
3. J. J. Sakurai. *Modern Quantum Mechanics.* Addison- Wesley Publishing Company. Revised edition 1994.
4. S. Rajasekar and R. Velusamy. *Quantum Mechanics I: Fundamentals.* London: CRC Press. Taylor and Francis group- Boca Raton. e-book version 2015.

SEMESTER - IV			
CORE XI	**SOLID STATE PHYSICS- II**		
Code:21PPHC42	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 5**

Objectives:

- To enhance knowledge and understanding of the properties of condensed materials.

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Understand the properties of solids	1	Un
CO 2	Demonstrate the types of Polarizability	2	Ap
CO 3	Compare the magnetic properties of solid materials	1	An
CO 4	Reason the working of magnetic mirror and SQUID	1	An
CO5	Identify theproperties of insulators and ferro electricity.	1	An
CO 6	Develop the research work in the field of material science and nanotechnology	1	Cr
CO7	Solve the problems related basic crystallography.	1	Cr
CO8	Discuss the quantum theory of magnetic materials	1	Ap

SEMESTER - IV			
CORE XI	**SOLID STATE PHYSICS- II**		
Code:21PPHC42	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 5**

UNIT I: Dielectrics

Review of basic formulas – Local field of an atom – Clausius-Mossotti relation – Polarizability – Electronic Polarizability – Ionic Polarizability – Orientational Polarizability – Dipolar relaxation – Dielectric loss – Dielectric breakdown – Frequency and Temperature dependence on Polarization.

UNIT II: Superconductivity

Introduction – Properties of superconductivity – Meissner effect – Thermal properties – Type I and type II superconductors – London Equation –BCS Theory – Quantum Tunneling **–** Josephson tunneling- Applications: Magnetic mirror, SQUID, High Tc Superconductors

UNIT III: Magnetic properties of Materials

Basic terms, Formulas – Classification of Materials – Magnetic Materials -Langevin's Theory of Diamagnetism– Langevin's Theory of Paramagnetism – Quantum Theory of Paramagnetism – Ferromagnetism – Weiss Molecular Field Theory – Ferromagnetic Domains – Domain Theory – Anti Ferromagnetism – Ferri magnetism.

UNIT IV: Ferroelectrics and Piezoelectric

Ferroelectric crystals – Displacive Transition – Landau Theory of Phase Transition – Second Order Transition – First Order Transition – Ferroelectric Domain – Piezoelectricity.

UNIT V: Smart Materials

Metallic Glasses: Preparation- Properties- Applications- Shape Memory Alloys (SMA): Phases of SMA- Characteristics- Properties of Ni-Ti Alloy- Applications- Advantages and Disadvantages-Bio materials: Classifications- Applications- ceramics- Bio-polymers.

Text Books:

1. Pillai S O. *Solid State Physics.* New Age International (P) Limited. Reprint, 8th edition. 2018.
2. Charles Kittel. *Introduction to Solid State Physics*. Wiley Publications. Reprint. 2019.
3. Dr. Mani P. *Engineering Physics II.* Chennai: Shri Dhanam Publishers. 10th Edition 2016.

Books for Reference:

1. Puri R K, Babbar V K. *Solid State Physics*. New Delhi: S Chand Publications. Reprint,First Edition. 2021.
2. Palanisamy P K. *Solid State Physics.* Chennai: Scitech publications Private Ltd. Reprint. 2013.
3. Wahab M A. *Numerical Problems in Solid State Physics.* Narosa Publishing house Pvt. Ltd. Reprint.2019.
4. Ali Omar M, *Elementary Solid-State Physics Principle and Applications.* Pearson Publication. Reprint. 2019.

SEMESTER - IV			
CORE XII	**NUCLEAR AND PARTICLE PHYSICS**		
Code:21PPHC43	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits:5**

Objectives:

- To enhance the knowledge of nuclear reactor, bombs and the elementary particles
- To extend the knowledge about different nuclear models, nuclear decay, properties of nuclear forces and elementary particles.

Course Outcomes:

CO No.	**Upon completion of this course, students will be able to**	**PSOs addressed**	**CL**
CO 1	List the basic atomic properties of nuclei	1	Re
CO 2	Classify the different types of nuclear reactions	5	Un
CO 3	Examine the different types of nuclear models and their properties	6	An
CO 4	Categorize the nuclear forces and the theories related to it	1	An
CO 5	Classify the types of elementary particles	1	Ev
CO 6	Distinguish the fission and fusion	1	An
CO 7	Relate the deuteron properties and reactions	2	Ap
CO 8	Examine the origin of various terms in nuclear physics	1	An

SEMESTER - IV			
CORE XII NUCLEAR AND PARTICLE PHYSICS			
Code:21PPHC43	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits:5**

UNIT I: Theories of Decay

Gamow's theory of alpha decay - General features of beta ray spectrum - Fermi's theory of beta decay-Forms of interaction and selection rules- parity selection rules-Parity in beta decay-The neutrino (Helicity of Neutrino) - electron capture.

UNIT II: Nuclear reaction

Introduction of nuclear reaction-Conservation laws-Q value equation -Theories of nuclear reaction- Particle induced nuclear reactions-Electromagnetic radiation induced nuclear reactions-Compound Nucleus-Reciprocity theorem- Direct reactions- Theory of stripping and pick up reactions-Statistical theory of nuclear reaction.

UNIT III: Nuclear models & Nuclear Energy

Liquid drop model- The Shell model- nuclear fission- Mass and energy of Fission Fragments-Neutron emission in fission Process-Prompt and Delayed Neutrons- Spontaneous Fission- Barrier Penetration-Theory of Spontaneous Fission-The Nuclear Chain Reaction.

UNIT IV: Nuclear Forces

The Deuteron -Ground state of Deuteron -Excited states of deuteron- Meson theory of nuclear force - Nucleon-nucleon scattering - Neutron proton scattering at low energies- Spin dependence of n-p scattering- Effective range theory of n-p scattering.

UNIT V: Elementary Particles

Classification of elementary particles- Fundamental Interactions-Conservation laws- C-P-T Theorem-SU (2) and SU (3) symmetries-baryon octet-Meson Octet-Baryon decouplet - Gellmann-Okubo mass Formula-Quarks.

Text Books:

1. Pandya M L and Yadav R P S. *Elements of Nuclear Physics*.Meerut : Kedar Nath& Ram Nath publications .Revised Reprint. 2008.
2. Tayal D C. *Nuclear Physics.* Himalaya Publishing House. Reprint 1985.

Books for reference:

1. Irving Kaplan. *Nuclear Physics.* USA: Wesley publishing company. Nineteenth Reprint, Second Edition.
2. Sharma R C. *Nuclear Physics.* Meerut : KedarNath& Ram Nath publications .6th revised edition.

3.Devanathan V. *Nuclear Physic.* New Delhi: Narosa Publishing. Revised Reprint. 2008.

SEMESTER - I & II			
CORE PRACTICAL I	**ELECTRONICS**		
Code : 21PPHCR1	**Hrs/Week:- 3**	**Hrs/Semester:- 45**	**Credits:3**

(Any 12 Experiments)

1. Modulus counters 2 to 9
2. FET Characteristics
3. Construction of constant current source
4. D/A converter
5. Triangular wave and Ramp generator
6. A/D converter
7. R S , $\bar{R}$ $\bar{S}$ flip flops using NAND and NOR gates
8. JK, D and T flip flops using NAND and NOR gates.
9. JK Master Slave flip flop
10. Serial in Parallel out shift register
11. Multiplexer and Demultiplexer
12. K map simplification and implementation of basic and universal gates by SOP and POS
13. BCD adder subtractor
14. Design of asynchronous counter
15. Verification of Boolean algebra
16. SCR Characteristics and power control

SEMESTER - III			
CORE PRACTICAL - III C++, MICROPROCESSOR& MICROCONTROLLER			
Code :21PPHCR3	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 3**

C++(Any 6 Experiments)

1. The Discrete Fourier transform
2. Currents in a network
3. Area under a curve using Monte Carlo and Simpsons rule
4. RungeKutta solution to radioactive decay problem
5. Euler solution to two-dimensional motion of a particle in a gravitational field
6. Roots of a transcendental equation
7. Curve fitting to a Gaussian, an exponential function, Cauchy's constant problem to a straight line
8. Eigen value and Eigen vectors of a matrix
9. Solution of linear harmonic oscillator and anharmonic oscillator
10. Frequency response of a series/parallel LCR Resonance circuit –Evaluation of Q- factor and bandwidth

MICROPROCESSOR& MICROCONTROLLER (Any 6 Experiments)

1. A/D converter using Microprocessor
2. D/A converter using Microprocessor
3. Rolling Display using Microprocessor
4. Stepper motor control using Microprocessor
5. Addition, Subtraction, Multiplication and Division (using various address. modes)
6. Data manipulation using Microprocessor (Ascending, descending, max and min)
7. Counters using Microprocessor
8. Display of any character
9. Traffic controller
10. Voltage/Temperature measurement
11. Digital clock
12. Wave form generator 13.Frequency measurement
14. Addition, Subtraction, Multiplication, Division-Microcontroller

SEMESTER - IV			
CORE PRACTICAL IV ELECTRONICS -II			
Code:21PPHCR4	**Hrs/Week: - 6**	**Hrs/Semester: - 90**	**Credits:3**

(Any 12 Experiments)

1. OP-AMP: Basic circuits (Inverting amplifier, non-Inverting amplifier, Summing amplifier and Difference amplifier)
2. Wien's Bridge oscillator OP-AMP
3. Op-amp: I to Vconverter, V to I converterand square wave generator
4. OP-AMP parameter calculation
5. Synchronous counter using IC 7476
6. Digital comparator IC based
7. Schmitt trigger using IC 555
8. Code converter
9. Parity Checker/generator and comparator using gates
10. Op-amp: Phase shift operator
11. Op-amp: Solving I order simultaneous equations
12. Construction of a series voltage regulator using transistor
13. Construction of II order active filters (low pass,high pass and band pass) using IC 741
14. UJT Characteristics and relaxation oscillator
15. Application of Flip flop
16. Triggering circuit if SCR
17. AC power control TRIAC
18. Switching characteristics of power MOSFET

SEMESTER - II			
ELECTIVE - II A. BIO-MEDICAL INSTRUMENTATION			
Code :21PPHE21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 4**

Objectives:

- Give the students basic knowledge about different life saving machines
- Enable the students to understand the principle behind the working of these instruments

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Define resting and action potentials	1	Re
CO 2	Classify the uses of electrode paste	1	Ap
CO 3	Discuss the principle of operation of different types of transducers	1	Un
CO 4	Interpret the output of bio potential recorders such as ECG, EEG and EMG	1	Ev
CO 5	Investigate internal and external pacemakers	1	An
CO 6	Illustrate the working of different kinds of radiation monitoring instruments	1	Ap
CO 7	Recognise the importance of computers in medicine	1	Un
CO 8	Evaluate the need for various imaging techniques such as Computer Tomography, Thermography and MRI	1	Ev

SEMESTER - II			
ELECTIVE - II A. BIO-MEDICAL INSTRUMENTATION			
Code :21PPHE21	**Hrs/Week: 6**	**Hrs/Semester:90**	**Credits: 4**

UNIT I: Human physiological systems and transducers

Cells and their structure-resting and action potentials – Design of medical instruments – Components of the Bio-medical instrument system – Electrodes: electrode potential-purpose of electrode paste-electrode material-Types of electrodes – Transducers Types: active – magnetic induction type-piezoelectric-photovoltaic-thermo electric-passive-resistive

UNIT II: Bio-Potential Recorders

Introductions- characteristics- ECG: origin-lead configuration-practical consideration- analysis – EEG: origin-brain waves –analysis – EMG:recording set up-determination of conduction velocities in motor nerves

UNIT III: Physiological Assist Devices And Operation Theatre Equipments

Pacemakers: energy requirements to excite heat muscle-methods of stimulation-different modes of operation:Ventricular synchronous pacemaker-Atrial synchronous pacemaker Kidney Machine: Renal function-dialysis-hemodialysis-peritoneal dialysis – Ventilators – Anesthesia machine

UNIT IV: Safety Instruments

Radiation Safety Instrumentation-Physiocological Effect due to 50 Hz current passage – Microshock and Macroshock – Electrical accidents in hospitals – Devices to protect against electrical hazards.

UNIT V: Advances In Biomedical Instrumentation

Computers in medicine – Lasers in medicine – Endoscopes – cryogenic surgery – Nuclear Imaging techniques – Computer Tomography –MRI

Text Books:

1. Dr. Arumugam M. *Biomedical Instrumentation.* Chennai: Anuradha publications. 10th Edition 2013.

SEMESTER - II			
ELECTIVE II B. MICROPROCESSOR AND MICROCONTROLLER			
Code :21PPHE22	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 4**

Objectives:

- Enable the students to understand microprocessor and microcontroller
- Enable them to write simple programs
- Enable them to interface microprocessor and microcontroller with other simple devices

Course Outcomes:

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Understand the architectures and instruction sets of microprocessors and microcontrollers	1	Un
CO 2	Verify bus transactions, memory organisation and address decoding, basic I/O interfaces and port addressing	1	Ev
CO 3	Apply and implement learned algorithm design techniques and data structures to solve the problems	2	Ap
CO 4	Understand the interfacing of peripheral devices like I/O ports, keyboards, displays, ADCs, DACs, stepper motor	1	Un
CO 5	Analyze concepts associated with interfacing a microprocessor to memory and to I/O devices	6	An
CO 6	Estimate how to control components of a microprocessor based system through the use of interrupts	4	Cr
CO 7	Recall a microprocessor programming model at a level that enables to write assemble language programs for the processor meeting given specifications	6	Re
CO 8	Understand the popular 8051 Microcontroller ,the processor family and Time delay	1	Un

SEMESTER - II			
ELECTIVE II B. MICROPROCESSOR AND MICROCONTROLLER			
Code :21PPHE22	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 4**

UNIT I: Microprocessor Architecture and Instruction set

Intel 8085 Architecture-Instruction format-8085 programming model-instruction classification-8085Instructionset – Data transfer operations –Arithmetic instructions – Logic operations-Branch operations.

UNIT II: Microprocessor Programming & Counters and Time Delays

Writing assembly language programs-Programming techniques: Looping, Counting and Indexing –Stack-Subroutine- -8085 Interrupt-counters and time delays

UNIT III: Microprocessor Interfacing

Techniques for time delay-Basic interfacing concept-8255(PPI)-Interfacing Keyboard and Seven Segment Display- Microprocessor based stepper motor-waveform generator using ADC and DAC

UNIT IV: Microcontroller Programming

Addressing mode of microcontroller 8051-arithmetic and logical instruction-8051 assembly language programmes: addition, subtraction, division, multiplication- interfacing 8051 with LED display and keyboard.

UNIT V: Addressing Modes & Delay

Register Addressing -Direct byte addressing- Register indirect addressing-Immediate addressing-Logical Instructions-Time delay for 8051-Assembling and running an 8051 program

Text Books:

1. Ramesh Gaonkar. *Microprocessor Architecture Programming and Applications with The 8085.* India: Penram International Publishing Private Limited. Fifth edition. 2011.
2. Karuna Sagar D, *Microcontroller, 8051.* Delhi: Narosha publishing house PVT Ltd, Print.2011.
3. Dr.Godse A P. *Microprocessor and Microcontroller.* Technical Publications. Fourth Revised edition.2017.

Books for reference:

1. Aditya.P.Mathur. *Introduction to Microprocessors.* New Delhi: Tata Mc Graw Hill Education P Ltd. Third Edition.
2. Ram B and Sanjay Kumar. *Fundamental of microprocessors and micro controllers.* New Delhi: Dhanpat rai Publications (P) Ltd. seventh revised Edition.

SEMESTER – IV			
CORE	**PROJECT**		
Code :21PPHP41	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits: 6**

FORMAT FOR PREPARATION OF PROJECT REPORT FOR M.Sc. Physics

1. IDENTIFICATION OF THE PROBLEM:

Students are given the freedom of choosing the topic of the project. It may be theoretical or practical and may be from any one of the following areas.

a) Physics-Theoretical
b) Physics-Practical
c) Electronics
d) Computational Physics
e) Micro Processor
f) Interdisciplinary projects involving concepts of physics

2. ARRANGEMENT OF CONTENTS:

The sequence in which the project report material should be arranged and bound should be as follows:

Cover page and Title page
Bonafide Certificate
Abstract
Table of contents
List of Tables
List of Figures
List of Symbols, Abbreviations& Nomenclature
Chapters
Appendices
References

3. PAGE DIMENSION AND BINDING SPECIFICATIONS:

The dimension of the project report should be in A4 size. The project report should be bound using flexible cover of the thick white art paper. The cover should be printed in black letters and the text for printing should be identical.

Total number of pages should not exceed 70.

4. PREPARATION FORMAT:

Cover page & Title page-A specimen copy of the cover page &Title page of the project report are given in Appendix 1.

Bonafide Certificate –The Bonafide Certificate shall be in double line spacing using Font Style Times New Roman and Font Size 14.

The Certificate shall carry the supervisor's signature and shall be followed by the supervisor's name, academic designation (not any other responsibilities of administrative nature), department and full address of the institution where the supervisor has guided the student. The term SUPERVISOR must be typed in capital letters between the supervisor's name and academic designation.

Preface- preface should be one page synopsis of project report typed double line spacing Font Style Times New Roman and Font Size 14.

Table of contents-The table of contents should list all material it as well as any material which precedes the title page and Bonafide Certificate will not find a place among the items listed in the Table of Contents but the page numbers of which are in lower case Roman letters. One and a half spacing should be adopted for typing the matter under this head.

List of Tables- The list should use exactly the same caption as they appear above the tables in the text. One and a half spacing should be adopted for typing the matter under this head. The table should be introduced in the appropriate places in the text.

List of Figures-The list should use exactly the same captions as they appear below the figures in the text. One and a half spacing should be adopted for typing the matter under this head. The figures should be introduced in the appropriate places in the text.

List of Symbols, Abbreviation & Nomenclature- One and a half spacing should be adopted for typing the matter under this head. Standard symbols, abbreviation should be used.

Chapters-The chapters may be divided into 5 parts

1. Introduction to project
2. Literature survey
3. Method and methodology/Working/ Experimental Techniques
4. Result Analysis
5. Conclusion

1. The main text will be divided into several chapters and each chapter may be further divided into several divisions and subdivisions.
2. Each chapter should be given an appropriate title.
3. Tables and figures in the chapter should be placed in the immediate vicinity of the reference where they are cited.
4. Footnotes should be sparingly. They should be typed single space and placed directly underneath in the very Same page, which refers to the materials they annotate.

Appendices- Appendices are provided to give supplementary information, which is included in the main text may serve as a distraction and cloud the central theme

1. Appendices should be numbered using numerals, Eg. Appendix 1, Appendix2 etc.
2. Appendices tables and references appearing in the Appendices should be numbered and referred to at appropriate places just as in the case of chapters.
3. Appendices shall the title of the work reported and the same title shall be made in the contents page also.

List of references: The listing of references should be typed 4 spaces below the heading "REFERENCES "in alphabetical order in single spacing left- justified. The reference material should be listed in the alphabetical order of the first author. The name of the author / authors should be immediately followed by the year and other details.

A typical illustrative list given below relates to the citation examples coated above

REFERENCES

1. Ariponnammal, S. and Natrajan, S.(1994)'transport phenomena of SmSel – X Asx',Pramana- journal of physics vol. 42 , No.1,pp 421-425.
2. Bernard R.W and Kellogg, C. (1980)'applications of convolution operators to problems in univalent function theory ', Michigan Mach, J., Vol.27,pp.81-94 .
3. Shin, K.G.&Mckay, N.D.(1984) "Open loop minimum time control of mechanical manipulations & its applications", Proc. Amer. Contr. Conf., San Diego, C A, pp. 1231-1236.

Tables and Figures- By the word table, is meant tabulated numerical data in the body of the project report as well as in the appendices. All other non- verbal materials used in the body of the project work and appendices such as charts , graphs, maps, photos& diagrams may be designated as figures .

5. TYPING INSTRUCTIONS

The impression on the typed copies should be black in colour.

One and a half spacing should be used for typing the general text. The general text shall be typed in the Font style "Times New Roman" & Font size 14.

Book For Reference :

1. Kothari C R. *Research Methodology-Methods and Techniques*. New Delhi: New Age International Publishers. 2nd Edition 2005.

SEMESTER – III			
SELF STUDY COURSE (Optional) PHYSICS FOR LECTURESHIP II			
Code :21PPHSS1	**Hrs/Week:**	**Hrs/Semester:**	**Credits: +2**

UNIT I: Mathematical Methods of Physics

Dimensional analysis. Vector algebra and vector calculus. Linear algebra, matrices, Cayley- Hamilton Theorem. Eigenvalues and eigenvectors. Linear ordinary differential equations of first & second order, Special functions (Hermite, Bessel, Laguerre and Legendre functions). Fourier series, Fourier and Laplace transforms. Elements of complex analysis, analytic functions; Taylor & Laurent series; poles, residues and evaluation of integrals. Elementary probability theory, random variables, binomial, Poisson and normal distributions. Central limit theorem.

UNIT II: Classical Mechanics

Newton's laws. Dynamical systems, Phase space dynamics, stability analysis. Central force motions. Two body Collisions-scattering in laboratory and Centre of mass frames. Rigid body dynamics- moment of inertia tensor. Non- inertial frames and pseudo forces. Variational principle. Generalized coordinates. Lagrangian and Hamiltonian formalism and equations of motion. Conservation laws and cyclic coordinates. Periodic motion: small oscillations, normal modes. Special theory of Relativity-Lorentz transformations, relativistic kinematics and mass–energy equivalence. Dynamical systems, Phase space dynamics, stability analysis. Poisson brackets and canonical transformations. Symmetry, invariance and Noether's theorem. Hamilton - Jacobi theory.

UNIT III: Electromagnetic Theory

Electrostatics: Gauss's law and its applications, Laplace and Poisson equations, boundary value problems. Magneto statics: Biot-Savart law, Ampere's theorem. Electromagnetic induction. Maxwell's equations in free space and linear isotropic media; boundary conditions on the fields at interfaces. Scalar

and vector potentials, gauge invariance. Electromagnetic waves in free space. Dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction. Dynamics of charged particles in static and uniform electromagnetic fields. Dispersion relations in plasma. Lorentz invariance of Maxwell's equation. Transmission lines and wave guides. Radiation-from moving charges and dipoles and retarded potentials.

UNIT IV: Thermodynamic and Statistical Physics

Laws of thermodynamics and their consequences. Thermodynamic potentials, Maxwell relations, chemical potential, phase equilibria. Phase space, micro-and macro-states. Micro- canonical, canonical and grand-canonical ensembles and partition functions. Free energy and its connection with thermodynamic quantities. Classical and quantum statistics. Ideal Bose and Fermi gases. Principle of detailed balance. Blackbody radiation and Planck's distribution law. First-and second-order phase transitions. Diamagnetism, paramagnetism, and ferromagnetism. Ising model. Bose-Einstein condensation.

UNIT V: Electronics and Experimental Methods

Semiconductor devices (diodes, junctions, transistors, field effect devices, homo-and hetero- junction devices), device structure, device characteristics, frequency dependence and applications. Opto-electronic devices (solar cells, photo-detectors, LEDs). Operational amplifiers and their applications. Digital techniques and applications (registers, counters, comparators and similar circuits). A/D and D/A converters. Microprocessor and microcontroller basics. Data interpretation and analysis. Precision and accuracy. Error analysis, propagation of errors. Least squares fitting.

Book for Study:

1. Melemnganba Chenglei W. *UGC-CSIR JRF/NET Physical Science*. India: Arihant Publications. 2015.

SEMESTER II			
Field Work			
Code: 21PPFW21	**Hrs/Week: 3**	**Hrs/Sem: 60**	**Credit: 3**

The students will be taken on Field trips to places like Schools and hospitals to apply the knowledge that they have gained. As per the requirements of the Course Papers included, the Field Visit places may be decided by the faculty.

SEMESTER - III			
Core VII: Computational Biology			
Code : 17PZOC31	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 5**

Objectives

- To provide mathematical foundation to build analytical skills.
- To make the student competent in the applications of information science in bioscience.
- To gain an insight about the molecular databases

Unit I **Biostatistics –Descriptive Statistics**

Introduction – measures of central tendency - arithmetic mean, geometric mean, harmonic mean, median and mode – measures of dispersion – range, quartiles, mean deviation, standard deviation, standard error and coefficient of variation – measures of skewness and kurtosis – stem and leaf diagram - box plot.

Unit II **Inferential Statistics**

Theoretical probability distributions - binomial - Poisson – normal distribution – hypothesis testing procedure – student's t- test – chi – square test – goodness of fit and contingency tables – ANOVA – assumptions - types - one way and two way.

Unit III **Correlation and Regression**

Computation and interpretation of correlation coefficient – Karl Pearson's correlation coefficient – Spearman's rank correlation coefficient – regression – types – regression lines and their properties – fitting linear regression equations and forecasting – relationship between correlation and regression coefficients.

Unit IV **Computer Applications**

Graphical presentation of statistical data – MS Excel – spread sheet – data entry and creation of graphs – statistical packages –GENSTAT STATISTICA and SIGMAPLOT – statistical calculation –SPSS package – Principal Component Analysis(PCA).

Unit V **Bioinformatics**

Basic concepts and scope - nucleicaid database - GENBANK and EMBL – protein sequence database - NBRF – PIR and SWISSPROT - database similarity searches – BLAST and PSI – BLAST algorithms – derivation and searching molecular phylogenetic analysis – basic and functional genomics of bacteria and human.

Books for Reference.

1. Jerrold H.Zar.1984 Biostatistical Analysis, 2nd edition, Prentice -Hall International Edition. USA
2. Snedecor, G.W. and Cochran, 1989. W.G. Statistical Methods ,(8th edition) Affiliated East West Press, New Delhi,.
3. Gurumani, N.2005. An Introduction to Biostatistics, MJP Publishers,2nd edition, Triplicane, Chennai-5
4. Agarwal, S.K.2008. Bioinformatics, APH Publishing Corporation, New Delhi.
5. Peter Norton 2009. Introduction to Computers, 6th edition, Tata McGraw Hill, New Delhi.
6. Thiagarajan, B.andPa.Rajalakshmi 2009. Computational Biology,MJP publishers, Chennai .

7.Rajadurai, M.2010. Bioinformatics – A Practical Manual, PSB Book Enterprises, Chennai.

PRACTICALS

Hrs/ Week : 2

1. Computation of mean, median, mode, variance, standard deviation, standard error and coefficient of variation for biological variables.
2. Display of data through stem and leaf diagram.
3. Test of significance using student's t – test.
4. Test of goodness of fit of data with the aid of chi- square test.
5. Analysis of variance of molluscan shells
6. Correlation coefficient between height and weight of students and length and width of leaves.
7. Fitting regression equations for two variables and prediction of values.
8. Creation of graphs using MS-Excel
9. Statistical calculation using SPSS software package.
10. EMBL database - Print out.

SEMESTER – III			
Core VIII: Biotechnology			
Code : 17PZOC32	**Hrs / week : 6**	**Hrs / sem : 90**	**Credits : 5**

Objectives

- To study the potential benefits of biotechnology
- To familiarize with basic concepts of nanotechnology
- To understand the application of biotechnology in industries

Unit I **Cloning and Screening**

Definition – scope – vectors - properties of good vector-cloning and expression vectors-E.coli vector- screening of recombinants - pBR 322 - bateriophage – Lambdaphage - M13 – cosmid – plasmid- shuttle and yeast. - Integration of DNA insert with the vector-Introduction of vector into suitable host.

Unit II **Animal Cell and Organ Culture**

Cell culture - culture media - initiation of cell culture - evolution of continuous cell lines – large scale culture of cell lines- stem cell culture – organ culture - somatic cell fusion- hybridoma technology – In- *vitro* fertilization- embryo transfer - transgenic animals- fish, sheep and mice.

Unit III **Microbial Biotechnology and Human Welfare**

Microbial biotechnology- Isolation and improvement of microbial strains – micro organism used in alcohol production –alcoholic beverages-wine,beer,whisky-uses of alcohols. cloned genes and production of chemicals-human peptide hormones - insulin–vaccine for hepatitis B – rabies – polio - small pox – malaria - foot and mouth disease viruses - disease prevention - gene therapy - DNA finger printing.

Unit IV **Enzyme andIndustrial Biotechnology**

Methods of enzyme production – immobilization of enzymes - enzyme engineering-application of enzymes.single cell protein- mushroom culture – techniques-advantages and nutritive value. Bio gas production – anaerobic digestion-solubilization-acidogenesis-methanogenesis- mechanism of methane production

Unit V Nanotechnology

Nanomaterials, synthesis of nanoparticles: RF plasma, chemical methods, thermolysis, nanobiosensor, nanofluids, nanocrystals in biological detection - synthesis of nanodrugs- nanomedicine.

Books for Reference

1. Dubey.R.C. 2006. A Text Book of Biotechnology, 4th edition S.Chand& Company Ltd,New Delhi.
2. Singh.B.D.2005. Biotechnology.Revised edition. KalyaniPublishers,New Delhi.
3. Kumaresan V. 2009 Biotechnology. Saras Publication
4. Rema.L.P. 2007.Applied Biotechnology.MJPPublishers,Chennai.
5. Satyanarayana U. 2006. Biotechnology, Books and Allied (P) Ltd. Kolkatta
6. Robert Preidt, LauraCostlow and Peter. 2007. Introductory Nanotecnology. Dominant Publishers and Distributors, Delhi
7. Suhas Bhattacharya, 2013. Introduction to Nanotechnology. Wisdom Press. Delhi

Practicals

Hrs/week : 2

1. Isolation of DNA from goat liver.
2. Isolation of RNA from yeast
3. PCR amplification.
4. Western blotting analysis.
5. Biogas production
6. Wine preparation
7. Mushroom culture
8. Charts and models pertaining to theory for spotters
9. Report of visit to biotechnology lab

SEMESTER IV			
Core XII: Applied Microbiology			
Code: 17PZOC43	**Hrs/ Week :6**	**Hrs/sem : 90**	**Credits : 5**

Objectives

- To know the basic principles of food, industrial and environmental Microbiology.
- To concentrate on the economic aspects and to make use of or combat the activities of microorganisms.
- To understand the interaction of microorganisms with their environments and the practical consequences of these interactions.

Unit I **Microbial Classification**

Definition – scope, history of Microbiology - Bergey's classification-recent status of classification- Five kingdom concept. Distinctive features of the major groups of microorganism- bacteria, fungi and virus

Unit II **Food Microbiology**

Microbiology of food -growth of microorganisms in food - food spoilage - food poisoning - food infections – food preservation – microbiology of fermented foods - detection of food - borne pathogens.

Unit III **Industrial Microbiology**

Choosing microorganism for industrial microbiology – bioreactors - types of bioreactors - major products of industrial microbiology – antibiotics – organic acids - biopolymers – biosurfactants - bioconversion process and biofuels. Beverages – wine, beer.

Unit IV **Medical Microbiology**

Microbial diseases - Protozoan diseases; Plasmodium, Entamoeba.Fungal diseases: mycotoxicosis, aspergillosis. Bacterial diseases: meningitis and streptococcal pneumonia .Food and waterborne diseases: cholera, typhoid. STD and contact diseases: gonorrhea and syphilis. Viral diseases: influenza, hepatitis B

Unit V **Environmental Microbiology**

Biodegradation using microbial communities -leaching of metals,hydrocarbon degradation in water, and soil. waste as a resource - microbes in composting, Sewage treatment, biofertilizers, symbiotic -asymbiotic nitrogen fixation.

Books for Reference

1. Dubey R. C.and D.K Maheswari, 2006 .A Text Book of Microbiology. S. Chand & Co, New Delhi.
2. Rogar&Stainer, John l.ingrahan, Mark l. Wheelis& Page R. Painter, 1992. General Microbiology. Mac Millan India Ltd.
3. Kannan,N. 1996. Laboratory Manual in General Microbiology..Palani Paramount Publications.
4. James cappuccino and Natalie Sherman,1999. Microbiology-a Laboratory Manual. Addison-Wesly - Hyman Inc. Tokyo.
5. Pelzer, Chan and Krieg, Microbiology 1998. 2nd edn. Tata MC Grow Hill Publishing Company.
6. Presscott, Harley and Klein. 2005 Microbiology, WCB MC Graw Hill Co. New York.
7. Purohit S. S.,1991. Microbiology – Fundamentals and Application. M/S SarawathiPurohit for Student edition, India

PRACTICALS

Hrs / Week : 2

1. Sterilization technique
2. Sample handling for microbial studies.
3. Preparation of culture media for microorganisms.
4. Counting of viable cells (CFU / ml) by serial dilution & spread plate or pour plate.
5. Dye reduction test in milk.
6. Gram staining
7. Capsular staining.
8. Test for antibiotic sensitivity.
9. Isolation of nitrogen fixing symbiotic bacteria from root nodule.
10. Observation of algae, fungi and blue green algae
11. Industrial visit/ Institutional visit and submission of report

SEMESTER –IV			
Elective III : Applied Entomology			
Code :17PZOE41	**Hrs/Week : 6**	**Hrs/Sem : 90**	**Credits : 4**

Objectives

- To explore the rich diversity of insects.
- To impart knowledge about the beneficial services and harmful effects rendered by insects.
- To familiarize with effective control measures.

Unit I **Insect Taxonomy**

Introduction – principles of classification – Imm's classification down to orders with their diagnostic characters, familiar and important examples – methods of collection, killing and preservation of insects.

Unit II **Beneficial Insects**

Productive insects – economic value of products of honey bee, silk worm and lac insect-helpful insects – insect pollinators, scavengers - insects as protein sources of human and animal feeds, medicinal uses of insects ,Forensic entomology .

Unit III **Harmful Insects**

Insect pests of crops – general characters, bionomics and control measures of any four important pests of paddy, sugarcane and coconut – pests of stored products – internal and external feeders.

Unit IV **Medical Entomology**

Insects in relation to public health –Biology, mode of transmission of diseases and control: housefly, sand fly, human body louse and head louse and mosquito (special reference to dengue, chikungunya and filariasis)

Unit V **Pest Management**

Assessment of pest population and pest damage. Methods of pest control: natural, cultural, mechanical, legal, biological and chemical (organic and inorganic compounds – synthetic pyrethroids). Classification of insecticides: based on mode of entry, mode of action and chemical nature – Recent trends in pest control: chemosterlants, hormones, pheromones, anti-feedants, Integrated Pest Management

Books for Reference

1. Fenemore, P.G.andB.Prakash 1997. Applied Entomology, Wiley Eastern Ltd., New Delhi.
2. Tembhare. D.B. 1997. Modern Entomology, Himalaya Publishing House, New Delhi,
3. Nayar, K.K., Vasantharaj David, B, and T.N.Ananthakrishnan 2004. General and Applied Entomology Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. NalinaSundari, M.S.andR.Shanthi 2006. Entomology MJP Publishers, Chennai.
5. AbishekShukla 2008, Entomology Daya Publishing House, New Delhi.
6. SandhyaAgrawal 2009 Applied Entomology Oxford Book Company, Jaipur, India.
7. Ravindran K.R.2013. A Text Book of Economic Zoology, Wisdom Press , New Delhi
8. T.V.Sathe,A.TSatha, and Jagtap,2011. Mahendra.Mosquito Borne Diseases.Mangalam Publishers & Distributers.

SEMESTER II			
Elective II : Plant Cell and Tissue Culture			
Code: 17PBOE21	**Hrs/Week: 6**	**Hrs /Sem:90**	**Credits: 4**

Objective

- To acquire knowledge on basic plant tissue culture techniques

Unit I

Basic concept and scope of plant *in vitro* technology: History of *in vitro* plant biology, organization of a tissue culture laboratory, equipment, basic techniques, medium components, medium preparation- MS medium and White's medium.

Unit II

Differentiation/ regeneration- organogenesis-process, mechanism of action of plant hormones, multiple hormonal controls on organogenesis. Embryogenesis: Major processes in embryonic development, role of phyto-hormones in embryogenesis. Somatic embryogenesis- physiological, biochemical and molecular aspects of somatic embryogenesis. Synthetic seeds and its applications.

Unit III

Haploid and triploid culture: androgenesis, gynogenesis, endosperm culture. Techniques and applications in crop improvement. Protoplast culture -isolation, purification and culture of protoplasts, protoplast fusion and somatic hybridization. Selection of hybrids, regeneration, applications and limitations.

Unit IV

Micropropagation: methods and stages of clonal propagation.Strategiesfor virus-free plant production.Assessment of clonal fidelity using different types of markers.Field evaluation, packaging technology and transport methods.Soma clonal variation- genotypic and phenotypic variations in cell cultures and in regenerated plants.Chromosomal mutation in cultured plants.Applications in crop improvement.

Unit V

Production of secondary metabolites by cell and organ cultures. Germplasm preservation- *in-situ* and *ex-situ* conservations of germplasms. Cryopreservation: principle, techniques and applications

Books for Reference

1. HarinderChaddha 2011 Tissue culture and non-gene biotechnology, Dominant publishers and distributers Delhi.
2. Sharp, W.R., D.A.Evans, P.V.Ammirato and Yamada, 1984 hand book of plant cell culture volume II, Library of congress Macmillian publishing Co New York.
3. Narayanaswamy, S**.**1994 Plant cell and tissue culture. Tata McGraw- Hill publishing limited New Delhi
4. Green, C.E., D.A. Somers , W.P. Hackett and D.D. Biesboer 1987, Plant biology Volume 3 Plant and cell culture Alan R. Liss, Inc., New York.
5. Kumar, H.D. 1998 A text book of Biotechnology Affiliated east- west private limited, New Delhi.

SEMESTER II			
Core VI: Developmental Biology			
Code: 17PZOC23	**Hrs/Week: 6**	**Hrs /Sem:90**	**Credits: 5**

Objectives

- To understand the sequential changes in the organization of embryo
- To have a knowledge about post embryonic development
- To know the role of genes in development.

Unit I Gametogenesis and Fertilization

Basic concepts of development – gametogenesis – spermatogenesis – oogenesis. Structure of gametes - sperm and egg of sea urchin and mammal. Fertilization (biochemical, molecular aspects) - prevention of polyspermy .Parthenogenesis.

Unit II Cleavage and Blastulation

Planes of cleavage - Patterns of cleavage – role of yolk in cleavage.Mechanisms and regulation of cleavage cycles. Cleavage and blastulation in sea urchin, frog, bird and mammal. Fate map of sea urchin and frog.

Unit III Gastrulation and Organogenesis

Gastrulation – Morphogenetic movements - gastrulation in sea urchin and frog. Organogenesis in vertebrates - CNS, eye, skin and its derivatives, heart, kidney, digestive tube and its derivatives.

Unit IV Role of Genes in Development

Genomic equivalence – differential gene expression – amplified genes – selective gene transcription – control of gene expression.
Congenital abnormalities – teratogenic agents - programmed cell death in development. Stem cells.

Unit V Metamorphosis and Regeneration

Amphibian metamorphosis – morphological, physiological, biochemical change and causation of metamorphosis.
Regeneration – patterns – morphollaxis - epimorphosis and heteromorphosis – regeneration ability in different group of organisms - blatema formation-regeneration of amphibian limb – Wolffian regeneration - polarity and gradient in regeneration.

Books for Reference

1. Philip Grant. 1985. Biology of Developing Systems. Hall – Saunders International edition.
2. Scott F. Gilbert. 1994. Developmental Biology. Sinamer Associates Inc Publishers, Sunderland, Massachusetts.
3. N.J Berrill. 1982. Developmental Biology. Tata McGraw – Hill Publishing Co.Ltd, New Delhi.
4. Balinsky.B.I.1981. Introduction to Embryology. Saunders College Publishing Ltd.
5. Wendell Smith.C.P, Williams.P.L, Sylvia Tread Gold. 1996. Basic Human Embryology. ELBS Edition. Pitman Publishing Ltd.
6. Banerjee S. 2005. A Text Book of Developmental Biology. Dominant Publishers and Distributors, New Delhi.
7. Lewis Wolpert, Cheryll Tickle. 2010. Principles of Development. Fourth edition. Oxford University Press, New Delhi.
8. Verma P.S, V.K. Agarwal and B.S. Tyagi. 1980. Chordate Embryology. S. Chand & Company Ltd, New Delhi.

PRACTICALS

Hrs / Week : 2

1. Spermatogenesis and oogenesis (vertebrate) - chart
2. Study of different types of eggs - frog, chick, man - slides/ model
3. Study of different types of sperms - frog, chick, man - slides
4. Frog developmental stages - cleavage, blastula, gastrula, external gill stage – slides
5. Observation of T. S. of testis and T.S. of ovary of frog and Mammal- slides.
6. Temporary mounting of chick blastoderm.
7. Observation of chick embryos – 24 hrs, 48 hrs, 72 hrs, 96 hrs.
8. Study of any two congenital abnormalities – Phocomelia, Cyclopic lamb.
9. Effect of thyroxine in amphibian metamorphosis
10. Regeneration in the tail of tadpoles

SEMESTER I			
Elective I : Environmental Biology and Resource Management			
Code: 17PZOE11	**Hrs / Week:6**	**Hrs/Sem :90**	**Credits : 5**

Objectives

- To create environmental awareness among students.
- To inculcate knowledge about the natural resources, their conservation and efforts towards their sustainability.
- To generate concepts of prediction, prospecting, promotion, preservation and vision about restoration and resuscitation of dwindling natural resources.

Unit I **Environment and Social Issues**

From unsustainable to sustainable development - environmental ethics, issues - possible solutions – urban problems related to energy - consumerism and waste products - climate change - global warming – ozone depletion - acid rain.

Unit II **Human Population & Environment**

Population growth – population explosion – family welfare programmes - environment and human health – human rights – value education – women and child welfare – Role of IT in environmental and human health.

Unit III **Natural Resources**

a. Forest resources: Use and over exploitation- deforestation- timber extraction- mining- dams and forests – tribes.

b. Water resources: Use and over exploitation of ground water – surface water – conflicts over water- dams - benefits and problems -Conservation of water.

c. Land resources: Land as a resource- land degradation- soil erosion and desertification -Conservation of soil

d. Energy resources: Growing energy needs – renewable and non-renewable energy sources – use of alternate energy source.

Unit IV **Biodiversity and Conservation**

Biodiversity – values of biodiversity - threats to biodiversity, *in-situ* conservation, *ex –situ* conservation- role of individual in conservation of natural resources - role of organizations - NB PGR, BSI, ZSI, WWF, IUCN and Convention on Biological diversity - Ramsar Convention, National Action Plan on Conservation of Biodiversity. Environmental Protection Act (1986) – Forest Conservation Act (1980).

Unit V **Disaster Management**

Flood warning system - earthquakes, droughts, famines and heat waves – cyclone - wild fires – land slide – Disaster Management Information System (DMIS) – A guideline for disaster management.

Books for Reference

1. DhulasiBrindha, V. 2004. Environmental Studies. Allied Publishers Pvt. Ltd., New Delhi.
2. Veer BalaRastogi and M.S. Jayaraj. 2009. Animal Ecology and Distribution of Animals KedarnathRamnath, Meerut – Delhi.
3. Agarwal, A.C. 1999. Environmental Biology, Agro Botanical, Bikaner.
4. Anjaneyalu, Y.B. 2004. Introduction to Environmental Science, SPBS. Publications. Hyderabad.
5. Kormondy Edward J. 1994. Concepts of Ecology - Prentice Hall of India, Pvt. Ltd.
6. Odum, E.P. 1983. Basic Ecology - CBS College Publishing, Saunder.
7. Anubhakaushik and C.P. Kaushik. 2007. Environmental Science & Engineering, Newage International (p) Publishers. New Delhi.
8. Ravikrishnan, A. 2010. Environmental Science & Engineering. Sri Krishna Publications, Chennai.
9. Saha, T.K. 2008. Ecology & Environmental Biology, Books and Allied (P) Ltd.

SEMESTER –I			
Core IV: Applied Entomology			
Code :19PZOC14	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Vision

To explore the richness and significance of insects

Mission

To impart knowledge on the beneficial services, harmful effects rendered by insects and to familiarize them with effective control measures

Course outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know about the diversity of insects, classify and state their major different orders	1	Un
CO-2	develop skills for collecting, mounting and preserving insects	1, 6	Cr
CO-3	acquire knowledge on beneficial insects, helpful insects and insects of medicinal and aesthetic value	1	Un
CO-4	analyse the main pest species of crops based on the symptoms of the attack and morphological traits	2	An
CO-5	explain the life cycle of main pest species on crops and insect vectors	2, 1	Un
CO-6	identify, collect and manage different insects of household, man and animals.	4, 6	Ap
CO-7	apply appropriate indirect and direct measures to prevent or reduce pest attack	5, 7	Ap
CO-8	plan and implement crop protection according to the IPM principles	4, 8	Ev, Cr

SEMESTER –I			
Core IV: Applied Entomology			
Code :19PZOC14	**Hrs/Week : 5**	**Hrs/Sem : 75**	**Credits : 4**

Unit I Insect Taxonomy

Introduction – principles of classification – Imm's classification down to orders with their diagnostic characters, familiar and important examples – methods of collection, killing and preservation of insects.

Unit II Beneficial Insects

Productive insects – economic value of products of honey bee, silk worm and lac insect-helpful insects – insect pollinators, scavengers - insects as protein sources of human and animal feeds, medicinal uses of insects , Forensic entomology .

Unit III Harmful Insects

Insect pests of crops – general characters, bionomics and control measures of any three important pests of paddy, sugarcane and coconut – pests of stored products – internal and external feeders.

Unit IV Medical Entomology

Insects in relation to public health –Biology, mode of transmission of diseases and control: housefly, human head louse and mosquito (special reference to dengue, chikungunya and filariasis).

Unit V Pest Management

Methods of pest control - natural, cultural, mechanical, legal, biological and chemical (organic and inorganic compounds – synthetic pyrethroids). Recent trends in pest control: chemosterlants, hormones, pheromones, anti-feedants, Integrated Pest Management (IPM).

Books for Reference

1. Fenemore, P.G. and B. Prakash. 1997. *Applied Entomology*. Wiley Eastern Ltd., New Delhi.
2. Tembhare. D.B. 1997. *Modern Entomology*, Himalaya Publishing House, New Delhi,
3. Nayar, K.K., Vasantharaj David, B. and T.N.Anantha Krishnan. 2004. *General and Applied Entomology.* Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
4. Nalina Sundari, M.S. and R. Shanthi. 2006. *Entomology.* MJP Publishers, Chennai.
5. Abishek Shukla. 2009. *Economic Entomology*. Daya Publishing House, New Delhi.
6. Sandhya Agrawal. 2009. *Applied Entomology.* Oxford Book Company, Jaipur, India.
7. Ravindran K.R. 2013. *A Text Book of Economic Zoology*. Wisdom Press, New Delhi.
8. Sathe, T.V., Satha, A.T. and Jagtap Mahendra. 2011. *Mosquito Borne Diseases*. Mangalam Publishers and Distributers, New Delhi.
9. Saxena, R. C. and R.C. Srivastava. 2007. *Entomology.* Agrotech Publishing Academy, Udaipur.

PRACTICALS

Hrs/Week: 2 **Credit: 1**

1. Identification and classification of common insects – Butterfly, Grasshopper, Stick insect, Leaf insect, Beetle.
2. Mounting of mouth parts of insects – Honey bee, Mosquito
3. Study of beneficial insect - Honey bee colony and their product(honey)
4. Study of beneficial insect - Silk moth – life stages, silk
5. Study of any three insect pests and their damages – one pest on each crop paddy, coconut, sugarcane.
6. Study of life history of the insect vector – House fly
7. Study of life history of the insect vector – Mosquito
8. Study of any two household insects – Bed bug, Silver fish
9. Study of any two ectoparasites – Human head louse, Flea
10. Submission of insect box with minimum 10 insects.

Books for Reference

1. Vasantharaj David, B. 2001. *Elements of Economic Entomology*. Popular Book Depot, Chennai.
2. Nayar, K.K., Vasantharaj David, B. and T.N.Anantha Krishnan. 2004. *General and Applied Entomology.* Tata Mc Graw Hill Publishing Company Ltd., New Delhi.
3. Fenemore, P.G. and Alka.Prakash 2006. *Applied Entomology*. New Age International Publishers, New Delhi.

SEMESTER – II			
Core VII : Biotechnology			
Code : 19PZOC23	**Hrs / week : 5**	**Hrs / sem : 75**	**Credits : 4**

Unit I Cloning and Screening

Definition – scope – vectors - properties of good vector-cloning and expression vectors - E.coli vector- screening of recombinants - pBR 322 - bateriophage – Lambdaphage – plasmid and yeast. vector - integration of DNA insert with the vector - introduction of vector into suitable host.

Unit II Animal Cell and Organ Culture

Cell culture - culture media - initiation of cell culture - large scale culture of cell lines- stem cell culture – organ culture - hybridoma technology – Artificial insemination - transgenic animals- fish and mice.

Unit III Microbial Biotechnology and Human Welfare

Microbial biotechnology- Isolation and improvement of microbial strains –cloned genes and production of chemicals - human peptide hormones – insulin – vaccine for hepatitis B – foot and mouth disease viruses - disease prevention - gene therapy - DNA finger printing – Bioremediation.

Unit IV Enzyme and Industrial Biotechnology

Methods of enzyme production – immobilization of enzymes -application of enzymes. Single cell protein- mushroom culture – techniques-advantages and nutritive value. Bio gas production – mechanism of methane production

Unit V Nanotechnology

Nanomaterials, synthesis of nanoparticles: RF plasma, chemical methods, thermolysis, nanobiosensor, nanofluids, nanocrystals- synthesis of nanodrugs- nanomedicine.

Books for Reference

1. Dubey.R.C. 2006. *A Text Book of Biotechnology*. 4th edition. S.Chand & Company Ltd,New Delhi.
2. Singh.B.D. 2005. *Biotechnology.* Revised edition. KalyaniPublishers, New Delhi.
3. Kumaresan, V. 2009. *Biotechnology*. Saras Publication, Nagercoil.
4. Rema, L.P. 2007. *Applied Biotechnology*. MJP Publishers,Chennai.
5. Satyanarayana, U. 2006. *Biotechnology,* Books and Allied (P) Ltd. Kolkatta
6. Robert Preidt, Laura Costlow and Peter. 2007. *Introductory Nanotecnology*. Dominant Publishers and Distributors, Delhi
7. Suhas Bhattacharya. 2013. *Introduction to Nanotechnology*. Wisdom Press. Delhi

Practicals

Hrs/week : 2 **Credit: 1**

1. Isolation of plasmid DNA
2. Isolation of Genomic DNA
3. Immobilization of enzymes by sodium alginate method
4. PCR amplification.
5. Western blotting analysis.
6. Biogas production
7. Mushroom culture
8. Charts and models pertaining to theory for spotters
9. Report of visit to biotechnology lab

Books for Reference:

1. Harisha S. 2007. *Biotechnology Procedures and Experiments Hand Book*. Infenity Science Press, LIC, Hinghum, Massachusett, New Delhi, India.
2. Asish Verma, Surajit Das and Anchal Singh. 2008. *Laboratory Manual for Biotechnology*. S.Chand and Company, New Delhi.

SEMESTER II			
Core	VIII	Microbiology	
19PZOC24	Hrs/ Week : 4	Hrs / Sem : 60	Credits : 4

Vision : To prepare graduate students with thorough knowledge and understanding of the core concepts in the field of Microbiology

Mission : To equip the students with knowledge about Taxonomy, organization, multiplication and infection of microbes and to develop expertise in microbiological techniques.

Course Outcome :

CO.NO	Upon completion of this course, the students will be able to	PSO addressed	CL
CO- 1	classify micro organisms focusing on the modern trends of Taxonomy	1	Un
CO- 2	prepare media to be utilized in the cultivation of microorganisms	2	Ev
CO-3	understand the structural organization and life cycle of microorganisms	2	Un
CO-4	explain the role of microorganisms in fermentation, medicine and the production of microbial products	2	An
CO-5	gain familiarity with the unique role of pathogens in human infectious diseases	2	Ev
CO-6	identify the methodologies used in disease treatment and prevention	6	An
CO-7	demonstrate practical skills in the use of technologies and methods common to microbiology	8	Ev
CO-8	apply scientific methods in the design and execution of experiments	8	Ap

SEMESTER II			
Core	VIII	Microbiology	
19PZOC24	Hrs/ Week : 4	Hrs / Sem : 60	Credits : 4

Vision : To prepare graduate students with thorough knowledge and understanding of the core concepts in the field of Microbiology

Mission : To equip the students with knowledge about Taxonomy, organization, multiplication and infection of microbes and to develop expertise in microbiological techniques.

Course Outcome :

CO.NO	Upon completion of this course, the students will be able to	PSO addressed	CL
CO- 1	classify micro organisms focusing on the modern trends of Taxonomy	1	Un
CO- 2	prepare media to be utilized in the cultivation of microorganisms	2	Ev
CO-3	understand the structural organization and life cycle of microorganisms	2	Un
CO-4	explain the role of microorganisms in fermentation, medicine and the production of microbial products	2	An
CO-5	gain familiarity with the unique role of pathogens in human infectious diseases	2	Ev
CO-6	identify the methodologies used in disease treatment and prevention	6	An
CO-7	demonstrate practical skills in the use of technologies and methods common to microbiology	8	Ev
CO-8	apply scientific methods in the design and execution of experiments	8	Ap

SEMESTER II			
Core	VIII	Microbiology	
19PZOC24	Hrs/ Week : 4	Hrs / Sem : 60	Credits : 4

Unit I Classification

Classification of microorganism – Five Kingdom concept . Modern trends of bacterial Taxonomy- Ribosomal RNA and sequencing - Construction of phylogenetic tree. General characters of main groups of microorganisms.

Unit II Cultivation of microorganisms

Preparation of culture media – Isolation and maintenance of pure culture- Cultural and morphological characteristics of bacteria – Microscopic examination of microorganisms- gram staining- acid fast staining – spore staining - capsular staining – flagellar staining.

Unit III Microbes – Structural organization

Structural organization of bacteria, virus and fungi – Life cycle of Actinomycetes, yeast and mycoplasma.

Unit IV Production of microbial products

Yeast fermentation and its products – Production of alcohol, beer and wine. Mixed fermentation product- Production of vinegar. Production of antibiotics - penicillin and tetracycline.

Unit V Microbial diseases

Protozoan diseases- ameobiais and sleeping sickness. Bacterial diseases- diphtheria, tetanus and gonorrhea. Viral diseases- chikungunya, dengue fever, rabies and ebola. Fungal diseases- actinomycosis and aspergillosis.

Books for Reference

1. Arti Kapil. 2016. *Text Book of Microbiology*. 9th Edition. University Press. Hyderabad.
2. Dubey, R .C and D.K. Maheswari. 2006. *A Text Book of Microbiology.* S chand & Co New Delhi.
3. Roger Stainer, John Lingraham, Mark I Wheelis and Page R. Painter. 1992. *General Microbiology* Mac Millan, Hampshire, London.
4. Pelzer Chan and Krieg. 1998. *Microbiology.* 2nd Edition. Tata MC Grow Hill Publishing Company, New Delhi.
5. Presscott Harley and Klein. 2005. *Microbiology.* WCB MC Graw Hill Co New York.
6. Purohit, S.S. 1991. *Microbiology – Fundamentals and Application*. M/ S Saraswathi Publication, India

7. Power, C.B, and K.F. Daginawala. 1988. *General Microbiology* . Vol I & II. Himalaya Publishing House, Mumbai.
8. Vijaya Ramesh. 2007. *Food Microbiology.* MJP Publishers, Chennai.

PRACTICALS

Hrs / Week : 2 **Credit: 1**

1. Sterilization Techniques

2. Sample handling for microbial studies

3. Preparation of culture media:

Nutrient broth, Nutrient agar, Potato dextrose agar, Mullen- Hinters agar

4. Counting of viable cells (CFU/ ml) by serial dilution & spread plate or pour plate methods

5. Gram staining

6. Spore staining

7. Simple biochemical tests of bacteria

a Acid and gas production in glucose broth

b Starch hydrolysis

c Catalase

d Nitrate reduction

8. Dye reduction test in milk

9. Test for antibiotic sensitivity

10. Isolation of symbiotic nitrogen fixing bacteria from root nodules

11. Observation of algae, fungi and blue green algae

Books for Reference:

1. Kannan N. 1996. *Laboratory Manual in General Microbiology.* Palani Paramount Publications, Palani.
2. James Cappuccino and Natalie Sherman. 1990. *Microbiology A Laboratory Manual*. Addison - Wesly- Hyman Inc,Tokyo.
3. Dubey R.C. and D.K. Maheswari. 2008. *Practical Microbiology*. S Chand & Company Ltd., New Delhi.

SEMESTER - III			
Core IX Computational Biology			
Code : 19PZOC31	Hrs/Week : 6	Hrs/Sem : 90	Credits : 4

Vision

To understand the central concepts of biostatistics and bioinformatics

Mission

To impart interdisciplinary expertise from the biological science, computer science and mathematics

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	analyse and interpret results of descriptive statistical methods effectively	1, 3	An, Ev
CO-2	apply the methods of hypothesis testing, statistical inference and design	4	Ap
CO-3	appreciate biological data in statistical perspective correctly and contextually	4	Un
CO-4	infuse critical appraisal skills to assess the research data and produce original research	7	Cr
CO- 5	carry out correlation and regression analysis and recognise theoretical distributions	6	Un, An
CO -6	formulate and test using appropriate statistical software	4	Cr
CO-7	implement statistical methods and statistical software programmes to a variety of practical problems	5	Ap
CO- 8	demonstrate the mastery of concepts of bioinformatics	1, 2	Un,

SEMESTER - III			
Core IX Computational Biology			
Code : 19PZOC31	Hrs/Week : 6	Hrs/Sem : 90	Credits : 4

Unit I Biostatistics –Descriptive Statistics

Introduction – measures of central tendency - arithmetic mean, geometric mean, harmonic mean, median and mode – measures of dispersion – range, quartiles, mean deviation, standard deviation, standard error and coefficient of variation – measures of skewness and kurtosis – stem and leaf diagram - box plot.

Unit II Inferential Statistics

Theoretical probability distributions - binomial - Poisson – normal distribution – steps in hypothesis testing procedure – student's t- test – chi – square test – goodness of fit and contingency tables – ANOVA – assumptions - types - one way and two way.

Unit III Correlation and Regression

Computation and interpretation of correlation coefficient – Karl Pearson's correlation coefficient – coefficient of determination - Spearman's rank correlation coefficient – regression – types – regression lines and their properties – fitting linear regression equations and forecasting – relationship between correlation and regression coefficients.

Unit IV Computer Applications

MS Excel – spread sheet – statistical functions calculation of arithmetic mean – t test – ANOVA one way classification– statistical packages –SIGMAPLOT – statistical calculation –SPSS package – Principal Component Analysis(PCA).

Unit V Bioinformatics

Basic concepts and scope - nucleic acid database - GENBANK and EMBL – protein sequence database - NBRF – PIR and SWISSPROT - database similarity searches – BLAST and PSI – BLAST algorithms – Smith – Waterman algorithm – Needleman – Wunsch algorithm – scoring matrices - PAM and BLOSUM – multiple sequence alignment – sum of pairs method and progressive method.

Books for Reference.

1. Jerrold H. Zar. 1984. *Biostatistical Analysis*. 2nd edition, Prentice -Hall International Edition. USA.
2. Snedecor, G.W. and W.G. Cochran. 1991. *Statistical Methods.* (8th edition). Affiliated East West Press, New Delhi,.
3. Gurumani, N. 2005. *An Introduction to Biostatistics*. MJP Publishers, 2nd edition, Triplicane, Chennai-5
4. Agarwal, S.K. 2008. *Bioinformatics.* APH Publishing Corporation. New Delhi.
5. Gautham, N. 2009. *Bioinformatics - Databases and Algorithms*. Narosa Publishing House Pvt Ltd. New Delhi.

6. Thiagarajan, B. and Pa.Rajalakshmi 2009. *Computational Biology,* MJP publishers, Chennai .
7. Rajathi, A and Chandran, P. 2010. *SPSS for you*. MJP Publishers, Chennai.

PRACTICALS

Hrs/ Week : 2 **Credit:1**

1. Computation of mean, median, mode, variance, standard deviation, standard error and coefficient of variation for biological variables.
2. Display of data through stem and leaf diagram.
3. Test of significance using student's t – test.
4. Test of goodness of fit of data with the aid of chi- square test.
5. Analysis of variance of molluscan shells
6. Correlation coefficient between height and weight of students and length and width of leaves.
7. Fitting regression equations for two variables and prediction of values.
8. Seqence alignment and similarity searching - BLAST
9. Statistical calculation using SPSS software package.
10. Retrieving data from EMBL database - Print out.

Books for Reference

1. Gurumani, N. 2005. *An Introduction to Biostatistics*. MJP Publishers, 2nd edition, Triplicane, Chennai-5.
2. Rajadurai, M. 2010. *Bioinformatics – A Practical Manual*, PSB Book Enterprises, Chennai.

SEMESTER - IV			
Core XV - Commercial Zoology			
Code :19PZOC43	Hrs /Week: 5	Hrs/ Sem : 75	Credits : 4

Vision :

To facilitate self- employment and entrepreneurship in Apiculture and Sericulture.

Mission :

To motivate the students to take up carriers related to agro- based, rural oriented cottage industry through imparting knowledge in apiary management, mulberry cultivation and silkworm rearing.

Course Outcome:

CO. No	upon completion of this course, students will be able to	PSO addressed	CL
CO-1	identify, choose suitable bees and maintain bee hive successfully	2	Ev
CO-2	understand the behavior of bees, prevent swarming and manage bee colonies	3	Un
CO-3	inspect bee colony, identify diseases of bees, recognize their enemies and take necessary control measures	4	An, Ap
CO-4	apply their knowledge to implement the procedure to extract honey and other bee products and to preserve honey	5	Ap
CO-5	demonstrate an understanding of mulberry cultivation, silkworm rearing and silk reeling	1	Un
CO-6	identify diseases, pests of mulberry and silkworm and adapt control measures	4	Ap, Cr
CO-7	utilize their knowledge in harvesting, marketing cocoons and reeling operations	5	Ap
CO-8	develop practical proficiency in apiculture and sericulture from the lab work and visit to the apiary and the department of sericulture	6	Ap

SEMESTER - IV			
Core XV - Commercial Zoology			
Code :19PZOC43	Hrs /Week: 5	Hrs/ Sem : 75	Credits : 4

Unit I Bee keeping technology

Apiculture as a cottage industry - choice of species in apiculture- Indian bee, European bee. Bee keeping equipments - Langstroth hive and Newton's hive- Appliances used in apiaries. Swarming – prevention and control. Queen rearing and introduction. Artificial feeding.

Unit II Management of bees & Honey bee products

Diseases of bees- brood diseases, diseases of adult bees - nosema and septicemia, enemies - greater wax moth, lesser wax moth, ants, wasps - control measures. Extraction and uses of honey- bee wax- bee venom and pollen. Preservation and storage of honey.

Unit III Moriculture

Mulberry cultivation – cultivation practices – biofertilizers – foliar spray – triacontanol and seriboost. Diseases of mulberry – white root rot, stem canker, leaf spot, powdery mildew, leaf blight and leaf mosaic - deficiency diseases — symptoms and control measures.

Unit IV Silk worm rearing

Mulberry silk worm development – silk worm rearing – rearing house – rearing appliances rearing operations – chawki rearing – application of sampoorna. Silk worm diseases - flacherie, muscardine, grasserie, and pest- Indian uzifly- symptoms and control measures.

Unit V Cocoon Mounting and Reeling

Mountages- mounting methods - cocoons – harvesting, transport and marketing. Silk reeling – reeling operations, reeling appliances – cottage basin – filature units. By-products of sericulture.

Books for Reference

1. Mishra. R.C. 1997-98. *Perspectives in Indian Apiculture.* Agro Botanica, 4E 176 J.N.Vyas Nagar, Bikaner, H.S.Offset Printers,Daryagunj, New Delhi.
2. Pierre Jean – Prost. 1994. *Apiculture*. Oxford & IBH Publishing Co.Pvt. LTD. New Delhi.
3. Root, R.I. 1985. *Encyclopedia of Bee Culture*. International Books & Periodicals Supply Service. 24 – B/5, Desh Bandhu Gupta Road, New Delhi

4. Raja Instus, E. 1994. *Economics of Bee Keeping Industry*. Rawat Publications, Jaipur and New Delhi.
5. Everett Franklin Phillips. 2010. *Bee Keeping*. Agrobios (India), Agro House, Chopasani Road, Jodhpur – 342 002.
6. Ganga, G. and J. Sulochana Chetty. 1997. *An Introduction to Sericulture*. Oxford & IBH Publishing Co Pvt. Ltd. New Delhi.
7. Krishnaswami, S. 1990. *Improved Method of Rearing Young Age Silkworms*. Central Silk Board – Bangalore.
8. Acharya, J. 1993. *Sericulture and Development*. Indian Publishers Distributers Kamak Nagar – New Delhi
9. Hisao Aruga. 1990. *Principles of Sericulture*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

PRACTICALS

Hrs / Week : 2 **Credit: 1**

1. Identification of bee species and casts.
2. Mounting of mouth parts and legs of worker bee.
3. Bee keeping equipments - Newton's hive, hive tool, smoker, uncapping knife, pollen box, honey extractor.
4. Identification of diseases and enemies of honey bees.
5. Mulberry diseases and pests
6. Development of silkworm.
7. Silk gland.
8. Rearing house and appliances.
9. Silkworm diseases and pests.
10. Visit to an apiary and sericulture department.

Books for Reference

1. Alka Prakash. 2001. *Laboratory Manual of Entomology*. New Age International (P) Ltd, 4835/ 24, Ansari Road, Daryaganj, New Delhi – 110002.
2. Tammanna N.Sonwalker.1993. *Hand Book of Silk Technology*. Wiley Eastern Ltd. Chennai.

SEMESTER – I			
Core I : Cell and Molecular Biology			
Course Code: 21PZOC11	**Hrs/Week : 6**	**Hrs/Sem: 90**	**Credits: 4**

Objectives

- To develop basic knowledge and skills in cell and molecular biology and become aware of the complexity and harmony of the cell
- To gain the comprehensive knowledge on the molecular structure of cells, organelles including membrane structure and its dynamics

Course outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire knowledge on the structure and function of biological membrane including the roles of gradients in energy transduction	1	Un
CO-2	compare the different types of transporters and its functions	2	An
CO-3	relate the mechanisms of cell to cell signaling, including intercellular signaling and second messenger	1	An
CO-4	understand the structure and function of proteins including the roles of amino acids in protein folding and protein-protein interactions.	1	Un
CO-5	identify the regulation of gene at the transcriptional and post transcriptional level	3	Ap
CO-6	illustrate the structural organization of gene and the control of gene expression	5	Un
CO-7	explain the cell cycle and its regulation, including the mechanism of mitosis and meiosis	6, 7	Ev
CO-8	demonstrate the characteristics, causes and onset of cancer, metastasis, proto oncogenes, tumor suppressor genes and apoptosis	6, 8	Un

Unit I **Cell and Transport Across Cell Membranes**

Molecular organization of cell membrane – molecular models (Unit membrane, Trilaminar and Fluid mosaic) – intercellular junctions - types of transport - diffusion –membrane transport proteins – uniportercatalysed transport – membrane electrical potential. Active transport by ATP powered pumps. Co - transport by symporters and antiporters.

Unit II **Cell Receptors and Cell Signaling**

Cell signaling –principle of cell signaling- signaling mechanisms-signal receptors - intercellular signaling - cell surface receptors –types- G protein coupled receptors- second messengers (cAMP, IP_3,DAG, cGMP, & Ca^{2+}) - signaling from plasma membrane to nucleus.

Unit III **Chromosome and Genes**

Chromosome structure, Organization of genes in chromosomes – introns and exons – simple, complex and split genes – forms of DNA-A,B,Z - molecular basis of mutation – transition- transversion – frame shift – induction of mutation – repair systems to counteract DNA damage and mutation –post-transcriptional modification.

Unit IV **Cell Organelles, Protein Synthesis and Processing**

Ultrastructure of ribosome – endoplasmic reticulum – Golgi complex, mitochondria. Protein synthesis- translational proof reading. Post translational modification - disulfide bond formation, correct folding, assembly into multimeric proteins and protein glycosylation - O-linked and N-linked glycolysation in endoplasmic reticulum.

Unit V **Cell Division**

Cell division and cell cycle: Mitosis and meiosis, their regulation, cell cycle - control -apoptosis and its regulations - characteristics of cancer cells – causes and onset of cancer – metastasis – proto oncogenes - tumour suppressor genes.

Books for Reference

1. De Robertis, E.D.P. and Robertis E.M.F. Cell *and Molecular Biology 9th International Edition,* Mumbai: K.M. Varghese Company, 1988.
2. David M. Prescott Cells – *Principles of Molecular Structure and Function*. USA: Jones and Bartlett Publishers. 1988.
3. Lodish, H., Baltimore D. and Darnell J. *Molecular Cell Biology*. USA : Scientific American Book, Inc.
4. Ajoy Paul.. *Text Book of Cell and Molecular Biology*. Kolkata: Books and Allied (P)

Ltd. Third Edition. 2011.

5. Bhamrah, H.S. *Molecular Cell biology*. New Delhi: Publications Pvt Ltd. 1995
6. David Freifelder. *Essentials of Molecular Biology*. New Delhi: Narosa Publishing House. 1995.
7. Sivarama Sastry, K., Padmanaban G. and Subramanyam. C. *Text Book of Molecular Biology*. New Delhi : MacMillan India Limited. 1994
8. Gerald Karp. *Cell Biology*. McGraw Hill. Second Edition. 1984.
9. Prakash S. Lohar. *Cell and Molecular Biology*. Chennai: MJP Publishers. 2007
10. Gupta M.L and Jangir, M.L. *Cell Biology Fundamentals and Application*. Jodhpur: Saraswati Purchit for Student Edition. 2001
11. Rastogi S.C. *Molecular Biology*. New Delhi : CBS Publishers and Distributors Pvt.Ltd., 2006.

PRACTICALS

Course Code: 21PZOCR1

Hrs / Week : 2 **Credit : 1**

1. Preparation and observation of squamous epithelial cells.
2. Preparation and observation of human blood smear.
3. Preparation and observation of cockroach haemolymph smear.
4. Meiotic cell division in grasshopper testis.
5. Giant chromosome in chironomous larva.
6. Observation of blood smear of frog.
7. Genomic DNA isolation
8. Observation of sarcomere, columnar epithelial cells and ciliated epithelial cells.
9. Observation of different types of tissues : bone, hyaline cartilage, liver, kidney and nervous tissue.

Books for Reference

1. Nagesh Rao K.M.S. *Histology.* New Delhi: CBS Publishers and Distributors. 2007.
2. Shah and Chinoy, N.J. *Essential Techniques in Cell Biology*. Ahmedabad: Anada Book Depot. Educational Publishers. 2007
3. Goswaml, H.K. *Practical Cytology*, *Applied Genetics and Biostatistics*. Bombay: Himalaya Publishing House.1986.

SEMESTER I			
Core II : Genetics and Evolution			
Course Code: 21PZOC12	**Hrs/Week: 6**	**Hrs/Sem: 90**	**Credits: 4**

Objectives:

- To highlight the importance of genetics and evolutionary significance to the society
- To learn about the genetic recombination of chromosomes, microbial genetics, evolutionary concepts and future evolution of man.

Course outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	examine the chromosomes and genetic recombination and interpret linkage and mapping data	1	Un
CO-2	discuss the theories of crossing over and construction of chromosome map	1	Un
CO-3	infer genetic recombination mechanisms in bacteria and assess the genetic and clinical significance of transposons	2	Un,Ev
CO-4	analyse changes in gene and genotypic changes and evaluate its consequences in populations	6	An, Ev
CO-5	discriminate various human genetic disorders and genetic variations in drug metabolism	4	An
CO-6	provide detailed explanations of neo – Lamarkism, neo – Darwinism, stabilizing and experimental evolution	1 , 6	Un,Cr
CO-7	examine, summarize and integrate central ideas underpinning evolutionary patterns and processes from the molecular to the macro scale	2	Un,Ap,Cr
CO-8	Critically analyse, issues such as speciation mechanisms relating to the formation of species.	2	Un, An

Unit I Chromosomes and Genetic Recombination

Introduction – human karyotype analysis– linkage – comparison of complete and incomplete linkage – Morgan's experiments - theories and molecular mechanism of crossing over – construction of chromosome map – three point test cross (Drosophila), tetrad analysis (Neurospora) - chromosome banding and chromosome paintingtechniques.

Unit II Microbial Genetics

Recombination in bacteria – conjugation – transformation – transduction – sexduction – transposons – families of transposable elements in bacteria. Yeast Ty elements – Drosophila transposons – modes of transposition – genetic, medical and evolutionary significance.

Unit III Population Genetics and Human Genetics

Gene pool concept – gene and genotype frequencies – Hardy – Weinberg equilibrium – algebraic proof- estimation of equilibrium gene frequencies for complete dominance, co-dominance and multiple alleles. Neurodegenerative diseases – Alzheimer's – Huntington's disease – genes in pedigree - dermatoglyphics – diagnostic features – pharmacogenetics – drug metabolism – genetic variation in the effect of drugs – genetic counselling.

Unit IV Evolutionary Concepts

Neo – Lamarkism, Neo- Darwinism - stabilizing, directional and diversifying selection, experimental evidences - modern concepts of recapitulation theory; genetic and non-genetic variations - origin and evolutionary significance.

Unit V Speciation

Species - modes of speciation – sexual selection and co - evolution- Genetic drift-evolutionary significance - isolating mechanisms and their significance – Simpson's adaptive grid concept – micro, macro, and mega evolution – evolution of man – cultural evolution – future evolution.

Books for Reference

1. Strickberger M.W. *Genetics*. 3rd edition, New York: Maxwell Macmillan International Edition 1985.
2. Gardner, Simmons and Snustad. *Principles of Genetics*, 6th edition NewYork: Prentice Hall. Inc. 1991.
3. Klug W.S. and M.R. Cummings. *Concepts of Genetics*. 6th edition New York: Prentice Hall. Inc. 2000.
4. Emmanuel C, IgnacimuthuS. and S. Vincent. *Applied Genetics – Recent Trends and Techniques.* Chennai: JP Publishers 2009.
5. Amita Sarkar. *A Text Book of Human Genetics.* New Delhi: Wisdom Press 2011.
6. Kreb J.E. Goldstein. S. and T. Kilpatrick. *Genes*10th edition. USA: Jones Bartlett Publishers 2011.
7. Ujjwala Deshmukh. *Cytogenetics and Evolution*. New Delhi: Dominant Publishers and Distributors 2005.
8. Gurbacham S. and Miglani. *Essentials of Molecular Genetics*. New Delhi: Narosa Publishing House 2015.
9. Ledyard Stebbins. *Processes of Organic Evolution*. New Delhi: Prentice Hall of India 1970.
10. Ernst Mayr. *Populations, Species and Evolution. An Abridgment of Animal Species and Evolution*. Cambridge: Harvard University press 1970.
11. Dobzshansky, Francis J. Ayala, G. and W. Ledyard Stebbins James. *Valentine Evolution*. Delhi: Surjeet Publications 1973.

PRACTICALS

Hours/Week: 2 **Course Code: 21PZOCR1** **Credit: 1**

1. Construction of genetic map for a given three point test cross.
2. Preparation of culture medium of Drosophila
3. Tracing the stages in the life cycle of Drosophila.
4. Observation of common mutants of Drosophila
5. Survey of simple Mendelian traits and ABO blood group in the class population and estimation of gene and genotype frequencies based on Hardy – Weinberg law.
6. Demonstration of role of random genetic drift in small populations using simulation (beads)
7. Analysis of dermatoglyphicdata (finger print) of the class population.
8. Construction of pedigree
9. Bacterial conjugation (chart).
10. Industrial melanism- Peppered moth

Books for Reference

1. Michael Breitenback. *Experimental Genetics I– biophysics*. *shg. ac /at/ home.htm*1997.

2. William. D. Stansfield. Schaum's Outline Series. *Theory and Problems of Genetics. Second Edition.* USA: McGraw Hill Book Company 1977.

SEMESTER –I			
Core III – Biochemistry			
Course Code: 21PZOC13	**Hrs/ Week: 5**	**Hrs/Semester: 75**	**Credits: 4**

Unit I **Atoms and Molecules**

Structure of an atom, chemical bonds (ionic, covalent and hydrogen). Structure and properties of water. Vanderwaals interaction, role of water in life. pH and buffers - Weak acids and alkalies, Henderson and Hasselbalch's equation - Biological buffer system.

Unit II **Carbohydrates**

Classification – structure – properties and functions of carbohydrates. Metabolism: glycolysis – TCA cycle – energy budget of glucose oxidation – glycogenolysis – glycogenesis – gluconeogenesis – HMP shunt pathway.

Unit III **Protein**

Classification – structure – properties and functions of amino acids – classification – properties and functions of proteins – metabolism of proteins – metabolism of tryptophan – phenylalanine – tyrosine - Inborn errors of metabolism (Phenylketonuria and Hartnup's disease).

Unit IV **Lipid**

Classification – Biological importance of simple lipids (Triglycerides and Wax), compound lipids (phospholipids and glycolipids) and derived lipids (saturated, unsaturated and cholesterol) – β oxidation, ketogenesis – biosynthesis of fatty acids – disorders of fat metabolism (hypercholestrolemia, hyperlipoproteinemia and atherosclerosis). Role of liver in fat metabolism.

Unit V **Enzymes and Nucleic acids**

Nomenclature – classification – properties – functions and mechanism of enzyme action and its regulation – coenzyme, isoenzyme. Nucleic acids, chemistry of nucleic acids, structure, biosynthesis and degradation, purine and pyrimidine nucleotides and disorders of their metabolism (Gout, Severe combined immunodeficiency, Orotaciduria and Thymidine phosphorylase deficiency).

Text Book:

1. Ambika Shanmugam, *Fundamentals of Biochemistry for Medical Student*s, Madras: Navabharat Printers and Traders, 2012.
2. Pankaj Naik, *Biochemistry for Medical Students* NewDelhi: 4th edition, Health Science Publishers, 2016.
3. Jain J.L, Sunjay Jain, Nitin Jain, *Fundamentals of Biochemistry*, New Delhi: S. Chand& Company, 2007.
4. Styer L.W.H, *Biochemistry*, San Francisco: Freeman & Company, 1995.
5. Murray R.K., Gaaner D.K, Mayer P.A and V.W. Rodwell. *Harper's Biochemistry*, Tokyo: 24th edition. Prentice Hall of Japan, Inc, 1996.
6. Rastogi S.C, *Biochemistry*, New Delhi: Second Edition. Tata Mc Graw Hill Publishing Company Ltd., 2003.
7. Satyanarayana U and U. Chakrapani. *Biochemistry,* Haryana and Kolkata : Fourth Edition. Elsevier & Allied. 2014.
8. Edward Staunton West, Wilbert R. Todd, Howard S. Mason, John T. Van. Bruggen, *Biochemistry*, New Delhi: Fourth edition. Oxford and IBH Publishing Co. 1966.
9. Bernard L. Oser, *Hawk's Physiological Chemistry*, New Delhi: 14th edition. Tata Mc Graw Hill Publishing Company Ltd.1965.
10. Chatterjee M.N, *A Textbook of Biochemistry*. New Delhi: Jaypee Brothers, Medical Publishers Pvt Ltd. 2010.
11. Lehninger, A. *Principles of Biochemistry*, New Delhi: CBS Publishers & Distributers, 1993.

SEMESTER I			
Core IV	**Applied Entomology**		
Course Code: 21PZOC14	**Hrs/ Week : 5**	**Hrs/ Sem: 75**	**Credits: 4**

Objective:

- To explore the richness and significance of insects.
- To impart knowledge on the beneficial and harmful effects of insects and to familiarize them with effective control measures

Course outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know about the diversity of insects, classify and state their major different orders	1	Un
CO-2	develop skills for collecting, mounting and preserving insects	1, 6	Cr
CO-3	acquire knowledge on beneficial insects, helpful insects and insects of medicinal and aesthetic value	1	Un
CO-4	analyze the main pest species of crops based on the symptoms of the attack and morphological traits	2	An
CO-5	explain the life cycle of main pest species on crops and insect vectors	2, 1	Un
CO-6	identify, collect and manage different insects of importance to household, man and animals.	4, 6	Ap
CO-7	apply appropriate indirect and direct measures to prevent or reduce pest attack	5, 7	Ap
CO-8	plan and implement crop protection according to the IPM principles	4, 8	Ev, Cr

Unit I Insect Taxonomy

Introduction – principles of classification – Imm's classification down to orders with their diagnostic characters of any ten significant orders – methods of collection, killing and preservation of insects.

Unit II Beneficial Insects

Productive insects – economic value of products of honey bee, silk worm and lac insect - helpful insects – insect pollinators, scavengers - insects as protein sources of human and animal feeds, medicinal uses of insects, weed killers, Forensic Entomology.

Unit III Harmful Insects

Insect pests - general characters, damage, symptoms, bionomics and control measures of any three important pests of paddy (paddy stem borer, rice gall midge, rice swarming caterpillar), sugarcane (sugarcane stemborer, sugarcane leaf hopper, cane white fly) and coconut (leaf caterpillar, red palm weevil, rhinoceros beetle) – pests of stored products – Internal feeders (rice weevil, cigarette beetle) – External Feeder (Red Flour beetle, Indian meal moth).

Unit IV Medical Entomology

Insects in relation to public health –Direct effect: annoyance, dermatosis, myiasis, envenomization, allergic reaction and entomophobia. Indirect effects: host pathogen interactions: common insects of medical importance - life cycle and control measures – mosquitoes (Anopheles and Aedes), housefly, human louse - vector borne disease: dengue, malaria, chikungunya, filariasis and sleeping sickness.

Unit V Pest Management

Methods of pest control - natural, cultural, mechanical, legal, biological and chemical (organic and inorganic compounds – synthetic pyrethroids). Recent trends in pest control: Biointensive integrated pest management, hormones, pheromones, anti-feedants, sterile

insect technique - insect viruses - modern trends in pest control - integrated pest management (IPM).

Books for Reference

1. Fenemore, P.G. and B. Prakash. *Applied Entomology.* New Delhi: Wiley Eastern Ltd.1997.
2. Tembhare. D.B. *Modern Entomology.* New Delhi: Himalaya Publishing House. 2017.
3. Nalina Sundari, M.S. and R. Shanthi. *Entomology.* Chennai: MJP Publishers. 2006.
4. Abishek Shukla. *Economic Entomology*. New Delhi: Daya Publishing House. 2009.
5. Sandhya Agrawal. *Applied Entomology*. Jaipur, India: Oxford Book Company. 2009.
6. Ravindran K.R. *A Text Book of Economic Zoology*. New Delhi: Wisdom Press. 2013.
7. Sathe, T.V., Satha, A.T. and Jagtap. *Mahendra. Mosquito Borne Diseases*. New Delhi: Mangalam Publishers & Distributers. 2011.
8. Saxena, R. C. and R.C. Srivastava. *Entomology.* Udaipur: Agrotech Publishing Academy, 2007.
9. David, B.V and T.N. Ananthakrishnan. *General and Applied Entomology.* Bangalore: Mc Graw Hill Education, 2004.
10. Vasanthraj David B. and V.V. Ramamurthy. New Delhi: Elements of Economic Entomology. Brillion Publication. 2016.

PRACTICALS

Course Code: 21PZOCR2

Hrs/ Week: 2 **Credit: 1**

1. Identification and classification of common insects – butterfly, grasshopper, stick insect, leaf insect, beetle.
2. Mounting– Honey bee (mouthparts, sting and pollen basket), Mosquito (mouthparts)
3. Submission of insect box with minimum 10 insects.

   Spotters (Museum specimen/ Slide) :
4. Beneficial insect - Honey bee colony and their product (honey)
5. Beneficial insect - Silk moth – life stages, silk
6. Any three insect pests and their damages – one pest on each crop paddy, coconut, sugarcane.
7. Life history of the insect vector – House fly
8. Life history of the insect vector – Mosquito

9. Any two household insects – bed bug, silverfish
10. Any two ectoparasites – human head louse, flea

Books for Reference

1. Vasantharaj David B. *Elements of Economic Entomology*. Chennai: Popular Book Depot. 2001.
2. Nayar, K.K., Vasantharaj David, B, and T.N. Ananthakrishnan. *General and Applied Entomology.* New Delhi: Tata Mc Graw Hill Publishing Company Ltd. 2004.
3. Fenemore, P.G. and Alka Prakash. *Applied Entomology*. New Delhi: New Age International Publishers. 2006.

SEMESTER II			
Core VI : Immunology			
Course Code: 21PZOC22	**Hrs /Week : 5**	**Hrs / Sem: 75**	**Credits : 4**

Objectives:

- To understand the fundamentals of immunology and key principles of immune System.
- To impart knowledge on the structure and functioning of immune system and how it relates to health and disease.

Course Outcome:

CO. No	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	analyse the genetic basis of antibody diversity, organization and arrangement of immunoglobulin genes	1	An
CO-2	understand the principle of the routine serologic procedures performed in the clinical laboratory.	1, 2	Un
CO-3	describe the structure and function of MHC molecules and the immunologic responses involved in preventing and combating infections	1	Un
CO-4	describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity	1, 4	Un
CO- 5	describe immunological response and how it is triggered and regulated	1	Un
CO -6	transfer knowledge of Immunology into clinical decision – making	5	Ev
CO-7	elaborate the role and advances being made in transplantation with artificial organs and the aberrations of the immune system such as infections and autoimmunity	1, 6	Cr
CO- 8	discuss the modern laboratory techniques applicable in the diagnosis and monitoring of diseases involving the immune system.	6	Cr

Unit I Immunoglobulin Genes- Organisation and Expression

Scope- structure of Immunoglobulin (IgG) - Genetic model for Immunoglobulin structure - germ line and somatic variation – Dryer and Bennett two gene model organization of Immunoglobulin (Ig) genes. Gene rearrangements in variable region - mechanism of variable region DNA rearrangements - generation of diversity – class switching.

Unit II Antigen- Antibody Responses

Antigen - Antibody reactions: Salient features of antigen antibody reaction. Detection of antigenantibody reaction - precipitation - single radial immunodiffusion – doubleimmunodiffusion –immunoelectrophoresis – rocket immune electrophoresis - immunofluorescence. Agglutination: haemagglutination- bacterial agglutination- passive agglutination- agglutination inhibition test - ELISA.

Unit III Immunobiology

Hypersensitivity: Types – Type I Anaphylaxis – Type II Antibody dependent cytotoxicity – Type III Immune complex mediated disease – Type IV Delayed type hypersensitivity and Type V Stimulatory hypersensitivity- factors causing hypersensitivity- Major Histocompatibility Complex - MHC products – structure, distribution and functions - clinical importance of HLA - HLA typing - HLA paternity testing - HLA and diseases.

Unit IV Infection and Immunity & Defects in immunity

Immune response to pandemic virus infections - role of innate immunity in controlling viral infection – adaptive immune responses to viral infection- examples of pandemic virus infections (Influenza virus and corona virus). Autoimmunity – causes of autoimmune diseases - organ specific and systemic autoimmune diseases – diagnosis and treatment.

Unit V Clinical Immunology

Tumour immunology– tumour antigens - natural immunity to tumours – T cell mediated immunity to tumours - therapeutic approaches to cancer - immune surveillance.Transplantation immunology - types of grafts - mechanism of graft rejection - graft versus host reaction –immune suppression - prevention of graft rejection. Vaccine – types – live attenuated vaccine and inactivated killed vaccines – Vaccination schedule.

Books for Reference

1. Catherine Sheehan. *Clinical Immunology*. *Principles and Laboratory Diagnosis*. Philadelphia: Wolterskluwer Company 1997.
2. David Male, Brian Champian and Annie Cooke. *Advanced Immunology*. Philadelphia: J.B. Lippincott Company, Gower Medical Publishing 1987
3. Emil R. Unanue and Baruj Benacerraf. *Text Book of Immunology*. *II Edition.* London: Williams and Wilkins 1984.
4. Ivan M. Roitt. *Essential Immunology*. Oxford: Blackwell Scientific Publications 1994.
5. Joshi K.R and Osamo N.O. *Immunology*. India: Agro Botanical Publishers1994.
6. Mary S. Leftfel, Albert D. Donnenberg and Noel R. Rose. *Hand Book of Human Immunology.* New York: CPC Press 1997.
7. Vamen Rao C. *Immunology*. New Delhi: Narosa Publishing House 2011.
8. Rastogi, S.C. *Essentials of Immunology*. New Delhi: CBS Publishers and Distributors 2002.
9. Talwar G.P. and Gupta S.K. *A Hand Book of Practical and Clinical Immunology.* Delhi: CBS Publishers and Distributors 1993.
10. Yadav P.R. *Immunology.* New Delhi: Discovery Publishing House 2004.
11. SurendraNaha. *Fundamentals of Immunology*. New Delhi: Dominant Publishers Pvt. Ltd 2012.
12. Sudha Gangal and Shubhangi Sontakke. *Textbook of Basic and Clinical Immunology*. Hyderabad: Universities Press (India) Pvt. Ltd 2016.

PRACTICALS

Hrs/Week - 2 **Course Code: 21PZOCR3** **Credit - 1**

1. Radial Immunodiffusion.
2. Double Immunodiffusion.
3. Haemagglutination.
4. Direct Agglutination - ABO blood grouping.
5. Rh - Typing.
6. Immunoelectrophoresis.
7. ELISA - Demonstration.
8. Isolation of lymphocytes and enumeration.
9. HLA typing.
10. Lymphoid organs in rat (spotter)

Books for Reference

1. Rabindra Narain, *Practical Immunology*. New Delhi: Wisdom Press, 2012.

2. Talwar G and S. K. Gupta. *A Handbook of Practical and Clinical Immunology.* Vol. 1 Second Edition. Delhi: CBS Publishers & Distributers 1992.

SEMESTER III			
Core IX	**Computational Biology**		
Course Code: 21PZOC31	**Hrs/ Week: 6**	**Hrs/ Sem: 90**	**Credits: 4**

Objectives

- To understand the central principles and concepts of computational methods, tools and algorithms for biological data analysis and interpretation
- To impart interdisciplinary expertise in biological science, computer science and mathematics

Course Outcome

CO. No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand descriptive and inferential statistical methods effectively	1,3	Un
CO-2	apply the methods of hypothesis testing, statistical inference and designing experiments	4	Ap
CO-3	analyse and interpret the biological data in a statistical perspective correctly and contextually	4	An
CO-4	infuse critical appraisal skills to assess the research data and produce original research	7	Cr
CO-5	carryout correlation and regression analysis and recognize theoretical distributions	6	An
CO-6	Formulate and test using appropriate statistical tools and softwares	4	Cr
CO-7	convert biological data into computational problem and execute quantitative analysis	5	Ap
CO-8	Demonstrate the mastery of concepts of skills for biological data management, analysis and graphical presentation	1,2	Ap

Unit I Biostatistics – Descriptive Statistics

Introduction – measures of central tendency - arithmetic mean, geometric mean, harmonic mean, median and mode – measures of dispersion – range, quartiles, mean deviation, variance, standard deviation, standard error and coefficient of variation – measures of skewness and kurtosis – stem and leaf diagram – boxplot.

Unit II Inferential Statistics

Theoretical probability distributions – binomial – Poisson – normal distribution – steps in hypothesis testing procedure – student's t – test and its applications in experimental biology – chi – square test – goodness of fit and contingency tables – ANOVA – assumptions – types – one-way and two-way – factorial design and randomized block design.

Unit III Correlation and Regression

Correlation – types – methods of determining correlation - graphical methods – mathematical methods – Computation and interpretation of Karl Pearson's correlation coefficient – coefficient of determination - Spearman's rank correlation coefficient – regression – types – regression lines and their properties – algebraic method of fitting linear regression equations and forecasting – relationship between correlation and regression coefficients.

Unit IV Computer Applications

MS Excel – spread sheet – statistical analysis of data - calculation of arithmetic mean – t test – ANOVA one-way classification – statistical packages – GenStat – statistical calculation – SPSS package – Principal Component Analysis (PCA).

Unit V Bioinformatics

Nucleic acid databases - DDBJ – protein sequence databases - NBRF – PIR and PSD - database similarity searches – Smith – Waterman algorithm – Needleman – Wunsch algorithm – scoring matrices-PAM and BLOSUM – multiple sequence alignment – sum of pair-wise method and progressive method – Phylogenetic trees – structure, construction and interpretation.

Books for Reference

1. Gurumani N. *An Introduction to Biostatistics*. Chennai: MJP Publishers, 2nd Edition, Triplicane, 2005.
2. Agarwal S.K. *Bioinformatics.* New Delhi: APH Publishing Corporation, 2008.
3. Gautham N. *Bioinformatics - Databases and Algorithms*. New Delhi: Narosa Publishing House Pvt Ltd., 2009.
4. Thiagarajan B. and Rajalakshmi Pa. *Computational Biology.* Chennai: MJP Publishers, 2009.
5. Rajathi A and Chandran P. *SPSS for you*. Chennai: MJP Publishers, 2010.
6. Claverie J M. and Notredame C. *Bioinformatics for Dummies.* 2nd edition, Hoboken: Wiley Publishing Inc, NJ07030-5774, 2007.
7. Pezzullo J.C. *Biostatistics for Dummies.* Hoboken: John Wiley & Sons Inc., NJ07030-5774, 2013.
8. Khan I and Khanum A. *Introductory Bioinformatics*. Hyderabad: Ukaaz Publications, 1st edition, 2004.

PRACTICALS

Course Code: 21PZOCR5

Hrs/ Week: 2 **Credit: 1**

1. Computation of mean, median, mode, variance, standard deviation, standard error and coefficient of variation for biological variables.
2. Display of data through stem and leaf diagram.
3. Test of significance using student's t – test.
4. Test of goodness of fit of data with the aid of chi – square test.
5. Analysis of variance of molluscan shells
6. Correlation coefficient between height and weight of students and length and width of leaves.
7. Fitting regression equations for two variables and prediction of values.
8. Statistical calculation (ANNOVA) using SPSS software package (version: 1.0.0.1406).
9. Multiple sequence alignment using Smith – Waterman algorithm
10. Construction of phylogenetic tree.

Books for Reference

1. Gurumani N. *An Introduction to Biostatistics*. Triplicane, Chennai: MJP Publishers, 2nd edition, 2005.
2. Rajadurai M. *Bioinformatics – A Practical Manual*. Chennai: PSB Book Enterprises, 2010.

SEMESTER II			
Core VIII	**Microbiology**		
Course Code: 21PZOC24	**Hrs/ Week : 4**	**Hrs / Sem : 60**	**Credits : 4**

Objective

- To prepare graduate students with thorough knowledge and understanding of the core concepts in the field of Microbiology.
- To equip the students with knowledge about taxonomy, organization, multiplication and infection of microbes and to develop expertise in microbiological techniques.

Course Outcome :

CO. NO	Upon completion of this course, the students will be able to	PSO addressed	CL
CO- 1	classify microorganisms focusing on the modern trends of Taxonomy	1	Un
CO- 2	prepare media to be utilized in the cultivation of microorganisms	2	Ev
CO-3	understand the structural organization and life cycle of microorganisms	2	Un
CO-4	explain the role of microorganisms in fermentation, medicine and the production of microbial products	2	Ev
CO-5	gain familiarity with the unique role of pathogens in human infectious diseases	2	Un
CO-6	identify the methodologies used in disease treatment and prevention	6	An
CO-7	demonstrate practical skills in the use of technologies and methods common to microbiology	8	Ev
CO-8	apply scientific methods in the design and execution of experiments	8	Ap

Unit I Classification

Classification of microorganism – Five Kingdom concept. Modern trends of bacterial taxonomy - ribosomal RNA and sequencing - construction of phylogenetic tree. General characters of main groups of microorganisms – analysis based on Bergey's Manual of Determinative Bacteriology (biochemical tests).

Unit II Cultivation of Microorganisms

Preparation of culture media – isolation and maintenance of pure culture - cultural and morphological characteristics of bacteria, fungi – microscopic examination of microorganisms - Gram staining - acid fast staining – spore staining - capsular staining – flagellar staining.

Unit III Microbes – Structural Organization

Structural organization of bacteria – structure of *E. coli*, virus – plant virus – Tobacco Mosaic Virus, animal virus – adenovirus - bacteriophage and fungi – yeast, penicillium - life cycle of Actinomycetes and yeast.

Unit IV Production of Microbial Products

Yeast fermentation and its products – production of alcohol, beer and wine. Mixed fermentation product - production of vinegar. Production of antibiotics - penicillin and tetracycline.

Unit V Microbial Diseases

Protozoan diseases - ameobiais and leishmaniasis. Bacterial diseases- diphtheria, tetanus and gonorrhea. Viral diseases - corona virus, dengue fever, rabies and ebola. Fungal diseases - actinomycosis, aspergillosis, ringworm and candidiasis.

Books for Reference

1. Arti Kapil. *Text Book of Microbiology*. Hyderabad: University press 9th Edition. 2016
2. Dubey R .C and D.K. Maheswari. *A Text Book of Microbiology.* New Delhi: S. Chand & Co. 2006
3. Roger Stainer, John Lingraham, Mark I Wheelis and Page R. Painter. *General Microbiology.* London: Mac Millan, Hampshire 1992.

4. Pelzer Chan and Krieg. *Microbiology.* New Delhi: Tata Mc Grow Hill Publishing Company, 2nd Edition 1998.
5. Wulf Crueger and Annellese Crueger. Biotechnology: *A Textbook of Industrial Microbiology*. New Delhi: CBS Publishers and Distributors, 3rd Edition. 2016.
6. Presscott Harley and Klein. *Microbiology.* New York: WCB Mc Graw Hill Co. 2005
7. Purohit S.S. *Microbiology – Fundamentals and Application*. India: M/S Saraswathi Publication, 1991
8. Power C.B and K.F. Daginawala. *General Microbiology*. Vol I & II. Himalaya Publishing House, 1988.
9. Ramesh. *Food Microbiology.* Chennai: MJP Publishers. 2007
10. Casida, J.R. Industrial Microbiology. New Delhi: New Age International Pvt. Ltd., 2nd Edition 2015
11. Ananthanaryanan, R and J. Panikar. *Text Book of Microbiology*, Chennai Anna Salai : Orient Longman Private Ltd., 160, 7th Edition. 2006.

PRACTICALS

Course Code 21PZOCR4

Hrs / Week : 2 **Credit: 1**

1. Sterilization Techniques
2. Sample handling for microbial studies
3. Preparation of culture media:

   Nutrient broth, Nutrient agar, Potato dextrose agar, Mullen- Hinters agar
4. Counting of viable cells (CFU/ ml) by serial dilution & spread plate or pour plate methods
5. Pure culture techniques - Streaking and spread plate methods.
6. Spore staining
7. Simple biochemical tests of bacteria
   a. Acid and gas production in glucose broth
   b. Starch hydrolysis
   c. Catalase
   d. Nitrate reduction
8. Dye reduction test in milk

9. Test for antibiotic sensitivity - Kirby Bauyer disc diffusion test

10. Isolation of symbiotic nitrogen fixing bacteria from root nodules

11. Observation of algae and fungi

Books for Reference:

1. Kannan N. *Laboratory Manual in General Microbiology* Palani: Palani Paramount Publications, 1996.
2. James Cappuccino and Natalie Sherman. *Microbiology: A Laboratory Manual*. Addison –Wesly - Hyman Inc,1990.
3. Dubey R.C. and D.K. Maheswari. *Practical Microbiology*. New Delhi: S Chand & Company Ltd. 2008.

SEMESTER III			
Core XI - Developmental Zoology			
Course Code: 21PZOC33	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Objectives :

- To understand the sequential changes in the development and organization of an embryo
- To acquire knowledge about the metamorphosis, regeneration and role of genes in development

Course Outcomes

CO. No	**upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	define the process of gametogenesis and describe the structure of gametes	**1**	**Kn,**
CO-2	outline the events that lead up to and comprise the process of fertilization	**1, 2**	**Un**
CO-3	compare and contrast the patterns of cleavage in the various model organisms	**2**	**An**
CO-4	discuss the morphogenetic movements, cellular mechanisms and the functions of gastrulation	**2**	**Cr**
CO-5	explain tissue interactions and the development of organ systems in vertebrates	**3**	**Cr**
CO-6	analyse the role of genes in development, aging and senescence	**5**	**An**
CO-7	experiment with the role of hormones in amphibian and insect metamorphosis	**4, 6**	**Ap**
CO-8	determine the ability of regeneration in different groups of organisms	**4, 6**	**Ev**

Unit I **Gametogenesis and Fertilization**

Gametogenesis – spermatogenesis – oogenesis. Structure of gametes - sperm and egg of sea urchin and mammal – types of egg- Fertilization (biochemical, molecular aspects) in sea urchin and mammal- prevention of polyspermy. Parthenogenesis.

Unit II **Cleavage and Gastrulation**

Planes and patterns of cleavage – cleavage in sea urchin, drosophila, frog, bird and mammal. Mechanism of cleavage. Fate map of sea urchin and frog. Gastrulation – morphogenetic movements - gastrulation in sea urchin and frog.

Unit III **Organogenesis**

Derivatives of ectoderm, mesoderm and endoderm. Organogenesis in vertebrates - CNS, eye, heart, kidney, digestive tube and its derivatives-Development of extraembryonic membranes in chick. Placentation in mammals - types and physiology.

Unit IV **Role of Genes in Development**

Genomic equivalence – differential gene expression – amplified genes – selective gene transcription – control of gene expression. Programmed cell death in development – Aging and senescence.

Unit V **Metamorphosis and Regeneration**

Metamorphosis – definition - insect metamorphosis - moulting and metamorphic changes - hormonal control of insect metamorphosis. Amphibian metamorphosis – morphological, physiological, biochemical change and causation of metamorphosis. Regeneration – patterns – morphollaxis - epimorphosis and heteromorphosis – regeneration ability in different group of organisms - mechanism of limb regeneration in amphibian.

Books for Reference

1. Michael J.F. Barresi, Scott F. Gilbert. *Developmental Biology*. USA: OUP USA, 9th Edition. 2010
2. Wendell Smith, C.P., Williams,P.L. and Sylvia Tread Gold. *Basic Human Embryology*. Great Britain: ELBS Edition. Pitman Publishing Ltd., 1996.
3. Banerjee, S. *A Text Book of Developmental Biology*. New Delhi: Dominant Publishers and Distributors, 2015

4. Lewis Wolpert and Cheryll Tickle. *Principles of Development*. New Delhi: Oxford University Press, Fourth Edition . 2018
5. Verma, P.S, Agarwal, V.K. and B.S. Tyagi. *Chordate Embryology*. New Delhi: S.Chand & Company Ltd, 14th Edition. 2010.
6. Sanjib Chattopadhyay. *An Introduction to Developmental Biology*. Kolkata: Books and Allied (P) Ltd., First Edition. 2017.

PRACTICALS

Hrs / Week : 2 **Credit: 1**

Course Code: 21PZOCR6

1. Mounting of chick blastoderm.
2. Study of effect of thyroxin in amphibian metamorphosis
3. Study of regeneration in the tail of tadpoles
4. Culture of Drosophila
5. Observation of sperm, egg, T. S. of testis and T.S. of ovary of frog.
6. Observation of sperm, egg, T.S. of testis and T.S. of ovary of mammal.
7. Observation of developmental stages of frog - cleavage, blastula, gastrula external gill stage and tadpole stages
8. Observation of chick embryos – 24 hrs, 48 hrs, 72 hrs, 96 hrs.
9. Types of placenta in mammals (one eg. in each type).

Books for Reference.

1. Verma, P.S, Agarwal, V.K. and B.S. Tyagi. *Chordate Embryology*. New Delhi: S.Chand & Company Ltd, 14th Edition, 2010.
2. Verma P. S.*A Manual of Practical Zoology Chordates.* New Delhi : S. Chand and Company Ltd, First Edition, 2007.
3. Balinsky B.I. 1976. *An Introduction To Embryology*. Japan: B.W. Saunders Company, U.S.A and Toppan Company Ltd., Fifth Edition, 2012.

SEMESTER IV			
Core XIII	**Marine Biotechnology**		
Course Code: 21PZOC41	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credits: 4**

Objectives

- To impart knowledge of biotechnological applications of marine organisms among the students.
- To provide an excellent education emphasizing the important processes and impacts on the marine ecosystems and ways to control them.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recall different zones of the sea	2	Un
CO-2	understand the physical and chemical properties of seawater and its impact on ocean life	5	Un
CO-3	identify and classify marine planktons based on their characteristics	3	An
CO-4	classify the flora and fauna of estuaries, mangroves and salt marshes and their adaptations	1	An
CO-5	analyse the role of microbes in recycling of nutrients	3	An
CO-6	explain the aspects of marine pollution and its impact on marine life	5	Un
CO-7	appraise the complexity and diversity of resources in the marine environment	4	Ev
CO-8	develop skills in a range of theoretical and practical applications on bioactive substances	6	Cr

Unit I Marine Habitat

Classification of marine habitat, plankton – classification and adaptations. Intertidal rocky, sandy and muddy shores – the features of fauna and adaptations. Marine microbes (bacteria, viruses and fungi).

Unit II Marine Ecosystems

Estuaries, mangroves, coral reef – ecology and types, species interaction and adaptations. Conservation of Gulf of Mannar Biosphere Reserve. Role of microbes in the sea: recycling of nutrients – nitrate, phosphate and sulphate.

Unit III Marine Pollution

Sources, effects and control measures of heavy metal, radioactive, oil and thermal pollutions. Biotechnology in marine pollution control.

Marine bioremediation - microplastics.

Unit IV Microbial Action in the Marine Environment

Biofouling – biofoulers – micro and macro foulers – impact of biofouling in maine environment and prevention. Biodeterioration: agents and protective methods.

Corrosion – mechanism and prevention.

Unit V Wealth of the Sea

Mineral wealth – petroleum, manganese nodules, beach placers, glauconite and garnet. Bioprospecting of marine resources - bioactive compounds from marine organisms (bacteria, fungi micro, macro algae and sponges). Sea-ranching of economically important marine organisms – crustaceans and molluscs.

Books for Reference

1. Bimla Singh. *Marine Biotechnology and Aquaculture Development*. Delhi: Vista International Publishing House. 2006.
2. Girish Chopra. *Coastal and Marine Geography*. Delhi: Common Wealth Publisher. 2012.
3. Gross G. *Oceanography: A view of the Earth*. New Jersey: Sixth edition. Prentice Hall Inc. 2008.
4. Mc Cormick J.M. and J.V. Thiruvathaakal. *Elements of Oceanography*. Philadelphia: W.B. Saunders Company. 1981.
5. Nybakken J.W. *Marine Biology – An Ecological Approach*. California: Addison Weslay Longman, Inc. 1997.
6. Olivia J. Fernando. *Sea water-Properties and Dynamics*. Thanjavur: Dhanesh Publications. 1999.
7. Frank E. Firth. *The encyclopedia of marine resources*. New York: Van Nostrand Reinhold Company.1969.
8. Veena. *Understanding Marine Biology*. New Delhi: Discovery Publishing House Pvt. Ltd. 2012.
9. Atlas R.M. and Bartha. M. *Microbial ecology- Fundamentals and Applications*. California: Benjamin- Cummings. 2003.
10. Vijaya Ramesh K. *Environmental Microbiology*. Chennai: MJP Publishers. 2004.
11. Moshrafuddin Ahamed and Basumatary S.K. *Applied Microbiology*. Chennai : MJP Publishers. 2006.
12. Tait R.V. and F.A. Dipper. *Elements of Marine Ecology*. Great Britain: British Library Cataloguing in Publication Data. 4th edition 1998.

PRACTICALS

Course Code: 21PZOCR7

Hours/ Week : 2 **Credits : 2**

1. Determination of acidity

2. Estimation of salinity

3. Determination of alkalinity

4. Estimation of total dissolved solids

5. Determination of nitrite

6. Estimation of phosphate

7. Collection and identification of marine plankton (any three phyto and zooplankton)

8. Identification and comments on the following

   i. Plankton net

   ii. Inter-tidal organisms

   a. Rocky shore: Sea anemone, Chiton
   b. Muddy shore: Uca, Cerithidia
   c. Sandy shore: Arenicola, Murex

   iii. Biofouling

   iv. Corrosion

9. Analysis of buckle canal sample (TDS/ Microbial load)

10. Visit to mangroves / estuaries / marine environment

Books for Reference

1. Strickland and Parsons. J.D.H. *A Practical Handbook of Seawater Analysis*, Canada: Bulletin 167, Fisheries Research Board of Canada. Second Edition 1972.

2. Kiewood Maff, D. *ICES* T*echniques in Marine Environmental Sciences*. Denmark: International Council for the Exploration of the Sea, 1987.

SEMESTER IV			
Core XIV	**Conservation Biology**		
Course Code: 21PZOC42	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credits: 4**

Objectives

- To create environmental awareness among students.
- To inculcate knowledge about the natural resources, biodiversity their conservation and efforts towards their sustainability.
- To generate concepts of prediction, prospecting, preservation and restoration of dwindling natural resources.

Course Outcome

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	infer the problems of unsustainable development	1	Un
CO-2	justify that human survival depends on developing practices that will achieve sustainable systems	3	Ev
CO-3	explore the biological, sociological and legislative perspectives for the management of flora and fauna to conserve wildlife.	5	An
CO-4	evaluate the importance of natural resources on conservation of biodiversity	3	Ev
CO-5	analyse the conservation management of various resources	3	An
CO-6	gain knowledge on values and threats of biodiversity	2	Ap
CO-7	learn the role of various organization in conservation of biodiversity	6	Un
CO-8	apply scientific principles and modern technologies to resolve problems in disaster management	8	Ap

Unit I Environment–Sustainable Development

Environmental ethics, issues - possible solutions - from unsustainable to sustainable development; Environmental Protection Act (1986) - Forest Conservation Act (1980), Wildlife (Protection) Act of Government of India (1972).

Unit II Conservation of Forest and Water Resources

Forest resources: Use and overexploitation – deforestation - timber extraction – mining - dams and forests – tribes. Conservation of forest.

Water resources: Use and over exploitation of ground water – surface water – conflicts over water – dams – benefits and problems - conservation of water.

Unit III Conservation of Land and Energy Resources

Land resources: Land as a resource – land degradation – soil erosion and desertification – conservation of soil.

Energy resources: Growing energy needs – renewable and non-renewable energy sources – use of alternate energy source.

Role of individual in conservation of natural resources.

Unit IV Biodiversity and Conservation

Biodiversity - values of biodiversity - threats to biodiversity – hot spots – biosphere reserve. *In-situ* conservation - *ex-situ* conservation - role of organizations in conservation **-** NBPGR, BSI, ZSI, WWF, IUCN - Ramsar Convention.

Unit V Disaster Management

Climate change – global warming

Causes, impact and management of earthquakes – cyclone – wildfires – landslide – flood – drought - disaster management system (DMIS).

Books for Reference

1. Dhulasi Brindha, V. *Environmental Studies*. New Delhi : Allied Publishers Pvt. Ltd. 2004.
2. Veer Bala Rastogi and M.S. Jayaraj. *Animal Ecology and Distribution of Animals*. Delhi: Kedarnath Ramnath, Meeruti.2009.
3. Agarwal, A.C. *Environmental Biology*, Bikaner : Agro Botanical. 1999.

4. Anjaneyalu, Y.B. *Introduction to Environmental Science*, Hyderabad: SPBS. Publications. 2004.
5. Kormondy Edward J. *Concepts of Ecology.* India: Prentice Hall Pvt. Ltd. 1994.
6. Odum, E.P. *Basic Ecology.* Saunder: CBS College Publishing. 1983.
7. Anubha Kaushik and C.P. Kaushik. *Environmental Science and Engineering*. NewDelhi: New Age International (P) Publishers. 2007.
8. Ravi Krishnan, A. *Environmental Science and Engineering*. Chennai: Sri Krishna Publications. 2010.
9. Saha, T.K. *Ecology and Environmental Biology*. Kolkatta: Books and Allied (P) Ltd. 2008.

PRACTICALS

Course Code: 21PZOCR8

Hrs/ Week: 2 **Credit: 1**

1. Estimation of population density using Quadrat method
2. Population density study – Mark and Recapture method
3. Chart – Rare, Threatened, Endangered and Extinct species
4. Mapping of National Parks in India with a note on important fauna
5. Mapping of Wild Life Sanctuaries in India with a note on important fauna
6. Renewable Energy Resources – Wind Energy
7. Case Study on Man Animal Conflict
8. Red Data Book
9. Shannon Wiener Index
10. Visit to an ecologically important place – National parks, Sanctuaries.

Books for Reference

1. Gareth Williams. *Techniques and Field work in Ecology*. Bell & Hyman Ltd. London. 1987.

2. Jaya Surya, Arumugam. N, Dulsy Fatima, Meyyan, R.P., Prasannakumar, S., Mani, A., Mariakuttikan, A., Narayanan, L.M., Nallasingam, K., Kumaresan, V. and A.M. Selvaraj. *Practical Zoology Vol-3*. Saras Publication, Nagercoil. 2013.

SEMESTER III	
Self Study Course **Zoology for Competitive Examination**	
Course Code: 21PZOSS1	**Credit: +2**

Objectives

- To motivate the students appear for high level competitive exams
- To make students competent to face the examinations effectively.
- To provide in-depth knowledge on different fields of Zoology which are vital for any competitive examination.

Course Outcome

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	gain knowledge about the systematic position of the organisms.	1	Un
CO-2	able to identify the different species based on their salient features	6	An
CO-3	acquire in depth knowledge on biomolecules and relate the various physiological mechanisms prevailing in the organism	3	An
CO-4	analyse the genetic concepts and laws	4	An
CO-5	understand different theories and patterns of evolution	1	Un
CO-6	acquire in-depth knowledge about cellular components and cell cycle regulation and discuss the consequences of uncontrolled cell division	2, 7	Kn, Cr
CO-7	evaluate the techniques help in bioremediation and demonstrate gene therapy technique	7, 8	Ev
CO-8	understand the various types of pathogens, analyse their transmission and prevention of infectious diseases	5	An, Un

Unit I **Diversity of Life Forms**

Concepts of species and hierarchial taxa, biological nomenclature, classical and quantitative methods of taxonomy of animals. Unicellular, colonial and multicellular forms. Levels of organization of tissues, organs & systems. Classification of invertebrates up to classes and chordates up to order – diagnostic features and examples. Organisms of conservation concern – principles of conservation - rare, endangered species - conservation strategies.

Unit II **Biochemistry and Physiology**

Composition, structure and function of biomolecules - carbohydrates, lipids, proteins, nucleic acids and vitamins. Conformation of proteins - Ramachandran plot. Physiology of digestion and absorption, respiration, transport of oxygen, carbon-di-oxide; structure of kidney and nephron, urine formation in man; structure of heart, cardiac cycle; structure, composition and functions of blood of man; types of muscle, structure of neuron, nerve impulse conduction, physiology of vision and hearing in man. Structure and functions of pituitary, Islets of Langerhans and thyroid gland. Human reproductive systems – menstrual cycle.

Unit III **Genetics and Evolution**

Mendelian principles, modern concept of gene, split gene, genetic regulation, genetic code. Sex chromosomes and their evolution, sex determination in Drosophila and man. Recombination, linkage, multiple alleles, genetics of blood groups, pedigree analysis, hereditary diseases in man – Inborn errors of metabolism- mutations and mutagenesis, structural and numerical alterations of chromosomes. Theories of evolution- natural selection, role of mutation in evolution, evolutionary patterns, molecular drive, mimicry, variation, isolation and speciation, biological and cultural evolution of man.

Unit IV **Cell and Molecular Biology**

Structure of model membrane, Structure and function of cell and its organelles (nucleus, plasma membrane, mitochondria, Golgi bodies, endoplasmic reticulum, ribosomes and lysosomes), cell division and cell cycle (mitosis and meiosis), steps, control and

regulation of cell cycle, chromosome movement, chromosome type – polytene and lamp brush, organization of chromatin, heterochromatin. Protein synthesis, structure of DNA, RNA, replication of DNA. Nucleic acid topology, DNA motif, transcription, RNA processing, translation, protein folding and transport.

Unit V **Biotechnology and Microbiology**

DNA sequencing methods, RFLP, RAPD and AFLP techniques, transgenic animals. Bioremediation and phytoremediation. Biosensors, tissue culture, Genomics and its applications to health – gene therapy – recombinant vaccines. Major infectious and communicable diseases (malaria, filariasis, tuberculosis, cholera, AIDS and Covid-19) their vectors, pathogens and prevention.

Books for Reference

1. Jordan. K.C. & Verma. P.S. *Invertebrate Zoology*. New Delhi: S. Chand& Company Ltd. 2009.
2. Jordan E.L. and Verma. P.S. *Chordate Zoology*. New Delhi: S. Chand & Company Ltd, Ram Nagar. 1965.
3. Sinha, Adhikari, Ganguly, Bharati Gowswani. Biology of Animals – Volume I. Kolkatta: New Central Book Agency; 7th edition. 2012.
4. Sinha, Adhikari, Ganguly, Bharati Gowswani. Biology of Animals – Volume II. Kolkatta: New Central Book Agency; 7th edition. 2012.
5. Ambika Shanmugam. *Fundamentals of Biochemistry for Medical Students*. Madras: Navabharat Printers and Traders. 2012.
6. Satyanarayana. U and U. Chakrapani. *Biochemistry*. Haryana and Kolkatta: Elsevier and Allied. Fourth Edition 2014.
7. Shembulingam. K. and Prema Shembulingam. *Essentials of Medical Physiology*. New Delhi : Jaypee Brothers, Medical Publishers Ltd. 2005.
8. Verma. P.S and Agarwal. V.K. *Cell Biology, Genetics, Molecular Biology, Evolution & Ecology*. New Delhi: S. Chand & Company Ltd, Ram Nagar. 2013.
9. Kumaresan. V. *Biotechnology*. Nagercoil: Saras Publication. 2009.
10. Presscott Harley and Klein. *Microbiology*. New York: WCB Mc Graw Hill Co. 2005.

SEMESTER III			
Core X	Wage and Salary Administration		
Code: 17PHRC32	Hrs/Week: 8	Hrs/Sem:90	Credits: 5

Objective:

- To provide a thorough knowledge relating to Wage and Salary Administration under various labour legislation

Unit I **Wage and Salary Administration:**

Definition – Nature and Purpose – Wage determination process – Wage administration rules – Factors influencing wage and Salary structure and administration – Principles of wages and salary administration – Theories of wages –Types of wages – Time rate – Piece rate – Debt method – Wage Differential

Unit II **Legal Framework of wage and salary Administration:**

Minimum Wages Act 1948- Payment of Wage Act 1936 – Payment of Bonus act 1965

Unit III **Compensation Administration:**

Definition of compensation –Objectives of Compensation Administration – Types of Compensation – Theories of Compensation: The Equity theory – Expectancy theory – The Contingency theory – Concept of Wages – Kinds of Pay Structure – Factors influencing Compensation Administration – Steps in Compensation Administration.

Unit IV **Incentives and Rewards:**

Definition –Determinants of Incentives – Types of Reward – Wage Incentives – Objectives of Wages Incentive Schemes – Types of Wages Incentive Plans – Halsey Premium Plan – Rowan Premium Plan – Taylor's Differential Piece rate Plan – Incentive Plans for White collar workers – Incentive Plans for Management employees.

Unit V **Employee Benefits and Services:**

Fringe Benefits – Meaning – Features –Objectives of Fringe benefit and Service Programmes – Forms of Fringe Benefits - Coverage of Benefits – Employee Security Payments – Payment for time not Worked – Problems Raised by Benefit Programmes

Text Book:

1. C.B. Mamoria and S.V. Gankar – Personnel Management, Himalaya Publishing House (Unit I, Unit IV, Unit V)
2. PravinDurai – Human Resource Management (Unit III)
3. N.D. Kapoor –Hand Book of Industrial law, New Delhi, Sultan Chand (Unit II)

Books for Reference:

1. Donald L. Caruth GailD. Handlogten Managing compensation (and understanding it too
2. David W. Belcher - Wage and salary administration

SEMESTER III			
Core XI	Strategic Management		
Code: 17PHRC33	Hrs/Week: 6	Hrs/Sem:90	Credits: 4

Objectives:

- To make the students understand the concept and techniques of Strategic Management.

Unit I

Strategy Management

Strategic Management – Definition – Kinds of Strategies – Grand Strategy – Functional Strategy -Levels of Strategy – Strategic Management Process – Importance of Strategic Management – Limitations of Strategic

Unit II

Strategy Formation

Objectives – Definition – Characterstics of Objectives – Goals – Guidelines for Ideal Objectives

Policies – Importance of Policies – Kinds of Policies – Characteristics of a good Policy

Company Mission – Meaning and Definition – Formulation of Mission – Essentials of a good Mission Statement

Unit III

Strategy Analysis

Environmental analysis - Meaning – Classification of External Environment – Remote Environment – Operating Environment.

Internal analysis- Meaning – Need for Internal Analysis – Process of Internal Analysis of a Firm- Functional Analysis – The Value Chain Approach

Unit IV

Strategies

Business level strategy – Cost- differentiation- focus.

Corporate level strategy – Horizontal Intergration – Vertical Intergration – Strategic Outsourcing – Related and Unrelated Diversification

Unit V **Implementation and Control**

Meaning of Strategy Implementation – Steps in Strategy Implementation – Control – Meaning – Types of Control – Essential features of an effective evaluation and control system.

Text Book:

1.G.Rajendran ,Strategic Management, Manglam Publications , New Delhi

2.Charles .W.L. Hill and Gareth O'Jonel- Strategic Management , Cengage Learning India Private Limited., New Delhi.

Books for Reference:

1.Azaar Kazmi - Strategic Management and Business Policy,Tata McGraw Hill Edition

2. Thomas L. Wheelel, J.David Hunger and Krish Rangarajan ,Strategic Management and Business Policy– Pearson Education.

Core XIV	SEMESTER IV		
Code: 17PHRC42	Training & Development		
	Hrs/Week: 6	Hrs/Sem:90	Credits: 4

Objective :

- To enable the students to understand the concepts of training and development.

Unit I **Introduction to Training:**

Training: Definition – Meaning – Concepts – Objectives – Values – Benefits - Types. History of Training in Indian Industries – Trends in training in Indian Industries - Principles of Training.

Unit II **Training needs and Methods:**

Training needs – Identification of training needs. Training process: Designing training programmes – Stages in designing a Structure – Important Considerations while designing the Training Programme.

Training methods: Lecture - Group discussions – Seminar – Symposium -Panel discussions – Debate - Programme instruction - Case study - Role playing - In-basket exercises - Fishbowl exercises.

Unit III **Training tools:**

Training Tools: Static Media: Print based Material – Flip Charts – Marker Board – Handouts - Over-head Projector- Slide Projector. Dynamic Media: Video tape – Audio tape – Computer aided training

Unit IV **Introduction to Development:**

Development – Definition – Meaning – Concept – Need – Objectives of Management Development Programme – Relationship between Training and Development. Role of Development Officers – Administrators – Consultants – Designers and Instructors.

Unit V **Evaluation:**

Evaluation of Training: Approaches to Evaluation – Need for Evaluation – Principles of an effective evaluation programme – Types of Evaluation – Stages of Evaluation - Hamblin's Model.

Text Book:

1. S.K.Bhatia, Training for Development, Deep& Deep Publications Pvt. Ltd.

Books for Reference:

1. B. Taylor and G. Lippitt- Management Development and Training hand book.
2. Concepts and Application – Training and Development
3. Lynton – Training for Development

Elective III	SEMESTER III		
Code: 17PHRE31	Research Methodology		
	Hrs/Week: 6	Hrs/Sem:90	Credits: 5

Objectives:

- The objective of this paper is to provide knowledge on research methods, techniques and process and to develop skills in the application of research methods for solving problems in business.

Unit I

Research Methodology

Meaning of Research –definition- Objectives of Research – Types of Research – Research Process – Criteria of Good Research - Scientific method – Present position of social science research in India.

Unit II

Defining the Research Problem And Research Design

Identification and Formulation of research problem – selection of research topic statement of research objectives. Hypothesis – definition, meaning and types. Research Design – Explorative, descriptive, diagnostic and experimental designs. Factors influencing the choice of a research design.

Unit III

Sampling Design and Measure of Data Collection

Sampling – meaning and definition. Types and sampling – random and non-random sampling. Sample size, Sample error. Data collection – observation, construction of questionnaires and Interview schedules. Pilot study and Pretest.

Unit IV

Processing and Analysis of Data

Processing Operations –Statistics in Analysis – Measure of Central Tendency – Measure of Dispersion – Measure of Relationship – Simple Regression Analysis – Chi Square Test – Analysis of Variance and Covariance (ANOVA) .(Only theory)

Unit V

Interpretation and Report Writing

Interpretation,- generalisation of data. Report Writing – Introduction – chapterisation – guidelines – footnotes – reference – bibliography – index presentation and documentation

Text Book:

Kothari.C.R., 1992, Research Methodology, New Delhi, Vikas Publishing Ltd.,

Books for Reference :

1. Levin J.Kchard, 1948, Statistics for Management 3rd Edn, Prentice Hall of India, New Delhi.
2. Gupta SC & Kapoor.V.K., 1987, Fundamentals of Applied Statistics Sultan New Delhi, Chand & Sons.

SEMESTER II			
Self-Study Course	**Personality Development**		
Code: 17PHRSS1	**Hrs/Week: 0**	**Hrs/Sem:0**	**Credits: 1**

Objective :

- To enlighten the students on the different aspects of their personality.
- To help the students to develop their personality.

Unit I Effective communication & it's key aspects, Body language, Assertiveness, problem-solving, Conflict & stress management, decision making skills, Motivation, positive & creative thinking, Leadership & qualities of successful leader, character building, Teamwork, Lateral thinking, Time management, Work ethics, Good manners & etiquettes- Interpersonal relationships-Analysis of strengths & weaknesses.

Unit II Personality: perception- personality, Man-personal personality, Personality Factors- Factors of association- Personality Relationship at home-friends-environment educational factor- Situational Factors Conditional- Genetic-compulsory- spiritual-public relations factors.

Unit III Personality Traits-personality person- formation- factors influencing person habits of highly effective people & personality habits- Be proactive—Begin with the end in mind—Put first things first—Think win- Seek first to understand then to be understood – Synergize – Sharpen the saw

Unit IV Five Pillars of Personality Development - Introspection – Self Assessment – Self Appraisal – Self Development Self Introduction. Self Esteem - Term of self-esteem- symptoms- advantages- Do's and don'ts to develop positive – Positive self-esteem & negative self esteem

Unit V Mind mapping, Competency mapping & 360* assessment & development, Types of persons – Extrovert- Introvert- Ambivert person.

Text Book:

Basic Managerial Skill for all-Prentice –Hall of India Pvt ltd, New Delhi.

Books for Reference:

1. 7 Habits of highly effective people-Stephen Covey

2. You can win-Shiv Khera –McMillan India ltd.

3. Management thoughts-Pramod Batra.

4. Business Communication by Sri Jin Kaushal, VK Global Publications Pvt. Ltd., Delhi.

SEMESTER III			
Self-Study Course	**Entrepreneurial Development**		
Code: 17PHRSS2	**Hrs/Week: 0**	**Hrs/Sem:0**	**Credits: 1**

Objective:

- To enable the students to start their own enterprise.

Unit I

Introduction - Understanding the meaning of Entrepreneurialship - Characteristics of an Entrepreneur - Classification of the Entrepreneurs - Entrepreneurial Scene in India - Factors influencing Entrepreneurship

Unit II

Entrepreneurial growth - Role played by government and Non-Government agencies - EDP's, TIIC, SIDBI, PIPDIC, IDBI, IFCI, ETC. Problems and prospects of Women entrepreneurs - Rural Entrepreneurs - Small scale entrepreneurs and Export Entrepreneurs

Unit III

How to enter into Market? - Business idea generation Techniques - Identification of Business Opportunities - Marketing Feasibility - Financial Feasibility - Technical – Legal - Managerial and Locational Feasibility

Unit IV

Project Appraisal - Methods - Techniques - Preparation of Business Plan - Content of a Business Plan - Project Report.

Unit V

How to start an enterprise? - Franchising and Acquisition - Product Strategies - Pricing Strategies - Distribution Strategies - Promotional Strategies. How to be a successful Entrepreneur? - Learning to be Successful – Successful Entrepreneurs

Text Book:

Khanka - Entrepreneurial Development.

Books for Reference :

1. Jayshree Suresh - Entrepreneurial Development.
2. Saini - Entrepreneurship : Theory & Practice.
3. Gupta CB - Entrepreneurial Development.
4. Vasant Desai - Dynamics of Entrepreneurial Development and Management.

Ltd,

SEMESTER I	
Core III	Accounting for Managers

Code: 19PHRC13	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Vision: To equip the students with the conceptual framework and tools / techniques of management accounting so that efficient decisions are arrived at.

Mission: To enable the students to use their knowledge to assess a company's performance in relation to its past performance, competitors and industry to make managerial decision.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of accounting	1,4	Un , Re
CO-2	prepare final accounts	1,4	Ap
CO-3	understand the nature ,scope and functions of managerial accounting.	1,4	Un , Re
CO-4	prepare cash flow statement.	4	Ap
CO-5	prepare fund flow statement.	4	Ap
CO-6	understand the objectives and steps in budgetary control and prepare the various types of budget.	4,6	Un , Ap
CO-7	able to use the various types of ratios for managerial decision.	4,6	An ,Cr
CO-8	apply accounting knowledge for planning and control.	1,4,6	Un ,Ap

SEMESTER II	
Core III	Accounting for Managers

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Code: 19PHRC13	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Unit II Accounting

Accounting – Definition – Purpose – Functions -Preparation of final accounts –Journal – Ledger – Trail balance – Trading and Profit & Loss Accounts (Simple Problems)

Unit II Management accounting

Meaning, definition, nature, scope and functions – advantages and limitations – differences between cost accounting and management accounting – differences between management accounting and financial accounting.

Unit III Cash flow and fund flow statement

Cash flow and fund flow statement – their importance and limitations - preparation of cash flow and fund flow statements.(Simple problems)

Unit IV Budgetary control

Budgetary control – Definition – Objectives – Merits and limitations – Steps in budgetary control – types of budgets.(Production, Cash, Sales, Flexible).(Simple problems)

Unit V Ratio analysis

Ratio - Meaning – types of ratios – Merits and limitations – Ratio analysis (Activity Ratio, Liquidity ratio, Solvency ratio)(Simple problems).

Text Book

Pillai R.S.N and Bagavathi. Management Accounting. New Delhi: S. Chand Publications,2015.

Books for Reference:

1. Antony Atkinson and Robert S Kalplan. Management Accounting : Information for Decision Making and Strategy Execution. US: Prentice Hall, 2011.
2. Gupta RL & Gupta VK. Principles and Practice of Accounting. New Delhi: Sultan Chand & Sons, 2010.
3. Maheswari S.N.Management Accounting & Financial Accounting. Chennai; Vikas Publishers, 2010.

SEMESTER I			
Core IV	Psychology for Human Resource Management		
Code: 19PHRC14	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Vision: To nurture students to become intellectually competent professionals to serve the local and national community through scientific studies of human behavior, emotions and thoughts.

Mission: To gain realistic ideas about implementing the psychological knowledge, skills and attitudes in occupational pursuits, to improve one's own quality of life and the needs of the society.

Course Outcome:

CO No.	Course Outcome Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	Acquire the basic knowledge of psychology of Human Resource Management.	3	Un
CO-2	Explain the schools of psychology.	3	Un
CO-3	Understand the theories and measurement of intelligence.	1,3	Un
CO-4	Explain the concept, types and factors influencing perception.	1,3	An
CO-5	Know the process of learning, aptitude and attitude.	3	Un & Ap
CO-6	Determine the factors, causes, effects, classification of adjustment and develop ways to manage stress.	1,3	Ev & Cr
CO-7	Examine the functions of industrial psychologist.	3	Ev& An
CO-8	Discuss the meaning, factors, theories and Identify the ways of measuring personality.	3	Cr & Ap

SEMESTER I			
Core IV	Psychology for Human Resource Management		
Code: 19PHRC14	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Unit I **Introduction and Schools of Psychology:**

Psychology – Definition - Meaning. Schools of Psychology: Psycho analysis. Behaviorism – Gestalt Theory - Transaction Analysis.

Unit II **Intelligence and Perception:**

Intelligence: Definition – Meaning - Theories of intelligence -Measurement of intelligence.

Perception: Concepts – Types - Factors influencing perception – Perception of people at work and organisation.

Unit III **Learning, Aptitude and Attitude:**

Learning: Definition - Theories of learning - learning curve - transfer of learning. Aptitude: Definition - Measurement of aptitude.

Attitude: Definition – Nature - Formation of attitude - process of attitude change - measurement of attitude.

Unit IV **Adjustment and Stress:**

Adjustment: Meaning - Factors influencing Adjustments.

Stress: Definition - Causes and Effects of stress –Managing or Coping up with stress.

Unit V **Industrial Psychology and Personality:**

Industrial Psychology – Meaning – Scope - Role and Functions of industrial psychologist.

Personality: Concept - Meaning – Factors influencing personality development – Heredity and Environment – Theories and Measurement of personality.

Text Book:

Clifford. T. Morgan Kind, 2005, An Introduction to Psychology, Bombay, Tata McGraw Hill.

Books for Reference:

1. Bhatia.H.R, 1997, Abnormal Psychology, Tata McGraw Hill, New Delhi.

2. Page, JD, 1993, Abnormal Psychology, New York, McGraw Hill.

Hall of India, 2013.

SEMESTER II			
Core VII	Labour Legislation		
Code: 19PHRC22	Hrs/Week: 6	Hrs/Sem: 90	Credit: 4

Vision: To equip the students with the complete knowledge of all applicable statutory compliances in order to protect their organisation from any violation and also provide quality working environment and social life to all the staff.

Mission: To provide theoretical knowledge of all the applicable statutory laws and sensitise the students that these laws protect the interest of all the stakeholders and is in fact contributing to the long term interest and sustenance of the organisation.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	gain knowledge of labour laws and enable the students to acquire skills to handle employment relations.	2	Un , Ap
CO-2	familiarise the students to the practical problems inherent in the implementation of the labour statutes.	2	Un , Ev
CO-3	understand the basic concepts of Labour Legislation and labour related provisions in the constitution of India.	2	Un , Ev
CO-4	understand the structure and functioning of ILO.	2	Un
CO-5	examine the Acts related to health, safety and welfare and make use of the Acts in case of Factories contract labourers and plantation labours.	2	Un , Ap
CO-6	interpret the knowledge in laws related to social security and apply the laws according to the needs.	2 ,5	Ap
CO-7	understand the implications of labour laws for industrial relations to know how to resolve industrial relations and human relations problems and promote welfare of industrial labour.	2	Un , Ap
CO-8	be competent with the various legal aspects of women and children.	2	Un , Ap

SEMESTER II			
Core VII	Labour Legislation		
Code: 19PHRC22	Hrs/Week: 6	Hrs/Sem: 90	Credit: 4

Unit I Basic concepts:

Definition – Objectives of labour Legislation- History of Labour Legislation - Labour related provisions under Constitution of India - The ILO – Objectives of ILO- Structure of ILO – Impact of ILO on Indian Labour..

Unit II Laws related to Health, Safety and Welfare:

Factories Act, 1948 - The Unorganised Workers' Social Security Act, 2008 - The Contract Labour Act, 1970 (Regulation and Abolition) – Environment Protection Act,1986.

Unit III Laws related to social security

Employee Provident Fund and Miscellaneous Provisions Act, 1952 (EPFS, EPS, EDLIS) - Employee State Insurance Act, 1948 -Payment of Gratuity Act, 1972 - The Equal Remuneration Act, 1976.

Unit IV Laws related to Industrial Relations

The Trade Union Act, 1926 - The Industrial Employment (Standing Orders) Act, 1946 -The Industrial Disputes Act, 1947

Unit V Laws related to women and Children

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 - Maternity benefit Act, 1961 - The Child Labour Regulation and Abolition Act, 1986 – The Information Technology Act, 2000.

Text Book:

1. Kapoor.N.D.Hand Book on Industrial Law. New Delhi: Sultan Chand & Sons,2011.
2. Bare Acts with latest Amendments.

Books for Reference:

1. Mishra. S.N. Labour and Industrial Laws. Allahabad: Central Publishing House,2018.
2. Padhi.P.K. Labour and Industrial laws.New Delhi: PHI Learning Private Ltd,2017.

SEMESTER II			
Core IX	Recruitment and Selection		
Code: 19PHRC24	Hrs/Week: 6	Hrs/Sem: 90	Credit: 4

Vision: To equip the students with a blend of theory and application of the wide range of issues, principles, practices in recruitment and selection which are needed by them as HR professionals to save the organisation from performance related problems at a later stage.

Mission: To provide conceptual knowledge and operational dimensions in recruitment and selection process with the aim of improving the business by selecting the right candidates.

Course Outcome:

CO No.	Upon completion of this course students will be able to	PSO addressed	CL
CO-1	understand the skills needed for recruitment and selection.	5	Un
CO-2	describe the meaning, functions, objective, importance of recruitment and hiring process.	5	Un
CO-3	understand the meaning, sources, advantage and disadvantages of internal and external hiring and illustrate the process of internal and external hiring.	5	Un , Ap
CO-4	write application form, bio data and resume.	5	Cr
CO-5	determine the features, purpose, types, process, advantage and disadvantage of testing and interviewing.	5	Ev
CO-7	design different ability tests and practice interview techniques.	5	Cr , Ap
CO-8	discuss the purpose, methods of collecting reference data, contents of appointment order and medical examination and develop appointment orders.	5	Un ,Cr

SEMESTER II			
Core IX	Recruitment and Selection		
Code: 19PHRC24	Hrs/Week: 6	Hrs/Sem: 90	Credit: 4

Unit I

Hiring Process:

Recruitment: Definition – Meaning – Features – Objective – Purpose and Importance – Process - Hiring decision: Nature of hiring: Regular – Temporary - Full time - Part time – Apprentice – Contractual and Outsourcing. Existing post or new post to be created -Need analysis - Cost analysis and Job analysis.

Unit II

Internal and External Hiring:

Hiring Internally: Meaning – Definition – Advantages - Disadvantages in terms of cost, time, quality and suitability. Sources of internal recruitment: - Circulars, Intranet Advertisements, Employee referrals, Appointment or promotion - Hiring Externally: Meaning – Definition – Sources: Advertisement in Newspaper- TV/Radio- Internet- Search on the internet- 'Wanted' signboards- Consultants-Employment exchange- Campus recruitment- Employee referrals and unsolicited applications. Advantages and disadvantages of the above sources in terms of Cost, Time, Convenience, Reach of the targeted population, and Quality of applicant pool.

Unit III

Screening the candidates:

Application Forms: Meaning – Definition – Information - Purpose – Evaluation - Advantages and Disadvantages - Bio-data: Meaning – Definition – Purpose - Advantages and Disadvantages - Resume: Meaning – Definition – Purpose – Parts – Formats - Advantages and Disadvantages - Curriculum vitae: Meaning – Definition – Purpose – Preparing – Formats - Advantages and Disadvantages- Weighted application blanks: Meaning – Definition – Purpose – Constructing a WAB- Advantages and Disadvantages -Taking a behavioural approach to recruitment: Spotting personality patterns - Making basic assumptions - Predicting the future - Strategy Vs. technique.

Unit IV

Testing and Interviewing:

Testing: Meaning – Definition – Purpose - Advantages and Disadvantages.
Ability tests: Clerical ability test - Mechanical ability test - Mental ability test - Physical ability test - Personality assessment test - Typing test - Shorthand test - Computer proficiency test - Interviewing: Meaning – Definition – Features – Objectives – Advantages and Disadvantages. Interview process - Planning the interview - Getting started - Examining the 5 interview areas Examining the strengths & weaknesses - Allowing candidates to ask questions at the end - Explaining the procedure of selection and concluding with a happy note - Making the decision.

Unit V

Reference checking & Appointment orders:

Reference Checking: Meaning – Definition – Purpose – Methods of Collecting Reference Data. Verification of character - Criminal antecedents - Previous work behavior - Educational qualifications - Verification of community certificates in public sector companies - Appointment Order: Meaning – Definition – Purpose - Contents of appointment letter, hard copy (or soft copy) - Method of delivery and retrieving the acknowledgement copy. Medical Examination & acceptance of offer for joining.

Text Book:

Aswathappa K Recruitment and Selection. New Delhi: Tata McGraw Hill Publishing Company Ltd, 2005

Books for Reference:

1. Lilly M. Berry.Employee Selection. California: Thomson Publications, 2002.
2. Robert W. Wendover High performance Hiring. California: Crisp Publication, 2011.

SEMESTER II			
Core X	Total Quality Management		
Code: 17PHRC25	Hrs/Week: 4	Hrs/Sem: 60	Credit: 4

Vision: To enable the students to understand the basic principles and techniques of Total Quality Management for effective decision making

Mission: To equip the students to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector. Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	discuss the concept of quality and total quality management.	4	Un
CO-2	gain insights on TQM approaches	4	Ev
CO-3	define and list the steps in supplier partnering.	4	Re
CO-4	gain knowledge on the tools and techniques of TQM	4,6	Re , Ap
CO-5	gain knowledge on the concept of six sigma and quality circles	4	Re , Ap
CO-6	discuss the concept of benchmarking	4	Un
CO-7	state the quality systems and ISO 9000	4	Re
CO-8	examine ISO 14000.	4	An

SEMESTER II			
Core X	Total Quality Management		
Code: 19PHRC25	Hrs/Week: 4	Hrs/Sem: 60	Credit: 4

Unit I

Introduction to Quality and Total Quality Management

Introduction to Quality – Definitions of quality -Need for quality - Dimensions of product and service quality - Definition of TQM - Basic concepts of TQM - Characteristics of TQM - Framework of TQM – Principles of TQM - Contributions of Deming, Juran and Crosby – Barriers of TQM

Unit II

TQM Approaches and Supplier Partnering

Continuous process improvement: introduction - Input/ Output Process Model - Juran Quality Trilogy - PDSA cycle - 5S House Keeping- Benefits of implementing 5S - Kaizen - Features of Kaizen Supplier partnership: Partnering - Supplier selection - Supplier Rating.

Unit III

TQM Tools and Techniques - 1

The seven traditional tools of quality: Flowchart – Check sheet – Histogram – Pareto Diagram - Cause and effect Diagram - Scatter Diagram - Control Chart New management tools : Affinity Diagram – Relationship Diagram – Tree Diagram – Matrix Diagram – Matrix Data Analysis – Decision Tree – Arrow Diagram

Unit IV

TQM Tools and Techniques - 2

Six sigma: Concept- Six Sigma Process (DMAIC) – Advantage of Six Sigma Quality Circles: Concept – Objectives –Characteristics – Structure of Quality Circles Bench marking: Definition - Reason to bench mark – Types of Benchmarking - Bench marking process- Benefits and Dangers of Benchmarking

Unit V

Quality Systems

Need for ISO 9000 – Benefits of ISO 9000 - ISO 9001-2000 Requirements Quality System - Introduction to Quality System - Elements - Documentation - Quality Auditing ISO 14000 – Concepts - Requirements - Benefits – TQM Implementation in manufacturing and service sectors (Case Study).

Text Book:

1. Jayakumar.V and Raju.R. Total Quality Management. Chennai: Lakshmi Publications, 2015

Books for References:

1. Dale H. Besterfiled, et at.Total Quality Management.Hongkong: Pearson Education Asia, 2006.

2. Suganthi L. and Anand Samuel.Total Quality Management.United States: Prentice Hall (India) Pvt. Ltd, 2006.

SEMESTER III			
Core XIII	**Compensation Management**		
Code: 19PHRC32	**Hrs/Week: 5**	**Hrs/Sem:75**	**Credits: 4**

Vision: To provide a clear frame work of the concepts of compensation management to facilitate the achievement of the strategic goal of establishing a comprehensive and competitive compensation plan for the organisation.

Mission: To develop an understanding of the concepts of compensation management and impart skills in analysing the reward management so that they provide the organisation with clear and consistent compensation tools.

Course Outcome

CO No.	Upon completion of this course students will be able to	**PSO addressed**	**CL**
CO-1	summarize the concepts of Compensation Management.	5	Un
CO-2	describe the objectives, types, theories, factors of compensation administration and demonstrate compensation administration.	5	Un
CO-3	understand and calculate compensation structure and ESOP	5	Un , Ap
CO-4	examine the legal framework of wages and salary administration.	2	An
CO-5	determine the determinants and types of incentives.	5	Ev
CO-6	understand the types of rewards for employees	5	Un
CO-7	understand the meaning, objectives, features and forms of employee benefits and services.	5	Un
CO -8	investigate the types of fringe benefits and other benefit programmes.	5	An

SEMESTER III			
Core XIII	**Compensation Management**		
Code: 19PHRC32	**Hrs/Week: 5**	**Hrs/Sem:75**	**Credit: 4**

Unit I **Compensation Administration:**

Definition of compensation –Objectives of Compensation Administration – Types of Compensation – Theories of Compensation: The Equity theory – Expectancy theory – The Contingency theory – Concept of Wages – Kinds of Pay Structure – Factors influencing Compensation Administration – Steps in Compensation Administration.

Unit II **Compensation Structure:**

Concept of Salary Structure - Salary Progression - Methods of Payment -Limitations of Job Related Compensation - Competency based Compensation - Executive Compensation – Team Compensation. ESOP- Meaning – Working – Advantages and disadvantages.

Unit III **Legal Framework of wage and salary Administration:**

Minimum Wages Act, 1948- Payment of Wage Act, 1936 – Payment of Bonus Act 1965

Unit IV **Incentives and Rewards:**

Definition –Determinants of Incentives – Types of Reward – Wage Incentives – Objectives of Wages Incentive Schemes – Types of Wages Incentive Plans – Halsey Premium Plan – Rowan Premium Plan – Taylor's Differential Piece rate Plan – Incentive Plans for White collar workers – Incentive Plans for Management employees.

Unit V **Employee Benefits and Services:**

Fringe Benefits – Meaning – Features –Objectives of Fringe benefit and Service Programmes – Forms of Fringe Benefits - Coverage of Benefits – Employee Security Payments – Payment for time not Worked – Problems Raised by Benefit Programmes

Text Book:

1. C.B. Mamoria and S.V. Gankar.*Personnel Management*. New Delhi: Himalaya Publishing House,2011.
2. Dr.Mousumi S. Bhattachariya. *Compensation Management*. New Delhi: Anurag Jain Publication, 2009.
3. KapoorN.D.*Hand Book of Industrial Law*. New Delhi: Sultan Chand Publications,2013.

Books for Reference:

1. Pravin Durai.*Human Resource Management.* New Delhi: Pearson Education, 2016.

SEMESTER III			
Core XIV	**Statistics For Management**		
Code: 19PHRC33	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credit: 4**

Vision: To equip the students with the concepts and tools of statistics and make them competent to analyse statistical data and arrive at apt solutions as per business requirements and organisational goals.

Mission: To impart knowledge about various statistical concepts, tools and analytical procedures and also equip them to process the data meaningfully and accurately with a view to provide effective solutions for the management of the organisation.

Course Outcome

CO No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	learn the basic statistical methods with a focus on the application of these methods to the business world.	6 ,7	Ap
CO-2	understand the basic statistical concepts such as types of data, classification of data, frequency distribution and construct frequency distributions.	6 ,7	Un ,Ap
CO-3	become aware of the concepts of sampling, sampling distributions and estimation.	6 , 7	An
CO-4	understand the concept and steps of performing a hypothesis (z, t, F) test and use it as a tool for statistical decision making in a business context.	6 ,7	An , Ev
CO-5	understand the assumptions of an ANOVA model and apply ANOVA in a business context.	6 , 7	Un , Ap
CO-6	understand the concept of Chi-square and use it as an analytical tool for making business decisions.	6 , 7	Un ,Ap
CO-7	appreciate the importance and application of non-parametric tests.	6 , 7	Un
CO-8	use correlation and regression models to analyse the relationships between variables.	6 ,7	Un, Cr

SEMESTER III			
Core XIV	**Statistics For Management**		
Code: 19PHRC33	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits: 4**

Unit I: Introduction

Statistics - Definition, Types, Importance and Scope, Limitations. Types of Data, Classification of data, Organising data, Methods of data classification. Frequency Distribution, constructing a frequency distribution, Types of frequency distribution.

Unit II: Sampling Distribution and Estimation

Introduction to sampling distributions, sampling distribution of mean and proportion, application of central limit theorem, sampling techniques.

Estimation: Point and Interval estimates for population parameters of large sample and small samples, determining the sample size.

Unit III: Testing Of Hypothesis: Parametirc Tests

Hypothesis testing: Parametric Tests : Introduction to hypothesis and hypothesis testing , general procedure for hypothesis testing, direction of the hypothesis test, errors in hypothesis testing ,hypothesis testing for population parameters with large samples (z-test), Hypothesis testing for means of small samples (t-test), Hypothesis testing based on F-distribution for two sample standard deviations. ANOVA - one and two way.

Unit IV: Chi – Square and Other Non-Parametric Tests

Introduction, Advantages and limitations of Non-parametric Methods, Properties of Chi-square distribution, Conditions for the application of Chi-square test, Contingency table analysis: Chi-square test of Independence, Chi-square tests for goodness of fit, Chi-square test for population variance.

The sign test for paired data, Mann-Whitney U-test, Wilcoxon Matched pairs test, Kruskal –Wallis test.

Unit V: Correlation and Regression Analysis

Correlation analysis – Meaning, Types of Correlation, , Coefficient of Determination, Karl Pearson's correlation coefficient and Spearman Rank Correlation coefficient, method of least squares .

Regression analysis – Meaning, Methods to determine regression coefficients- Least squares Normal equations – Deviations method.

Text Book:

1. Richard I. Levin, David S. Rubin,.*Statistics for Management*. Chennai: Pearson Education, 2011.
2. Sharma.J.K. *Business Statistics*. Chennai: Pearson Education, 2006.

Books for Reference:

1.Gupta.S.P & Gupta.M.P. *Business Statistics*.New Delhi: Sultan Chand & Sons, 2015.

SEMESTER III			
Elective I	**Performance Management**		
Code:19PHRE31	**Hrs. / Week : 4**	**Hrs / Sem : 60**	**Credit: 3**

Vision: To instill the importance of performance management and to effectively implement and manage a Performance Management System in support of the strategic goals of the organization

Mission: To provide students with the necessary skills and critical understanding about the performance management process, methods and evaluation.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire in-depth knowledge about performance management.	5	Un
CO-2	gain a working knowledge of performance management systems.	5	Un
CO-3	distinguish between performance management and performance appraisal	5	Ev
CO-4	understand about KPA's and KRA's	5	Un
CO-5	the different methods of measuring performance	5	Un
CO-6	gain knowledge and analyse about the different performance tools.	5	Un ,An
CO-7	learn and conduct appraisal interviews and BARS	5	Un, Ap
CO-8	acquire knowledge about the performance evaluation	5	Un

SEMESTER III			
Elective I	**Performance Management**		
Code:19PHRE31	**Hrs. / Week : 4**	**Hrs / Sem : 60**	**Credit: 3**

Unit I **Introduction to Performance Management:**

Performance Management: Meaning **-** Definition –Need – Scope - Integrated approach- Features – Principles – Dimensions - Process – Benefits.

Performance Appraisal: Objectives- Purpose – Process – Criteria – Difference between Performance Appraisal and Performance Management.

Unit II **Performance Planning**

Performance Planning – Meaning – Definition - Need - Objective- Planning Individual performance – Key Performance areas and Key result areas – Task and Target – Goal setting exercises – Process.

Unit III **Measuring Performance –** Principlesof Measurement**-–** Criteria for performance – Balanced Score card – Performance Review – Outcome Metrics – Economic Value Added and other Economic Measures

Unit IV **Performance Management Tools:**

Tools for Measuring Performance – HR Scorecard - Assessment Centre - Tools used in Assessment Centres - Self-appraisal - HR Accounting – 360 Degree Appraisal -540 Degree Appraisals - Appraisal Interview - Behaviorally Anchored Rating Scale (BARS)

Unit V **Performance Development and Evaluation:**

Development Plan -Performance Management Documentation - Evaluating Performance Management System - Implementing Performance Management System - Performance Analysis - Evaluation and Maintenance of Performance Evaluation- Check- List – Evaluation - Review meetings- Attitude surveys- Focus groups- Performance monitoring: Methods of Monitoring.

Text Books:

1. Armstrong. M.*Performance Management- The New Realities*.New Delhi: Kogan Page India Ltd, 2006.
2. Rao.T.V. *Performance Management: Towards Organisational Excellence*.Pune: Vikas book house, 2015.

Reference Books:

1. Armstrong.M. *A Hand book of Reward Management Practice*. New Delhi: Kogan Page India Ltd, 2006.
2. Rao, T.V.*Performance Management and Appraisal System*. New Delhi: Excel Books, 2004.

SEMESTER III			
Elective I Business Ethics, Corporate Social Responsibility and Governance			
Code: 19PHRE31	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 3**

Vision: To provide a strong grounding on theory, through the understanding of Business Ethics, Corporate Social Responsibility and Governance in real-life situations and be able to find solution for 'most good'.

Mission: To enable the students to gain understanding of the contemporary issues of corporate governance in the wake of changing business ambience and appreciate ethical practices in business/ profession.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the nature and characteristics of Business ethics.	6	Un
CO-2	Gain knowledge on the Evolution of Business Ethics and Kohlber's Six Stage Moral Development .	6	Un
CO-3	examine the concepts of management of ethics in the wake of changing business ambience.	4,6,7	An , Ap
CO-4	analyse the role and function of ethical managers in real-life situations.	5,6	An , Ap
CO-5	gain knowledge on the Legal Aspects of Ethics and Economic Environment and its implications for business.	4,6,7	Un
CO-6	gain knowledge on the concept of corporate governance.	4,6	Ap , An
CO-7	analyse the cases in corporate governance.	4,6	Ap ,An
CO-8	identify the challenges and implementation of Corporate Social Responsibility.	6	Ap

SEMESTER III			
Elective I Business Ethics, Corporate Social Responsibility and Governance			
Code: 19PHRE31	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 3**

Unit I Introduction

Ethics –Meaning– objectives of ethics – characteristics -nature of ethics in business – characteristics of business ethics – need for business ethics – Concepts and Theories of Business Ethics - evolution of business ethics – Kohlber's Six Stage Moral Development Process – Utilitarianism, Deontology and Virtue Theory.

Unit II Ethics and Business

Ethics and Business: - Ethics in practice - Ethics for managers- role and function of ethical managers- Environmental Ethics - Marketing Ethics - Ethical Issues in Human Resource Management - Corporate Ethics.

Unit III Legal and Economic Environment

Political – legal environment- Provisions of the Indian constitution pertaining to Business -political setup – major characteristics and their implications for business - prominent features of MRTP &FERA - Economic Environment -Philosophy of economic grow and its implications for business

Unit IV Corporate Governance

Corporate Governance: an overview – Theories of governance - Boards in Corporate governance: Types and Roles – selection of Members – responsibilities of Board - Boards in Public Sector Vs Private Sector – current issues on composition of Board of Directors – cases in Corporate Governance.

Unit V Corporate Social Responsiblity

Definition- Evolution- need for CSR; theoretical perspectives - Corporate citizenship – Business Practices - Strategies for CSR - challenges and implementation - Government's Role – Awards by Institutions: Debate on Methodology of Evaluation of CSR Initiatives.

Text Books:

1. Fernando A. C.*Business Ethics and Corporate Governance*. New Delhi: Pearson Education, 2012
2. Sherlekar S.A, *Ethics in Management*,Chennai: Himalaya Publishing House, 2009.

Books for Reference:

1. Shaw W.H. *Business Ethics*.USA: Cengage Learning, 2007.
2. William B. Werther and David B. Chandler.*Strategic corporate social responsibility*.California: Sage Publications Inc, 2011.

SEMESTER- III			
Elective II	**Managerial Economics**		
Code: 19PHRE32	**Hours / Week :4**	**Hrs / Semester: 60**	**Credit :3**

Vision: To emphasize the influence of micro and macroeconomics on managerial decision making and to explain the supply, demand and cost functions, its relative impact on the economy and the company

Mission: To use the concepts and tools of Economics analysis as relevant for managerial decision making and to provide a fair understanding of the aggregate economic system within a firm operates.

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of managerial economics.	4	Un
CO-2	gain knowledge on the nature and scope of managerial economics.	4	Re
CO-3	understand and determine the types of demand	4	Un , Ap
CO-4	infer the supply factors	4	Re
CO-5	understand the concept of production and cost.	4	Un , Ap
CO -6	gain knowledge of market structure and pricing.	4	Un , Ap
CO-7	gain insights to the macro economic factors.	4	Un
CO-8	gain knowledge on the monetary and fiscal policies.	4,7	Un

SEMESTER- III			
Elective II	**Managerial Economics**		
Code: 19PHRE32	**Hours / Week :4**	**Hrs / Semester: 60**	**Credit :3**

Unit – I Introduction

Meaning, nature and scope of Managerial Economics– Relationship between Economic theory and Managerial Economics –Role of Managerial Economics in Business Decisions- Concepts of Opportunity cost, Time Value of Money -Role in business decision making

Unit – II Demand and Supply Analysis

Meaning -Types and determinants of demand- Law of Demand – Giffen Paradox - Elasticity of Demand: Types, Measures and Role in Business Decisions- Determinants of supply- Elasticity of Supply- Measures and Significance.

Unit – III Production and Cost Function

Production function – Cost concepts – Cost output relationship – Economy of scale – Cost functions and cost-output relationship – Economics and Diseconomies of scale – Cost control and Cost reduction- Cost Behaviour and Business Decision- Relevant costs for decision-making.

Unit - IV Market Structure and Pricing

Market structure – Characteristics -Pricing and output decisions under Monopoly, Duopoly, Monopolistic Competition and Perfect Competition –Penetrative and Skimming Pricing- Government intervention in pricing –Price discrimination

Unit – V Macro-Economic Factors and Managerial Decision:

Business cycle –Phases and Business Decision- Factors causing Inflation and Deflation- Control measures – Balance of payment Trend and its implications in managerial decision- Aggregate and concepts – GNP, GDP, GDS – National income – Business cycle – Inflation and Deflation — Monetary and Fiscal policies.

Text Books:

1.G.S.Gupta. *Managerial Economics*.New Delhi: Tata Mc Graw Hill,1990.

2.Varshney R.L and Maheshwari K.L . *Managerial Economics*.New Delhi: Sultan Chand & Sons,2014.

Books for Reference:

1. Dominick Salvatore.*Managerial Economics in a Global Economy*. Chennai*:* Oxford Univ. Press, 2011.

2. N. Gregory Mankiw.*Principles of Economics*.New Delhi: Thomson learning ,2007.

SEMESTER III			
Elective II	**Business Environment**		
Code: 19PHRE32	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 3**

Vision: To enable students to understand and appreciate the influence of the forces in the external economic, political, legal, social, and technological environment on business.

Mission: To impart theoretical knowledge that provides a framework to understand the existing external environment and help in preparing appropriate strategies for organisations to face the challenges**.**

Course Outcome

CO No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**C L**
CO-1	understand the Overview of Business Environment	4	Un
CO-2	gain knowledge of Business and Its Environment and the influence of the forces in the external environment.	4,6	An ,Ev
CO-3	understand the concept of Economic System.	4	Un
CO-4	understand the concept of Political Environment	4	Un ,Ap
CO-5	gain knowledge of the Economic Environment	4,6	Un , An
CO-6	understand the influence of Social Environment in business.	4,6	Un ,Ap
CO- 7	gain knowledge of the technological developments and the impact of informational technology.	4,6	Un , Ap
CO-8	explain the Economics of development and help in preparing appropriate strategies for organisations to face the challenges.	4	Re, Un

SEMESTER III			
Elective II	**Business Environment**		
Code: 19PHRE32	**Hrs/Week: 4**	**Hrs/Sem: 60**	**Credit: 3**

Unit I Overview of Business Environment
Basic Concepts of Functioning of an Economy - National Income - Business and Its Environment – Political, Economic, Socio-cultural, Technological, Legal and Ecological environment - India's Population and Its Impact on the Economy.

Unit II Economic System
Economic System -Capitalism- Socialism - Mixed Economy -Public Policies - Business Economic -Monetary and Fiscal Policies- Foreign Trade Policy. Economic Legislation – MRTP - Competition Act – FERA – FEMA- Intellectual Property Rights.

Unit III Political and Economic Environment
Political environment: Government and Business – Political Systems, Political Stability and Political Maturity as conditions of business growth- Role of Government in Business

Economic Environment: Phase of Economic Development and its impact- GDP Trend and distribution and Business opportunities- Monetary System

Unit IV Social and Technological Environment
Societal Structure and Features-– Social and cultural factors and their implications for business- Technology Development - Technology Trade and transfer- Technology Trends in India- Role of Information Technology

Unit V The Economics of Development
The Economics of development - Stages and Strategies of Economic Growth -Role of the State in Economic Development-Economic Planning; Industrial and Licensing Policies (1951-91); New Economic Policy (1991)- India in the Global Economic System – FDI-WTO -World Bank- IMF.

Text Book:
Francis Churunilam.,*Business environment: Text and Cases*.Bangaluru: Himalaya Publishing House,2009.

Books for Reference:
1.Fernando. A.C. *Business Environment* . New Delhi: Pearson Education,2011.
2. Paul, Justin .*Business Environment: Text andCases*. New Delhi: McGraw Hill Education,2010.
3. Saleem, Shaikh .*Business Environment.* New Delhi: Pearson Education,2015.

SEMESTER IV			
Elective III	**International Human Resource Management**		
Code: 19PHRE41	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credit: 3**

Vision: To enable the students to understand the complexities of managing human resources in a multinational context**.**

Mission: To develop an understanding of the the importance and relevance of international HRM practices that helps international companies to gain competitive advantage**.**

Course Outcome

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the concept of International Human Resource Management.	1,5	Un
CO-2	gain knowledge on the Cross-border Alliances and SMEs.	4	Un
CO-3	examine the concepts of Staffing International Assignments.	1,5	An , Cr
CO-4	explain the concept of the Roles of Expatriates and Non-Expatriates.	1,5	Ap, An
CO-5	gain knowledge on International training and development.	1,5	Un
CO-6	utilize and apply the knowledge in managing human resources in offshoring countries.	1,5	Ap, An
CO-7	analyse the key issues in International Industrial Relations.	1,5	Re,An
CO-8	understand the concept of trade unions and response of trade unions to multinationals.	1,5,6	Un

SEMESTER IV			
Elective III International Human Resource Management			
Code: 19PHRE41	**Hrs/Week: 5**	**Hrs/Sem: 75**	**Credit: 3**

Unit I Introduction to IHRM

Definition - Differences - Variables Moderating differences - Path to Global Status – Control Mechanism.

Unit II Cross-border Alliances and SMEs

Cross-border Alliances – Cross-border mergers and acquisitions – International Equity Joint Ventures – International SMEs.

Unit III Staffing International Assignments

Approaches to staffing - Transferring staff for international business activities –Roles of Expatriates and Non-Expatriates - Issues in staff selection - Factors moderating performance - Selection criteria – Dual Career Couples.

Unit IV International Training and Development

Expatriate training - Pre-departure training programmes - Developing staff through - international assignments - Performance management – International Compensation-Standardization and Localization of HRM Practices – Managing human resources in offshoring countries

Unit V International Industrial Relations

Key Issues in International Industrial Relations - Trade unions and international industrial relations - Response of trade unions to multinationals.

Text Book:

Dowling, Peter J, Marion Festing, and Allen D. Engle .*International Human Resource Management*.New Delhi: Cengage Learning,2015.

Books for Reference:

1. Aswathappa, K. and Sadhana Dash ..*International Human ResourceManagement*. New Delhi: McGraw Hill Education,2013.
2. Edwards, Tony and Chris Rees .*International Human ResourceManagement* .New Delhi:
Pearson Education,2013.

SEMESTER I			
Core II	Human Resource Management		
Code: 21PHRC12	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives:

- To provide a strong grounding in broad based fundamental Human Resource management, knowledge and skills and to prepare students for a meaningful and productive career as Human Resource professionals.
- To develop the analytical skills of the students to think critically so that they align the HRM concepts and strategies with the organisation.

Course outcome:

CO No.	Upon completion of this course students will be able to	PSOs Addressed	Cognitive Level
CO -1	summarize the concepts of Human Resource Management	1	Un
CO-2	interpret the objectives, scope, functions, importance and evolution of HRM and personnel Management.	1	Un
CO-3	examine the approach and process of job design, job analysis, job specification and job description.	1	An
CO-4	formulate the process of selection, placement.	5	An, Cr
CO-5	understand and explain and analyse the induction programme.	1	Un, An
CO-6	examine the process of performance appraisal and potential appraisal.	1	An
CO-7	understand the concept of QWL and QC.	1	Un
CO 8	evaluate job satisfaction, morale, industrial peace and harmony.	1	Ev

SEMESTER I			
Core II	Human Resource Management		
Code: 21PHRC12	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Unit I **Introduction to Human Resource Management**

Introduction: Meaning – Scope – Objective – Functions - Importance of Human resource management – Personnel Management and HRM – Similarities and Dissimilarities - Evolution of HRM - Organisation of HRM - Line and staff responsibility - Role of Personnel manager and HR manager – Human resource management practices in India- Jobs and careers in HRM.

Unit II **Analyzing work and Designing jobs**

Job design: Definition – approaches - job design options

Job analysis: Definition – process - benefits of job analysis- potential problems. Job Specification: Definition - Process. Job Description: Definition - Content of Job Description.

Unit III **Recruiting, Selecting, Inducting and Placing New Hires**

Recruitment: Definition- Meaning- Features- Objectives - Process .

Selection: Definition – Meaning - Selection Process – barriers to effective selection. Induction: Definition – Meaning – Objectives - Benefits of Induction Programme - Contents of Induction Programme- Phases of Induction Programme. Placement: Definition – Meaning- Placement Process.

Unit IV **Performance Management and Compensation Management**

Performance management: Concept and process - performance appraisal, - potential appraisal. Compensation management: Concept - Forms of Compensation - Types and Structure of Rewards – Objectives of Compensation Management- Factors influencing Compensation Management - Essential elements of a compensation system.

Unit V **e-HRM**

Nature of e-HRM - e-HR activities - e- Recruitment – e- Selection –e-Performance Management – e- Learning – e- Compensation.

Text Book:

Aswathappa.K. *Human Resource Management*. New Delhi; Tata McGraw-Hill Publishing Company Ltd, 7th Edition, 2017.

Books for Reference:

1. Stephen P.Robbins and Decenzo. *Human Resource Management*. New Delhi; Prentice Hall of India Private Ltd, 11th Edition, 2011.
2. KhankaS.S.*Human Resource Management*.NewDelhi;S. Chand & Company Ltd, 2nd Edition,2007.

SEMESTER I			
Core III	Accounting for HR Managers		
Code: 21PHRC13	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives:

- To equip the students with the conceptual framework and tools / techniques of management accounting so that efficient decisions are arrived at.
- To enable the students to use their knowledge to assess a company's performance in relation to its past performance, competitors and industry to make managerial decision.

Course Outcome

CO No.	On completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the concept of accounting	1,4	Un , Re
CO-2	prepare final accounts	1,4	Ap
CO-3	understand the nature ,scope and functions of managerial accounting.	1,4	Un , Re
CO-4	prepare cash flow statement.	4	Ap
CO-5	prepare fund flow statement.	4	Ap
CO-6	understand the objectives and steps in budgetary control and prepare the various types of budget.	4,6	Un , Ap
CO-7	able to use the various types of ratios for managerial decision.	4,6	An ,Cr
CO-8	apply accounting knowledge for planning and control.	1,4,6	Un ,Ap

SEMESTER I			
Core III	Accounting for HR Managers		
Code: 21PHRC13	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Unit I **Accounting**

Accounting – Definition – Purpose – Functions -Preparation of final accounts –Journal – Ledger – Trail balance – Trading and Profit & Loss Accounts (Simple Problems)

Unit II **Management accounting**

Meaning, definition, nature, scope and functions – advantages and limitations – differences between cost accounting and management accounting – differences between management accounting and financial accounting.

Unit III **Cash flow and fund flow statement**

Cash flow and fund flow statement – their importance and limitations - preparation of cash flow and fund flow statements.(Simple problems)

Unit IV **Budgetary control**

Budgetary control – Definition – Objectives – Merits and limitations – Steps in budgetary control – types of budgets.(Production, Cash, Sales, Flexible).(Simple problems)

Unit V **Ratio analysis**

Ratio - Meaning – types of ratios – Merits and limitations – Ratio analysis (Activity Ratio, Liquidity ratio, Solvency ratio) (Simple problems).

Text Book

Pillai R.S.N and Bagavathi. *Management Accounting.* New Delhi; S. Chand Publications, 4th Edition, 2015.

Books for Reference:

1. Antony Atkinson and Robert S Kalplan. *Management Accounting: Information for Decision Making and Strategy Execution*. US;Prentice Hall, 6th Edition, 2011.
2. Gupta RL & Gupta VK. *Principles and Practice of Accounting*.NewDelhi ;Sultan Chand & Sons, 14th Edition, 2010.
3. MaheswariS.N.*Management Accounting & Financial Accounting*.Chennai;Vikas Publishers, 2nd Edition, 2010.

SEMESTER I			
Core IV	Organisational Behaviour		
Code: 21PHRC14	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Objectives:

- To enable the students to understand the various dimensions of organizational behaviour.
- To develop the students with the determinants of intra – individual, inter – personnel and inter – group behavior in organizational setting and to equip them with behavioural skills in managing people at work.

Course Outcome

CO No.	Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the concept of Organisational behaviour and Personality.	1,3	Un
CO-2	gain insights on Perception and Attitude.	3	Re
CO-3	understand the concept of Learning	3	Un
CO-4	examine the concepts and theories of Motivation and Leadership.	1,3	An
CO-5	understand the Characteristics and types of Group behaviour.	3	Un
CO-6	describe and apply the concept of Team Building.	1,3	Re , Ap
CO-7	evaluate the Organisational change and reasons for Organisation Change.	3	Ev
CO-8	examine the concept of Organisation Development and Effectiveness.	3	An

SEMESTER I			
Core IV	Organisational Behaviour		
Code: 21PHRC14	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Unit-I **Introduction to Organisational Behaviour and Personality**

Organizational Behaviour: Definition - Nature and Scope – Objectives – Evolution - Models of Organisational Behaviour – Autocratic – Custodial - Supportive - Collegial. Personality: Definition - Determinants of Personality - Types of Personality – Theories of Personality - Sigmund Freud's four stages of Personality - Ericson's eight life stages.

Unit-II **Perception, Attitude and Learning**

Perception: Definition - Perception Process - Factors affecting Perception. Attitude: Concepts - Formation of Attitude - Types of Attitude – Measurement of Attitude. Learning: Meaning - Definition- Determinants of Learning- Learning Theories - Classical Conditioning - Operand Learning - Cognitive Theory - Social Learning Theory.

Unit-III **Motivation and Leadership**

Motivation: Meaning – Concepts - Theories of Motivation –Content theories- Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - McGregor's Theory X and Theory Y- Alderfer's ERG theory- McClelland's three needs theory. Process theories- Vroom's expectancy theory- Porter's & Lawler's expectancy theory- Adam's equity theory. Leadership: Definition – Functions - Leadership Styles - Leadership Theories - Trait Theory -Behavioral Theory - Managerial Grid Theory.

Unit-IV **Group Behaviour and Team Building**

Group Behaviour: Definition- Characteristics of a Group - Types of Groups - Group Formation and Development - Group Role - Inter-Group Behaviour - Inter-Group Conflict -Group Decision Making. Team Building: Meaning - Types of Team - Team Building Process.

Unit-V **Organisational change, Development and Effectiveness**

Organisational Change and Development: Reasons for Organisational Change – Types of Change - Planned Change - Resistance to Change and Managing Change. Organisational Development (OD): Meaning – Objectives - Models of OD and OD Interventions - Organisational Effectiveness: Definition - Approaches to Organisational Effectiveness –Factors Influencing Organisational Effectiveness.

SEMESTER I			
Core V	Industrial Relations		
Code: 21PHRC15	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Objectives:

- To make the students fully competent to meet the challenges in the contemporary and emerging industrial relations which is becoming more complex due to technological interventions and globalization.
- To impart theoretical knowledge that provides a framework to understand the existing industrial relations and the relationship between various stake holders which will enable the students to resolve the challenges in industries and organisations.

Course Outcome

CO No.	On completion of this course students will be able to	PSOs Addressed	C L
CO-1	understand the interaction pattern among labour, management and the State.	2 ,1	Un
CO-2	have a basic knowledge of the Indian Industrial Relations System and it's distinctive features	2 ,1	Un
CO-3	understand the various approaches to Industrial Relations.	2,3	Un
CO-4	examine the concepts, functions, structures and evaluate the problems of trade union.	2	Ev
CO-5	understand the importance, types and process of collective bargaining and discuss the negotiation process during collective bargaining.	2,3	Re , An
CO-6	analyse and apply the concept, forms ,levels of WPM and evaluate the reasons for failure of WPM.	2,3	An, Ap
CO- 7	be efficient enough to handle the grievance measures according to the changing scenario of social and industrial environment.	2,3	Un, Ap
CO -8	state the causes for indiscipline and analyse the code of discipline in Industry.	2,3	Un , Ap

SEMESTER I			
Core V	Industrial Relations		
Code: 21PHRC15	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Unit I **Industrial Relation**

Meaning – Introduction - Concept - Importance of Industrial Relations - Scope and Aspects of Industrial Relations - Components of Industrial Relations - Factors affecting Industrial Relations–Perspectives /Approaches to Industrial Relation.

Unit II **Trade unions**

Definition – Features - Functions of Trade unions in India – Principles to regulate Trade Union Function–Types and Structure of Trade Unions - Union Security - Trade union movement in India - Problems of Trade Union.

Unit III **Collective bargaining**

Meaning- Features – Importance – Principles - Process - Forms of Collective Bargaining – Content and coverage of Collective Bargaining Agreement – Collective Bargaining Agreement at different Levels - Process of Negotiation during Bargaining – Recent Trends in Collective Bargaining.

Unit IV **Workers Participation in Management**

Concept – Need for WPM - Objectives of WPM – Forms of Participation – Levels of Participation – Forms of Workers Participation in India – Reasons for failure of WPM in India.

Unit V **Grievance and Discipline**

Grievance: Concept – Causes – Pre-requisites of a Grievance Procedure – Procedure for settlement – Model Grievance Procedure.

Discipline: Definition- Causes of Indiscipline – Objectives of Discipline – The Red Hot Stove Rule - Disciplinary Action - Procedure for punishment – Types of Punishment – Chief features of the Code of Discipline – Objectives of the Code of Discipline- Code of Discipline in Industry.

Text Book:

1. Mamoria, Mamoria and Gankar. *Dynamics of Industrial Relations*. New Delhi;Himalaya Publishing House,13th Edition, 2015.

Book for Reference:

1. ArunMonappa. *Industrial Relation*.NewDelhi ;Tata McGraw Hill, 2nd Edition, 2012.
2.VenkataRathnam C.S and Manoranjan Dhal. *Industrial Relation*.NewDelhi;Oxford University Press, 2nd Edition,2017.

SEMESTER II			
Core VI	Human Resource Planning and Development		
Code: 21PHRC21	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Objectives:

- To give an in-depth knowledge of the tools and techniques used by organizations in HR Planning and Development.
- To enable the students to link the human resource planning and development functions to organization's strategies to the meet current challenges.

COURSE OUTCOME:

CO No.	On completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the objectives, importance and techniques of human resource planning.	1,3	Un
CO-2	know the concepts of job evaluation and job performance.	1,5	Re
CO-3	recall the process, system and strategies of hrd. understand the features and process of career planning.	1	Re
CO-4	discuss the concept of employee empowerment	1,5	Re , Un
CO-5	know the concept managing hr in virtual organisation.	1,3	Re
CO-6	recall and interpret the objectives, scope and steps in hr audit.	1,5	An
CO-7	examine the ethical issues in organization and the factors influencing ethical behaviour at work.	1	An
CO-8	discuss the concept of international human resource management	1,3	Re, Un

SEMESTER II			
Core VI	Human Resource Planning and Development		
Code: 21PHRC21	Hrs/Week: 6	Hrs/Sem: 90	Credits: 4

Unit I **Introduction to Human Resource Planning**

Definition – Objectives – Characteristics - Significance – Need and Importance – Factors affecting HRP - Process of Human Resource Planning - Requirements for Effective HRP – Benefits of HRP – Barriers to HR Planning. HR Supply and Demand Forecasting Techniques

Unit II **Job Evaluation and Performance Evaluation**

Job Evaluation: Concepts-Objectives –-Procedure – Methods – Advantages and Limitations.

Performance Evaluation: Objectives – Uses – Determining the criteria for Performance evaluation- Process of Performance Evaluation – Selection of the Evaluator for conducting Performance Evaluation – Performance Evaluation Methods – The 360 degree Feedback Method- Management by Objectives.

Unit III **Human Resource Development**

Career Planning – Features of career Planning – Objectives of Career Planning – Process of Career Planning _Evaluation of Available Career Opportunities – Implementation and Review –Merits and Limitations of Career Planning. The process and system of HRD – HRD for workers -HRD strategies and experiences. Current trends in Human Resource Planning and Development.

Unit IV **Employee Empowerment and Competency mapping**

Employee Empowerment: Meaning – Approaches – Forms of Empowerment - Life stages of an empowered group – Barriers to Empowerment- Employee empowerment in India : An Overview. Competency mapping – Meaning- Process-Objectives- Methods- Models – Approaches- Merits and Limitations of Competency Mapping.

Unit V **Human Resource Audit, Ethical Issues in HRM and International Human Resource Management**

Meaning – Features – Objectives – Scope – Steps in HR audit – Approaches to HR Auditing – Essential conditions for an Effective HR audit

International Human Resource Management: Types of International Business – Perspective of International HRM – Practices in International HRM. Ethical Issues: Types of Ethics – Ethics and HRM – Approaches to Ethical issues in Organisation- Factors influencing Ethical Behaviour at Work

SEMESTER II			
Core VII	Behavioural HRM		
Code: 21PHRC22	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Objectives:

- To nurture students to become intellectually competent professionals to serve the local and national community through scientific studies of human behavior, emotions and thoughts.
- To gain realistic ideas about implementing the psychological knowledge, skills and attitudes in occupational pursuits, to improve one's own quality of life and the needs of the society.

Course Outcome:

CO No.	Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	acquire the basic knowledge of psychology of Human Resource Management.	3	Un
CO-2	understand the schools of psychology.	3	Un
CO-3	understand the theories and measurement of intelligence.	1,3	Un
CO-4	understand the concept, types and factors influencing perception.	1,3	Un
CO-5	know the process of learning, aptitude and attitude.	3	Un , Ap
CO-6	determine the factors, causes, effects, classification of adjustment and develop ways to manage stress.	1,3	Ev, Ap
CO-7	examine the functions of industrial psychologist.	3	An
CO-8	discuss the meaning, factors, theories and identify the ways of measuring personality.	3	Ap

SEMESTER II			
Core VII	Behavioural HRM		
Code: 21PHRC22	Hrs/Week: 6	Hrs/Sem: 60	Credits: 4

Unit I **Introduction and Schools of Psychology**

Psychology – Definition - Meaning. Schools of Psychology: Psycho analysis. Behaviorism – Gestalt Theory - Transaction Analysis.

Unit II **Intelligence and Perception**

Intelligence: Definition – Meaning - Theories of intelligence -Measurement of intelligence.

Perception: Concepts – Types - Factors influencing perception – Perception of people at work and organisation.

Unit III **Learning, Aptitude and Attitude**

Learning: Definition - Theories of learning - learning curve - transfer of learning. Aptitude: Definition - Measurement of aptitude.

Attitude: Definition – Nature - Formation of attitude - process of attitude change - measurement of attitude.

Unit IV **Adjustment and Stress**

Adjustment: Meaning - Factors influencing Adjustments.

Stress: Definition - Causes and Effects of stress –Managing or Coping up with stress.

Unit V **Industrial Psychology and Personality**

Industrial Psychology – Meaning – Scope - Role and Functions of industrial psychologist. Personality: Concept - Meaning – Factors influencing personality development – Heredity and Environment – Theories and Measurement of personality.

Text Book:

Clifford. T. Morgan Kind.*An Introduction to Psychology*. Bombay; Tata McGraw Hill, 7th Edition, 2005.

Books for Reference:

1.Bhatia.H.R.*Abnormal Psychology*. New Delhi;Tata McGraw Hill, 2nd Edition, 1997.

2.RachanaSharma.*Abnormal Psychology*. NewDelhi;AtlanticPublishers, 4th Edition,2012.

SEMESTER II			
Core VIII	Labour Legislation		
Code: 21PHRC23	Hrs/Week: 5	Hrs/Sem: 90	Credits: 4

Objectives:

- To equip the students with the complete knowledge of all applicable statutory compliances in order to protect their organisation from any violation and also provide quality working environment and social life to all the staff.
- To provide theoretical knowledge of all the applicable statutory laws and sensitise the students that these laws protect the interest of all the stakeholders and is in fact contributing to the long term interest and sustenance of the organisation.

Course Outcome:

CO No.	On completion of this course, students will be able to	PSOs Addressed	CL
CO-1	gain knowledge of labour laws and enable the students to acquire skills to handle employment relations.	2	Un , Ap
CO-2	familiarise the students to the practical problems inherent in the implementation of the labour statutes.	2	Un ,Ev
CO-3	understand the basic concepts of Labour Legislation and labour related provisions in the constitution of India.	2	Un ,Ev
CO-4	understand the structure and functioning of ILO.	2	Un
CO-5	examine the Acts related to health, safety and welfare and make use of the Acts in case of Factories contract labourers and plantation labours.	2	Un , Ap
CO-6	interpret the knowledge in laws related to social security and apply the laws according to the needs.	2 ,5	Ap
CO-7	understand the implications of labour laws for industrial relations to know how to resolve industrial relations and human relations problems and promote welfare of industrial labour.	2	Un , Ap
CO-8	be competent with the various legal aspects of women and children.	2	Un , Ap

SEMESTER II			
Core VIII	Labour Legislation		
Code: 21PHRC23	Hrs/Week: 5	Hrs/Sem: 90	Credits: 4

Unit I **Basic concepts**

Definition – Objectives of labour Legislation- History of Labour Legislation - Labour related provisions under Constitution of India - The ILO – Objectives of ILO- Structure of ILO – Impact of ILO on Indian Labour.

Unit II **Laws related to Health, Safety and Welfare**

Factories Act, 1948 - The Unorganised Workers' Social Security Act, 2008 - The Contract Labour Act, 1970 (Regulation and Abolition) – Environment Protection Act,1986.

Unit III **Laws related to social security**

Employee Provident Fund and Miscellaneous Provisions Act, 1952 (EPFS, EPS, EDLIS) - Employee State Insurance Act, 1948 -Payment of Gratuity Act, 1972 - The Equal Remuneration Act, 1976.

Unit IV **Laws related to Industrial Relations**

The Trade Union Act, 1926 - The Industrial Employment (Standing Orders) Act, 1946 -The Industrial Disputes Act, 1947.

Unit V **Laws related to women and Children**

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 - Maternity benefit Act, 1961 - The Child Labour Regulation and Abolition Act, 1986.

Text Books:

Kapoor.N.D.*Hand Book on Industrial Law*. New Delhi; Sultan Chand & Sons,11th Edition, 2016.

Books for Reference:

1. Mishra. S.N. *Labour and Industrial Laws*. Allahabad; Central Publishing House, 29th Edition, 2018.
2. Padhi.P.K. *Labour and Industrial laws*.New Delhi; PHI Learning Private Ltd, 4th

SEMESTER II			
Core IX	Recruitment and Selection Procedures		
Code: 21PHRC24	Hrs/Week: 5	Hrs/Sem: 90	Credits: 4

Objectives:

- To equip the students with a blend of theory and application of the wide range of issues, principles, practices in recruitment and selection which are needed by them as HR professionals to save the organisation from performance related problems at a later stage.
- To provide conceptual knowledge and operational dimensions in recruitment and selection process with the aim of improving the business by selecting the right candidates.

Course Outcome:

CO No.	Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the skills needed for recruitment and selection.	5	Un
CO-2	describe the meaning, functions, objective, importance of recruitment and hiring process.	5	Un
CO-3	understand the meaning, sources, advantage and disadvantages of internal and external hiring and illustrate the process of internal and external hiring.	5	Un , Ap
CO-4	write application form, bio data and resume.	5	Cr
CO-5	determine the features, purpose, types, process, advantage and disadvantage of testing and interviewing.	5	Ev
CO-7	design different ability tests and practice interview techniques.	5	Cr , Ap
CO-8	discuss the purpose, methods of collecting reference data, contents of appointment order and medical examination and develop appointment orders.	5	Un ,Cr

SEMESTER II			
Core IX	Recruitment and Selection Procedures		
Code: 21PHRC24	Hrs/Week: 5	Hrs/Sem: 90	Credits: 4

Unit I **Recruitment**

Recruitment: Definition – Meaning – Features – Objective – Purpose and Importance – Process. Hiring decision: Nature of hiring: Regular – Temporary - Full time - Part time – Apprentice – Contractual and Outsourcing. Existing post or new post to be created -Need analysis - Cost analysis.

Unit II **Internal and External Recruitment**

Hiring Internally: Meaning – Definition – Advantages - Disadvantages in terms of cost, time, quality and suitability. Sources of internal recruitment: - Circulars, Intranet Advertisements, Employee referrals, Appointment or promotion. Hiring Externally: Meaning – Definition – Sources: Advertisement in Newspaper- TV/Radio- Internet- Search on the internet- ''Wanted' signboards- Consultants-Employment exchange- Campus recruitment- Employee referrals and unsolicited applications. Advantages and disadvantages of the above sources in terms of Cost, Time, Convenience, Reach of the targeted population, and Quality of applicant pool. Difference between internal recruitment and external recruitment.

Unit III **Screening of Applications**

Application Forms: Meaning – Definition – content - Purpose – Evaluation - Advantages and Disadvantages. Bio-data: Meaning – Definition – Purpose - Advantages and Disadvantages. Resume: Meaning – Definition – Purpose – Parts – Formats - Advantages and Disadvantages. Curriculum vitae: Meaning – Definition – Purpose – Preparing – Formats - Advantages and Disadvantages. Weighted application blanks: Meaning – Definition – Purpose – Constructing a WAB- Advantages and Disadvantages. Taking a behavioural approach to recruitment: Spotting personality patterns - Making basic assumptions - Predicting the future - Strategy Vs. technique.

Unit IV **Testing and Interviewing Procedures**

Testing: Meaning – Definition – Purpose - Advantages and Disadvantages. Ability tests: Clerical ability test - Mechanical ability test - Mental ability test - Physical ability test - Personality assessment test - Typing test - Shorthand test - Computer proficiency test. Interviewing: Meaning – Definition – Features – Objectives – Advantages and Disadvantages. Interview process - Planning the interview - Getting started - Examining the 5 interview areas - Examining the strengths & weaknesses - Allowing candidates to ask questions at the end - Explaining the procedure of selection and concluding with a happy note - Making the decision.

Unit V **Reference checking & Job offer letter**

Reference Checking: Meaning – Definition – Purpose – Methods of Collecting Reference Data. – pros and cons of reference checks. Verification of character - Criminal antecedents - Previous work behavior - Educational qualifications - Verification of community certificates in public sector companies. Job offer letter: Meaning – Definition – Purpose - Contents of appointment letter, hard copy (or soft copy) - Method of delivery and retrieving the acknowledgement copy. Medical Examination & acceptance of offer for joining.

Text Book:

Aswathappa.K. *Recruitment and Selection.* New Delhi;Tata McGraw Hill Publishing Company Ltd, 6th Edition, 2005.

Books for Reference:

1. Lilly M.Berry.*EmployeeSelection*.California;Thomson Publications,1st Edition, 2002.
2.Robert W. Wendover. *High performance Hiring*.California; Crisp Publication, 8th Edition, 2011.

SEMESTER II			
Core X	Total Quality Management		
Code: 21PHRC25	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Objectives:

- To enable the students to understand the basic principles and techniques of Total Quality Management for effective decision making
- To equip the students to use models and quality management methodology for the implementation of total quality management in any sphere of business and public sector.

Course Outcome

CO No.	On completion of this course students will be able to	PSOs Addressed	CL
CO-1	discuss the concept of quality and total quality management.	4	Un
CO-2	gain insights on TQM approaches	4	Ev
CO-3	define and list the steps in supplier partnering.	4	Re
CO-4	gain knowledge on the tools and techniques of TQM	4,6	Re , Ap
CO-5	gain knowledge on the concept of six sigma and quality circles	4	Re , Ap
CO-6	discuss the concept of benchmarking	4	Un
CO-7	state the Quality systems and ISO 9000	4	Re
CO-8	examine ISO 14000.	4	An

SEMESTER II			
Core X	Total Quality Management		
Code: 21PHRC25	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Unit I **Introduction to Quality and Total Quality Management**

Introduction to Quality – Definitions of quality -Need for quality - Dimensions of product and service quality. Definition of TQM - Basic concepts of TQM - Characteristics of TQM - Framework of TQM – Principles of TQM - Contributions of Deming, Juran, and Crosby – Barriers of TQM –Quality statements- customer satisfaction, customer complaint, customer retention-cost of quality.

Unit II **TQM Approaches and Supplier Partnering**

Continuous process improvement: introduction - Input/ Output Process Model - Juran Quality Trilogy - PDSA cycle - 5S House Keeping- Benefits of implementing 5S - Kaizen - Features of Kaizen .Supplier partnership: Partnering - Supplier selection –Supplier certification- Supplier Rating- Relationship development.

Unit III **TQM Tools and Techniques – 1**

The seven traditional tools of quality: Flowchart – Check sheet – Histogram – Pareto Diagram - Cause and effect Diagram - Scatter Diagram - Control Chart New management tools : Affinity Diagram – Relationship Diagram – Tree Diagram – Matrix Diagram – Matrix Data Analysis – Decision Tree – Arrow Diagram - 360 degree feedback- Quality Function Development.

Unit IV **TQM Tools and Techniques – 2**

Six sigma: Concept- Process (DMAIC) –Six Sigma Matrix- Advantage of Six Sigma. Quality Circles: Concept – Objectives –Characteristics – Structure of Quality Circles. Taguchi's Quality Loss Function- Concept- Methods. Bench marking: Definition - Reason to bench mark – Types of Benchmarking - Bench marking process- Benefits and Dangers of Benchmarking. FailureMode and Effect analysis- Concept- Types - Stages –Benefits.

Unit V **Quality Systems**

Need for ISO 9000 – Benefits of ISO 9000 - Quality System - Introduction - Elements - Documentation - Quality Auditing ISO 14000 – Concepts - Requirements - Benefits – OHSMS –ISO9001:2015 QMS-ISO14001:2015 EMS-1SO 45001:2018 OHSMS-ISO 50001 ENMSTQM Implementation in manufacturing and service sectors (Case Study).

Text Book:

Jayakumar.V and Raju.R. *Total Quality Management*. Chennai; Lakshmi Publications, 6th Edition, 2015.

Books for References:

1. Dale H. Besterfiled .*Total Quality Management*: Pearson Education, India, 5th Edition, 2011.

SEMESTER III			
Core XIII	Compensation Management		
Code: 21PHRC32	Hrs/Week: 5	Hrs/Sem:75	Credits: 4

Objectives:

- To provide a clear frame work of the concepts of compensation management to facilitate the achievement of the strategic goal of establishing a comprehensive and competitive compensation plan for the organisation.
- To develop an understanding of the concepts of compensation management and impart skills in analysing the reward management so that they provide the organisation with clear and consistent compensation tools.

Course Outcome

CO No.	Course Outcome Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	summarize the concepts of Compensation Management.	5	Un
CO-2	describe the objectives, types, theories, factors of compensation, administration and demonstrate compensation administration.	5	Un
CO-3	understand and calculate compensation structure and ESOP	5	Un , Ap
CO-4	examine the legal framework of wages and salary administration.	2	An
CO-5	determine the determinants and types of incentives.	5	Ev
CO-6	understand the types of rewards for employees	5	Un
CO-7	understand the meaning, objectives, features and forms of employee benefits and services.	5	Un
CO -8	investigate the types of Fringe benefits and other benefit programmes.	5	An

SEMESTER III			
Core XIII	Compensation Management		Credits: 4
Code: 21PHRC32	Hrs/Week: 5	Hrs/Sem:75	

Unit I **Compensation Administration:**
Definition of compensation –Objectives of Compensation Administration – Types of Compensation – Theories of Compensation: The Equity theory – Expectancy theory – The Contingency theory – Concept of Wages – Kinds of Pay Structure – Factors influencing Compensation Administration – Steps in Compensation Administration.

Unit II **Compensation Structure:**
Concept of Salary Structure - Salary Progression - Methods of Payment - Competency based Compensation - Executive Compensation – Team Compensation - ESOP Meaning – Working – Advantages and disadvantages - Compensation Management in Multi-National organisation.

Unit III **Legal Framework of wage and salary Administration:**
Minimum Wages Act, 1948- Payment of Wage Act, 1936 – Payment of Bonus Act 1965 – ESI Act – EPF Act.

Unit IV **Incentives and Rewards:**
Definition –Determinants of Incentives – Types of Reward – Wage Incentives – Objectives of Wages Incentive Schemes – Types of Wages Incentive Plans – Halsey Premium Plan – Rowan Premium Plan – Taylor's Differential Piece rate Plan – Incentive Plans for White collar workers – Incentive Plans for Management employees.

Unit V **Employee Benefits and Services:**
Fringe Benefits – Meaning – Features –Objectives of Fringe benefit and Service Programmes – Forms of Fringe Benefits - Coverage of Benefits – Employee Security Payments – Other Remunerations.

Text Book:

1. C.B. Mamoria and S.V. Gankar.*Personnel Management*. New Delhi; Himalaya Publishing House,Edition,2011.
2. Dr.Mousumi S. Bhattachariya. *Compensation Management*: New Delhi; Anurag Jain Publication, 2009.

Books for Reference:

1. Pravin Durai.*Human Resource Management*. New Delhi; Pearson Education, 2016.
2. KapoorN.D.*Hand Book of Industrial Law*. New Delhi; Sultan Chand Publications, Edition,2013.

SEMESTER IV			
Core XVI	**Strategic Human Resource**		
Code: 21PHRC41	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits: 4**

Objectives:

- To make the students understand the concept and techniques of Strategic Management.
- To help the students to use key strategy concepts and to integrate and apply their learning to various business situations

Course Outcome

CO No.	Course Outcome On completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the kinds of strategies and importance of strategic management .	**3**	**Un**
CO-2	gain knowledge of strategic management process.	**3**	**Un**
CO-3	understand the strategy formation for objectives, policies and company mission.	**1,3**	**Un**
CO-4	analyse the strategy for internal and external environment.	**3**	**An**
CO-5	gain knowledge and use the business level strategy .	**3,6,7**	**Re , Ap**
CO-6	evaluate the corporate level strategy.	**3,6**	**Ev**
CO-7	describe the concept of strategy implementation.	**3**	**Re**
CO-8	understand the features of effective evaluation and control.	**3,7**	**Un**

SEMESTER IV			
Core XVI	**Strategic Human Resource**		
Code: 21PHRC41	**Hrs/Week: 6**	**Hrs/Sem:90**	**Credits: 4**

Unit I **Introduction to Strategic Management**

Strategy: Introduction- Concept of Strategy- Strategy formation process- Hierarchy of Strategy – Nature of Strategic Management- Strategic management process Conceptual framework for Strategic Management- Strategic Intent - Elements of Strategic Intent.

Unit II **Environmental analysis and Competitive Advantage**

Business Environment – Components of Business Environment – Internal Analysis – Framework - External Environment Analysis – Procedures – Levels – Techniques of External Analysis: ETOP / QUEST / SWOT / PEST Analysis – Porter's Five Forces Model.

Unit III **Strategies and Strategic Choice**

Concept of Corporate Strategy - Types of Corporate level Strategy: stability, expansion, retrenchment and combination - Business level strategy – Strategy in the Global Environment –Strategic Analysis and Choice (SAC): Process of Strategic Analysis and Strategic Choice – Factors affecting Strategic Choice – Tools of Strategic Analysis and Choice: Environmental Threat and Opportunity Profile / SWOT Analysis / McKinsey's 7S Framework / BCG Product- Portfolio Matrix / GE Nine Cell Matrix / Experience Curve / Market Life Cycle Model / Balanced Scorecard.

Unit IV **Strategy Implementation and Evaluation**

Strategic Implementation: Meaning - Definition – Nature – Process – Aspects – Barriers – Resource Allocation: Approaches – Structural Implementation: Types of Organizational Structure – Stages of Organizational Life Cycle – Strategic Evaluation and Control – Nature – Measures –Techniques - Designing Strategic Control Systems – Implementing Strategic Change: Types –Process.

Unit V **Strategic Issues**

Managing Technology and Innovation: Introduction – Nature of Technology – Managing Technology – Innovation – Strategic Issues in Managing Technology and Innovation – Non-Profit Organisations: Strategies of Non-Profit Organisations - Strategic Issues of Non-Profit Organisations – Internet Economy: Strategic guidelines for Internet Economy – New Business Models and Strategies for Internet Economy.

Text Book:

1. Azhar Kazmi, Strategic Management and Business Policy, 3rd Edition, Tata McGraw Hill, 2008.

Books for Reference:

1. John A.Parnell. Strategic Management, Theory and practice Biztantra (2012).
2. Adriau HAberberg and Alison Rieple, Strategic Management Theory & Application, OxfordUniversity Press, 2008
3. Dr.Dharma Bir Singh, Strategic Management & Business Policy, KoGent Learning Solutions Inc., Wiley, 2012.
4. John Pearce, Richard Robinson and Amitha Mittal, Strategic Management, McGraw Hill, 12th Edition, 2012.
5. Dr. Vellaiputhiyavan, Strategic Management, Thakur Publishers, Edition, 2014.

SEMESTER IV			
Core XVIII	Training and Development		
Code: 21PHRC43	Hrs/Week: 5	Hrs/Sem:75	Credits: 4

Objectives:

- To impart in students the different types of training methods and tools and also enable them to realize how training is indispensable for effective use of human resources and tailoring them to meet the organisational aspirations.
- To educate the students on assessing training requirements of different types of people based on their skills and competencies and the future growth potential of the individual and the organisational plan.

Course Outcome

CO No.	Course Outcome Upon completion of this course students will be able to	PSOs Addressed	CL
CO-1	understand the meaning, objectives, values, Difference between training, development and education.	5	Un
CO-2	analyse the types, benefits principles and changing facets in training.	5	An
CO-3	identify the roles and responsibilities of trainers.	5	Ev
CO-4	illustrate the needs, identification of needs and process of training	5	Ap
CO-5	discuss the different methods of training and determine the training method necessary for training.	5	Cr, Ev
CO-6	describe the different types of training tools and recommend it for training purposes.	5	Un, Ev
CO-7	understand the meaning, concept, objectives, need and role of Development programme.	5	Un
CO-8	discuss the need, approaches and examine the types and stages of evaluation.	5	Un ,An

SEMESTER IV			
Core XVIII	Training and Development		
Code: 21PHRC43	Hrs/Week: 5	Hrs/Sem:75	Credits: 4

Unit I **Introduction to Training:**

Training: Definition – Objectives - Purpose – Organizational climate for Training and Development – Components of Training – Training Skills - Difference between Training and Development - Benefits of training to employers and employees – Roles and responsibilities of trainers – Types of training - Principles of Training.

Unit II **Identification of Training and Development Needs and Design:**

Training and Development Needs: Concept – Objective - Process – Importance – Tools / Methods of Identification Training and Development Needs.

Training and Development Design: Concept of designing Training and Development programmes – Process of designing Training and Development programmes - Concept of conducting Training and Development programmes.

Unit III **Training Methods and tools:**

Training methods: Lecture - Group discussions – Seminar – Symposium -Panel discussions – Debate - Programme instruction - Case study - Role playing - In-basket exercises - Fishbowl exercises.

Training Tools: Static Media: Print based Material – Flip Charts – Marker Board – Handouts - Over-head Projector- Slide Projector. Dynamic Media: Video tape – Audio tape – Computer aided training.

Unit IV **Management Development:**

Management Development – Definition – Objectives - Need and importance – Management characteristics – Role of Training and development officers - Management development implications.

Unit V **Validation and Evaluation:**

Validation of Training –Meaning – Methods - Evaluation of Training – Definition - Need for Evaluation – Principles– Criteria – Objectives -Types of Evaluation Instruments and data – Dimensions - Models of Evaluation – Kirk Patrick's Model- CIRO's – Philips model.

Text Book:

1. Taylor.B and Lippitt.G.*Management Development and Training hand book*,UK.McGraw Hill Education Pvt Ltd, 2003.

2. Dr.Janakiram.B.*Training and Development*.New Delhi; Biztantra Publishers,2018.

Books for Reference:

1. Bhatia.S.K.*Training for Development*.New Delhi; Deep& Deep Publications Pvt. Ltd, 2008.

2. Dipak Kumar.Bhattacharyya ,*Training and Development:Theories and applications*. New Delhi ;Sage Publications India Pvt. Ltd,2015.