SEMESTER I					
Part III	Part III ALLIED BIOCHEMISTRY -I				
Code: 18UBCA11Hrs/Week : 4Hrs/ Sem : 60Credits : 3					

VISION:

Acquire knowledge about the chemical composition of life.

MISSION:

- Understand fundamental biochemical processes.
- Knowledge about vitamins and their deficiency
- Study the functions of hormones.

Course Outcomes

CO. No.	Upon completion of this course, students will be able to	PSO	CL
		addressed	
CO 1	Explain about the chemical composition and the elements of	1,2	Un
	life. Differentiate direct and indirect method for the		
	determination of energy requirement of man		
CO 2	Express the importance of bioenergetics	7	Un
CO 3	Compare the biological reaction such as exergonic reaction	3	An
	and endergonic reaction		
	Demonstrate about the various energy rich compounds such	5	Ap
CO 4	as adenosine triphosphate, guanosine triphosphate,		
	uridinetriphosphate, Cytidinetriphosphate and acyl		
	phosphate.		
	Distinguish water soluble and fat soluble vitamins and	3	An
CO 5	analyze their composition, functions and deficiency		
	symptoms.		
CO 6	Interpret the hormones producing organs and their functions,	3,5	Cr,Re
	Know about the plant as well as animal hormones.		
	Identify the antibiotics which are all responsible for affecting	7	Re
CO 7	cell wall synthesis, cytoplasmic membrane and enzyme		
	systems.		
CO 8	Develop knowledge about the antibiotics interfering with	5	Ev
	nucleic acid function and inhibiting protein synthesis.		

SEMESTER I					
Part III	ALLIED	BIOCHEMIST	RY -I		
Code: 18UBCA1	1	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 3	

UNIT-I 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 – II Vitamins

Introduction – definition - Sources of vitamin – Deficiency diseases – provitamins – biological functions - Properties of Vitamins – Classification of vitamins - water soluble (Vitamin B₁, B₂, B₃, B₅, B₆, B₇, B₉ and B₁₂) 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 – Animal hormones.

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:

- Dulsy Fatima, L.M. Narayanan, R.P. Meyyan Pillai, K. Nallasingam, S. Prasanna Kumar and N. Arumugam, *Biochemistry*, Saras Publication, 1996
- 2. Patricia trueman, Nutritional Biochemistry, MJP publisher 2011
- 3. L.Veerakumari, *Biochemistry* MJP publisher 2010

Book for Reference :

- 1. Dr. A.C. Deb, Concepts of Biochemistry, Books & Allied (P) Ltd., 1999
- 2. C.B. Powar, G.R.Chatwal, Biochemistry, Himalaya Publishing House 2002

SEMESTER II				
Part III Allied Biochemistry -II				
Code: 18UBCA21	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 3	

Vision:

Achieve broad based knowledge in concepts and principles of biochemistry.

Mission:

- Provide an opportunity in acquiring knowledge about nutritional biochemistry.
- Understand the various pathways involved in cell respiration.
- Grasp in-depth knowledge about the biochemistry of blood and respiration.
- Familiarize the learners with the techniques involved in biochemistry.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO	CL
		addressed	
CO 1	Discuss in detail about the nutritional values of milk, egg,	1,3	Un,An
	meat, fish, vegetable foods, fruits, tea, coffee, cocoa and		
	alcohol. Analyse the physio-chemical interactions between		
	diet ingredients.		
CO 2	Categorize energy yielding foods, body building foods and	1,5	An,Cr
	protective foods. Assess effect of drugs on food intake,		
	body weight, nutrient requirements and growth, vitamins		
	and minerals.		
CO 3	Demonstrate the theories of biological oxidation	6	Ар
	decarboxylation, electron transport system and oxidative		
	phosphorylation.		
CO 4	Describe the functions of blood. Discuss in brief about red	1	Un
	blood cells, white blood cells, blood platelets, plasma and		
	plasma protein.		
CO 5	Identify the variation in structure of hemoglobin with	2	Re
	reduced solubility and altered oxygen affinity.		
CO 6	Formulate how the transport of oxygen by blood and	1	Ev
	carbon-di-oxide in blood taking place.		
CO 7	Interpret the role of kidneys in acid-base balance, Relate	2,6	Cr,Ap
	the physical and chemical transport of blood,		
CO 8	Compare the relation between optical and electron	1,2	An,Re
	microscope, Identify the separated components using paper		
	as well as gel electrophoresis.		

SEMESTER II				
Part III	II Allied Biochemistry -II			
Code: 18UBCA21	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 3	

UNIT – I Nutritional Biochemistry

Nutritive value of Milk – 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 – Physico-chemical interactions between diet ingredients and drug ingredients – gastric emptying and drug absorption – transport across membrane – dietary effects on drug function – drug excretion – low protein diets – dehydration and starvation – 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 Oxidations

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 – Functions of Blood – (Homeostatic functions, Blood as transport system) – Types of Blood group, Rh⁺ and Rh⁻ Red Blood Cells – White Blood Cells– Blood Platelets – Plasma – Plasma proteins – Albumin, Globulin (alpha, beta and gama), Fibrinogen – Functions of plasma proteins - Blood groups – Hemoglobin – Variation in structure - Hemoglobin with reduced solubility, altered oxygen affinity.

UNIT – IV Biochemistry of Respiration

Introduction – Transport of Oxygen by Blood– Oxygen dissociation curve – Factors affecting the dissociation of oxyhemoglobin –Temperature, Electrolytes and Effect of CO_2 – Carboxyhemoglobin – Oxygen toxicity – Transport of Carbon dioxide in blood – Mode of transport of CO_2 – Physical and Chemical transport – Chloride shift – Significance of N₂ in respiration – Buffer Systems of the Blood – The hemoglobin buffers – Acid Base balance – Causes of disturbances – Role of kidneys in acid base balance - Hypoxia.

UNIT – V Biochemical Techniques

Introduction – 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 – Identification of separated components – Applications.

Text Books:

- Dulsy Fatima, L.M. Narayanan, R.P. Meyyan Pillai, K. Nallasingam, S. Prasanna Kumar and N. Arumugam, *Biochemistry*, Saras Publication, 1996
- 2. Patricia trueman, Nutritional Biochemistry, MJP publisher 2011
- 3. L.Veerakumari, Biochemistry MJP publisher 2010

Book for Reference :

- 1. Dr. A.C. Deb, Concepts of Biochemistry, Books & Allied (P) Ltd., 1999
- 2. C.B. Powar, G.R.Chatwal, *Biochemistry*, Himalaya Publishing House 2002

SEMESTER- I				
Part III Core I General Chemistry I				
Code :18UCHC11Hrs/Week:4Hrs/ Sem: 60Credits:4				Credits:4

Vision:

Inculcating the students the basic principles and concepts in chemistry.

Mission:

- Understand the development of atomic structure and general aspects of inorganic and physical Chemistry.
- Recall the importance of periodic table
- Be familiar with balancing the ionic equations using electron transfer concept.
- Explain the various concepts of acids and bases.

Course Outcome :

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	compare Rutherford and Bohr's model of the atom	1, 2	An
CO-2	predict electronic arrangement in orbits	1, 2, 3	Ev
CO-3	understand quantum numbers and to Know the rules for filling up of orbitals	1 ,2 ,3,4	Un
CO-4	explain the periodic properties of the different groups of compounds focusing on production methods	1	Un
CO-5	apply methods of balancing redox reactions	1, 2, 3	Ар
CO-6	know the different concepts of acids and bases	1, 3	Re
CO-7	identify different types of bonding in molecules	3, 4	An
CO-8	sketch Molecular orbital diagram and to apply the VSEPR theory to predict the shape of a molecule or polyatomic ion.	3, 4	Ар

SEMESTER- I				
Part III Core I General Chemistry I				
Code :18UCHC11Hrs/Week:4Hrs/ Sem: 60Credits:4				

Unit I Atomic Structure I (Classical Approach)

Introduction-Discharge tube experiment-properties of cathode ray and anode rays-measurement of e/m for electrons- Milikan's oil-drop experiment-sub atomic particles-Rutherford nuclear structure of atom-weakness of Rutherford's model-Mosley's experiment- composition of the nucleus- Bohr's model of the atom – derivation of Bohr's radius and energy of the electronsignificance of negative value of energy- drawbacks of Bohr atom-origin of hydrogen spectrum-Ritz combination principle-Sommerfeld extension of Bohr's theory–electronic arrangement in orbits-Langmuir scheme-Bohr-Bury scheme.

Unit II Atomic Structure II (Wave mechanical Approach)

de Broglie equation- Heisenberg's uncertainity principle- Postulates of quantum mechanics – derivation of Schrodinger equation – eigen value – eigen function – significance of ψ and ψ^2 – charge cloud concept –radial and angular function - shapes of orbitals-nodal planes- g and u character. Quantum numbers –rules for filling up of orbitals – Aufbau principle – Hund's rule – Pauli's exclusion principle.

Unit III Periodic Table and Atomic Properties

Modern periodic law- long form of periodic table – its 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

Unit IVConcept of Electron Transfer and Acids and Bases

Oxidation and reduction – electronic Concept – Oxidation number – Calculations of Oxidation number of elements in compounds and ions – Redox reaction – Important Oxidants and their reduction half reaction Fe (II) and Potassium permanganate – important reductants and their oxidation half reaction Fe (II) and Oxalic acid. Methods of balancing redox reactions.

Arrhenius concept – limitations – Bronsted - Lowry concept – protocity (Basicity) of an acid – hydroxity (Acidity) of a base –levelling concept, Lewis concept – relative acidity of Hy molecules. Pearson's principle of hard and soft acids and bases (HSAB). Theories of hardness and softness – applications of HSAB theory(relative stabilities of compounds-occurrence of minerals-course of reactions-poisoning of metal catalysts-rate of chemical reactions).

Unit V Chemical Bonding

Ionic bond, factors influencing the formation of ionic bond- covalent bond – overlapping of atomic orbital – σ bond and π bond – co ordinate covalent bond – Fajan's rule –

valence bond theory – limitations – molecular orbital theory – bonding and anti bonding molecular orbital – energy level – bond order – molecular orbital diagram of homo nuclear diatomic molecules H_2 , H_2^+ , N_2 , O_2 , F_2 – molecular orbital diagram of hetero nuclear molecules CO and HF – comparison of VB and MO theory.

Hybridization of sp,sp²,sp³,sp³d, sp³d²,and sp³d³, with example – salient features of concept of hybridization –VSEPR Theory – postulates –VSEPR theory as applied to molecules of regular geometry (BeCl₂, BF₃, CH₄, CCl₄, PCl₅, SF₆ and IF₇) and irregular geometry (NH₃, H₂O, and SF₄) – geometry of ions (CO₃²⁻and ClO₄⁻)- Hydrogen bonding – nature, type

Text Books

- 1. ArunBahl, B.S.Bahl, G.D.Tuli, *Essentials of Physical Chemistry*, S.Chand and Company Ltd., New Delhi-Revised edition-2008
- 2. B.R.Puri, L.R.Sharma, K.C.Kalia, *Principles of Physical Chemistry*, Milestone publishers and distributers, Delhi, 2010.
- 3. R.D.Madan, Modern Inorganic Chemistry, S.Chand and Company Ltd., New Delhi, 2005.

Books for Reference

- 1. B.R. Puri. L.R. Sharma, Madan S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing Co., 2008.
- 2. Gurdeep Raja, Advanced inorganic Chemistry, Goel Publishing house1986.
- 3. Sathyaprakash and R.D.Madan, *Advanced Inorganic Chemistry* Volume I, S.Chand and Company, New Delhi.2005

SEMESTER- I				
Part III Core I General Chemistry II				
Code :18UCHC12 Hrs/Week:4 Hrs/ Sem: 60 Credits:4				

Vision:

Educate the basic characteristics of organic compounds and organic reaction mechanism

Provide students with a sound education in the fundamental concepts of physical

chemistry.

Mission:

- Understand the basic mechanism involved in organic reaction,
- Have an idea about the properties of alkenes, alkynes and aromatic substitution
- Know the importance of halogen compounds
- Have a firm foundation in chemical principles as well as higher level of understanding in organic and Physical Chemistry

Course Outcome :

CO No.	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO 1	know the nomenclature of different class of organic compounds	1	Re
CO 2	associate polarization of a bond with electronegativity	1, 3	Un
CO 3	discuss nucleophillic and electrophilic groups and their properties, Identify Aromatic, antiaromatic& non- aromatic compounds by Huckel's rule	1,3	Re,Un
CO 4	discriminate terminal & non-terminal alkynes, the acidic nature of acetenylic hydrogen	1,3	An,Un
CO 5	predict the mechanism of aromatic substitution reactions and effect of o,m& p directing group	1,6	Cr
CO 6	interpret the reactions and properties of halogen compounds, Distinguish the nuclear and side chain halogen compounds in aromatic ring, Describe the preparation and properties of halogen derivatives such as vinyl chloride, chloroprene	1,2,5,6,7	Un,An,Ap
CO7	classify and compare the types of colloids, Discuss the preparation methods and properties of colloids	1,2,5	Un
CO 8	enumerate the importance of colloids in day to day life,Know the experimental methods of determining the colligative properties	1, 3,4	Re

SEMESTER- I				
Part III Core I General Chemistry II				
Code :18UCHC12Hrs/Week:4Hrs/ Sem: 60Credits:4				

Unit I 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

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 carbanes – their generation, shapes and stability. Types of reaction-substitution- elimination-addition-definition and examples.

Unit – II Hydrocarbons

Alkenes – Mechanism of addition reaction to alkenes – Markownikoff'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 acetenylic 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.

Unit – III Halogen Compounds

Aliphatic halogen compounds – General methods of preparation, reaction of monohalogen compound- Mechanism of S_N1 , S_N2 , E1, E2, E1CB 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 – IV Colloids

Definition- Classification of Colloids –comparison of lyophilic and lyophobic colloids-Preparation of sols-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(Brownian movement) Electrical (electrical double layer) – Coagulation of colloids – Hardy Schulze lawHoffmeister 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 – 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 – Osmotic pressure- isotonic solution- determination of osmotic pressure-Berkely and Hartley's method. Abnormal molecular masses of electrolytes – Relation between Van't Hoff factor and degree of association and dissociation

Text Books

- 1. K.S.Tewari, N.K.Vishnoi, S.N.Mehrotra, *A Text Book of Organic Chemistry*, 2nd Revised Edition, 1998.
- 2. ArunBahl and B.S.Bahl, Advanced Organic Chemistry, S.Chand and Company Ltd., Reprint 2005.
- 3. ArunBahl,B.S.Bahl,G.D.Tuli, *Essentials of Physical Chemistry*, S.Chand&Company Ltd.,New Delhi,2008.

Books for Reference

- M.K.Jain and S.C.Sharma , *Modern Organic Chemistry*, Vishal Publishing Co., 2017-2018.
- Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013
- B.R. Puri. L.R. Sharma, Madan S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing Co., 2008.

SEMESTER II					
Part III	Part III Core III Inorganic Chemistry- I				
Code :18UCHC21Hrs./Week:4Hrs/ Sem:60Credits:4					

Vision

Transforming knowledge into skill through novel metallurgical techniques and periodic properties

Mission

- Recall the basic methods of purification of ores.
- Explain the general characteristics about s and p block elements.
- Have an insight into the theory of practicals.

Course Outcome:

CO No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO 1	Recall the methods of purification of ores	1	R
CO 2	Identify the electronic configurations of the zero, s, p d-and f-block elements	1, 5	An
CO 3	Explain the general characteristics and diagonal relationship of alkali and alkali earth metalsand discuss the preparation and uses of their compounds	1	Un
CO 4	Describe the extraction and uses of various lanthanide and actinide compounds.	1, 5, 7	Un
CO 5	Derive equations for reactions of compounds of the zero group elements	1, 3	Ар
CO 6	Compare the different shapes of compounds of noble gases	3, 4	Ар
CO 7	Apply the knowledge about interfering radicals, common ion effect and solubility product	1, 4, 7, 8	Ар
CO 8	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	1, 2 7, 8	Ev

SEMESTER II					
Part III Core III Inorganic Chemistry- I					
Code :18UCHC21 Hrs./Week:4 Hrs/ Sem:60 Credits:4				Credits:4	

Unit I General Principles of Extraction of Metals

Minerals, ores and gangue -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 process – 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 – flux and slag. Refining of impure metals – thermal refining - distillation, liquation – vapour phase refining- Van Arkel process, carbonyl process- electrolytic process- zone refining process- Elingham diagram- Types of furnaces – Fuel fired – blast, reverberatory and blast furnace – Electric furnace – Arc furnaces and resistance furnace.

Unit II s-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 beryllium. Sodium carbonate and sodium bicarbonate – manufacture – properties and uses – principle of fire extinguisher. Preparation and uses of basic beryllium acetate, epsum salt, gypsum, plaster of Paris and lithopone.

Unit III p-block elements (boron and carbon)

Boron – classification and nomenclature of boron hydrides – preparation, structures and uses of diborane – boron trihalides as Lewis acid – relative strength of boron trihalides. Lewis acids – 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 – Per carbonates – Preparation, Properties and Structure of Permonocarbonate , perdicarbonates - Preparation, Properties and uses of Carbonyl Chloride and Carbon disulphide -Fullerenes

Unit IV p-block elements (nitrogen and halogens)

Liquid ammonia as a non-aqueous solvent - Preparation, Properties, Uses and Structures of

hydrazine, hydrazoic acid and hydroxylamine – Structure of oxides of Nitrogen(NO, N₂O, NO₂, N₂O₄, N₂O₅)

Pecularities of fluorine, the first element of the group – manufacture of fluorine – etching on glass. hydrides of halogens (hydrogen halides) - formation – physical state - stability – reducing character - nature of bonds – relative strengths of oxide – Born – Haber cycle. Interhalogen compounds – preparation and structure of interhalogen compounds. Pseudohalogen-polyhalides and basic nature of iodine.

Unit V Theory of practicals II

Inorganic quantitative analysis – Primary and secondary standard. Preparation of a primary standard solution. Methods of expressing the strength of the solution – percentage, normality, molarity, molality and formality, volumetric principle – calculation of strength of solution.

Types of titrations –definition - principle and examples. Acid-base titrations - Redox titrations involving self, internal and external indicators. Complexometric titrations.

Inorganic qualitative analysis - basic idea Types of radicals - simple and interfering radicals Common ion effect and solubility product -definition -applications in inorganic qualitative analysis.

Analysis of anions: 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 (ammoniummolybdate test).

Need for eliminating interfering radicals -methods of elimination of various radicals.

Analysis of Cations : Test for – lead, copper, cadmium, antimony, bismuth, cobalt, nickel, manganese, zinc, barium, strontium, calcium, magnesium and ammonium.

Principles of gravimetric analysis – precipitation methods – conditions of precipitation – coprecipitation and post precipitation

Text books

- 1. B.R.Puri, L.R.Sharma, K.C.Kalia, *Principles of InorganicChemistry*, Milestone publishers and distributers, Delhi.
- 2. R.D.Madan, Modern Inorganic Chemistry, S.Chand& Co., Ltd. New Delhi, 2005

Books for Reference

- 1. Gurdeep Raj, Advanced inorganic Chemistry, Goel Publishing house1986.
- 2. Sathyaprakash and R.D.Madan, *Advanced Inorganic Chemistry* Volume I, S.Chand and Company, New Delhi.2005,
- 3. S. Giri, D.N. Bajpai and O.P. Pandey, *Practical chemistry*, S. Chand and Company Ltd., New Delhi.6th Edition.

SEMESTER- II					
Part III Core IV Organic Chemistry-I					
Code :18UCHC22Hrs/Week:4Hrs/ Sem: 60Credits:4					

Vision

Acquire excellence in Organic Chemistry for educating and graduating students

Mission

- Gain knowledge about the importance of ethers, epoxides, hydroxy, nitro and amino compounds
- Appreciate the applications of organometallic compounds in synthesis
- Understand the concepts of tautomerism & molecular rearrangements

Course Outcome:

СО	Upon completion of this course, students will be able to	PSO	CL
No.		addressed	
CO 1	Prepare alcohols and summarize their properties, Distinguish	1,3,6	Ev,An,Re
	between 1°, 2 °& 3° alcohols, Recognise the differences		
	between the acidities of alcohols and phenols		
CO 2	Reframe the alcohol series, Justify the effect of substituent on	1,2,3,6	Cr,Re
	the acidity of phenols, Know the preparation and uses of		
	thioalcohols		
CO 3	Estimate alkoxy group by ziesel's method	1,2	Cr
CO 4	Compare ethers and alcohols, nitroalkanes and alkyl nitrites,	1,3	An
	Differentiate 1°, 2°&3° amines by reactions		
CO 5	Justify the effect of substituent on the basicity of aromatic	1,3	Cr
	amines		
CO 6	Recall the synthetic importance of organometallic	1,6,7	Re
	compounds, RecogniseFrankland reagent and its significance		
CO 7	Illustrate the theory of resonance and tautomerism	1,3	Un
CO 8	Identify the product of rearrangement reactions such as	1,3	An
	pinacol-pinacolone, Benzil-Benzilic acid, Curtius, Lossen,		
	Favorskiiand Friesrearrrangement.		

SEMESTER- II					
Core IV Organic Chemistry-I					
Code :18UCHC22Hrs/Week:4Hrs/ Sem: 60Credits:4					

UNIT – I Hydroxy Compounds

Alcohols – General methods of preparation and properties of mono hydric alcohols – distinction between primary, secondary and tertiary alcohols – (Lucas test, catalytic dehydrogenation, oxidation, Victor - Meyer's test)-Interconversion of primary, secondary and tertiary alcohols. Ascent and descent in the series of alcohols-trihydric alcohol-Glycerol-Preparation, properties – derivatives of glycerol- nitroglycerine-blasting gelatin- Cordite and dynamite-Phenols – classification with example – effect of substitutent on the acidity of phenols – Mechanism of Kolbe's reaction, Riemer- Tiemann- test for phenol – Preparation & uses of Nitrophenol (picric acid only)- Dihydric phenol – Catechol, Resorcinol &Quinol –Thioalcohols-ethyl mercapton.

UNIT-II Ethers and Epoxides

Classification- Preparation by Williamson's synthesis and alkoxymercurationdemercuration methods.- Ziesel's method for the estimation of alkoxy groups-comparison of ethers and alcohols- Phenolic ethers- preparation and properties of anisole, guaicol-

Ethers- ethers of industrial importance – Preparation properties and uses of oxirane, and dioxane

UNIT – III Nitro Compounds and Amino Compounds

Preparation and reaction of nitrile and isonitrile – distinction between nitroalkane and alkyl nitrites – reduction reaction of nitroalkane – NEF reaction.

Preparation of o, p,m-dinitrobenzene- trinitrobenzene.

Aliphatic amine – separation of mixture of amine –(Hoffmann, Heisenberg method)-Comparison of 1°, 2°&3° amines- Mustard oil reaction- Mannich reaction – ascending and descending of amines.

Aromatic amines – effect of substitutents on the basicity of aromatic aminespreparation and properties of phenylenediamine

Diazonium compounds- Preparation of diazonium chloride and its synthetic applications.

UNIT -IV Organometallic Compounds

Definition – examples- Organomagnesium compound (Alkyl magnesium halides) – preparation, general characteristics and synthetic applications (Nucleophilic substitution reactions, addition reaction and miscellaneous reactions.) Organo zinc compounds(Diethyl Zinc-Frankland reagent)- preparation, properties and synthetic applications (Nucleophilic substitution and addition reactions). Organo Lithium compounds (alkyl lithium) –preparation and synthetic applications- Organo Silicon compounds- Preparations and reactions- Preparation and uses of TEL.

UNIT - V Tautomerismand Molecular Rearrangements

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-benzilic acid rearrangement
- Rearrangement involving migration to electro deficient nitrogen-Curtius rearrangement, Lossen rearrangement
- c) Rearrangement involving carbanion intermediate Favorskiirearrrangement
- d) Rearrangement involving migration from oxygen to aromatic ring-Fries rearrangement

Text Books

- 1. K.S.Tewari, N.K.Vishnoi, S.N.Mehrotra, *A Text Book of Organic Chemistry*, 2nd Revised Edition, 1998.
- 2. ArunBahl and B.S.Bahl, *Advanced Organic Chemistry*, S.Chand and Company Ltd., Reprint 2005.
- 3. M.K.Jain and S.C.Sharma , *Modern Organic chemistry*, Vishal Publishing Co., 2017-2018

Books for Reference:

- Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013
- 2. I.L Finar, Organic Chemistry, Volume 1, The Fundamental Principles, 6th Edition, 1973.

SEMESTER- IV					
Core VI Organic Chemistry-II					
Code :18UCHC41Hrs/Week:4Hrs/ Sem: 60Credits:4					

Vision:

Acquire adequate knowledge to design a reaction in organic chemistry

Mission:

- Know the chirality of molecules and understand the stereoisomerism
- Study the conformational analysis
- Appreciate the application of organometallic compounds in synthesis

Course Outcome:

СО	Upon completion of this course, students will be able to	PSO	CL
No.		addressed	
CO - 1	interpret the elements of symmetry, chirality	1	Un
CO - 2	explain the rules of stereochemical configuration to perspective drawings, Newman projections and Fischer projections Apply the Cahn Ingold Prelog rule for ascertaining the geometric configuration (cis or trans and/or E or Z) of disubstituted cycloalkanes	2	Un, Ap
CO - 3	define Sachse Mohr theory – Newman projection ,Sawhorse & Fischer formulae Know about the conformational analysis	1	Re
CO - 4	classify carbohydrates and compare and contrast the reactions and structure of glucose and fructose Illustrate the structure and reactions of carbohydrates	5,6	Un
CO - 5	discuss epimerization and mutarotation	1	Un
CO - 6	demonstrate various Theories of colour and constitution, know the applications of dyes.	1	Ap, Re
CO - 7	synthesize and Characterize acetoaceticester, malonic ester and cyanoacetic ester	5,7	Cr
CO - 8	recall the preparation of NBS and wilkinsons catalyst Prepare reagents in organic synthesis like Lithium Aluminium hydride, Periodic acid, Sodamide, Selenium dioxide, lead tetra acetate, Osmium tetraoxide, Raney nickel, Sodium	3, 8	Re Cr
	borohydride		

SEMESTER- IV					
Core VI Organic Chemistry-II					
Code :18UCHC41Hrs/Week:4Hrs/ Sem: 60Credits:4					

Unit - I 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. 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, allenes and spiranes with examples. Geometrical isomerism – 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 Conformational Analysis

Definition – Bayer's strain theory – Sachse Mohr theory – Newman projection ,Sawhorse & Fischer formulae - difference between conformation and configurations. Conformation analysis of ethane, 1,2 – dichloro ethane and cyclohexane (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 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 Active Methylene Compounds & Dyes

Active methylene compounds –preparation, synthetic applications of acetoaceticester, malonic ester and cyanoacetic ester

Dyes-Witt's theory of colour and constitution – chromophore – Auxochrome –classification of dyes according to chemical structure – preparation and uses of Nitrodyes – Martius yellow. Azo dyes – Aniline yellow, Methyl orange, Congo red, Bismark brown,

Diphenylmethane dyes- Auramine O. Xanthene dyes – Fluorescein, Eosin and Rhodamine B. Phthalein dyes – Phenolphthalein. Indigo and Thioindigoid dyes – Indigo and Thioindigo. Anthraquinoid dyes – Alizarin.

Classification of dyes according to method of application-Direct dyes, Mordant dyes, Vat dyes, Ingrain dyes and Disperse dyes.

Unit-V Synthetic Reagents

Preparation and synthetic applications of the following reagents in organic synthesis – Aluminium isopropoxide, N-Bromo succinimide (NBS), Lithium Aluminium hydride, Periodic acid, Sodamide -Selenium dioxide- lead tetra acetate-Osmium tetraoxide- Raney nickel-Sodium borohydride- Wilkinson's catalyst.

Text Books

- 1. K.S.Tewari,N.K.Vishnoi,S.N.Mehrotra, A Text Book of Organic Chemistry, 2nd Revised Edition, 1998.
- 2. Arun Bahl and B.S.Bahl, Advanced Organic Chemistry, S.Chand and Company Ltd., Reprint 2005.

Books for Reference

- 1. Ernest I. Eliel, Stereochemistry of Organic compounds, Tata McGRAW –Hill Publication company Ltd., New Delhi, 1975
- 2. D. Nasipuri, Stereochemistry of Organic Compounds Principles and Applications, New Age International Publishers, 1994
- 3. P. S. Kalsi, Stereochemistry -Conformation and Mechanism, New Age International Publishers, 1994
- 4. M.K.Jain and S.C.Sharma, Modern Organic chemistry, Vishal Publishing Company, 2008.
- Jerry March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, 4th Edition. 2013
- 6. N.Tewari, Advance Organic Reaction mechanism Books and allied (P) Ltd. Kolkata 700010 India Second revised edition 2005

SEMESTER- IV				
Part III NME II - EVERYDAY CHEMISTRY				
Code :18UCHN41	Hrs./Week:2	Hrs/ Sem: 30	Credits:2	

Vision

Deepen the basic facts and concepts of the materials used in our daily life

Mission

- Provide a significant knowledge on the drugs and their applications
- Realize the quality of drinking water and its parameters
- Recognize the nature and the function of food additives in our food.

Course Outcomes

CO No.	Upon completion of this course, students will be	POs	CL
	able to	addressed	
CO 1	Differentiate between hand and soft water in terms of	2	Ар
	origin and content		
CO 2	Analyse samples of water to assess their suitability for drinking	5	An
CO 3	Know the importance of some common drugs	5	Un
CO 4	Understand the chemistry behind mouth washes, antacids, analgesics, antipyretics, sedatives and hypnotics	2,5	Un
CO 5	Correlate the importance of colloids in day to day life	1	Cr
CO 6	Know the preparation of some special milks		Re
CO 7	Understand the basic principles behind the preparation	1	Un
	of some useful compounds		
CO 8	Knowledge on the preparation of commercial products	2,7	Cr
	such as candle, Tooth paste, Blackboard chalk, Moth		
	balls, Cleaning powder, Face powder, Lipstick and		
	Eyetex		

Unit I Water Softening Techniques

Water- water quality parameters - Hardness of water - temporary and permanent hardness, disadvantages of hard water - softening of hard water - zeolite process, demineralization process and reverse osmosis - sterilization of water for domestic use by chlorine, ozone and UV light

Unit II Pharmaceutical Chemistry

Drugs- Definition – Importance of some common drugs with examples – mouth washes – antacids – analgesics – antipyretics – sedatives and hypnotics. Anesthetics – Basic requirements of anesthetics – Classification with examples – distinction between antiseptics and disinfectants.

Unit III Colloids

Colloids- coagulation of colloid - protective colloids- gold number- Gels- preparation and properties (imbibition, thixotropy, syneresis).Emulsion - types - emulsifiers. Polymers - Number average and weight average molecular weights- determination of molecular weights by osmotic pressure method.

Unit IV Dairy Chemistry

Milk – composition of milk - Types of milk - Special milks – sterilized milk – flavoured milk – irradiated / vitaminised milk – toned milk – condensed milk. Fermented milks – Cultured butter milk – Acidophilus milk – Yoghurt (Firm-bodied milk).

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) Cleaning powder vi) Face powder

vii) Lipstick viii) Eyetex

Text books

 K.Bagavathi Sundari Applied Chemistry Mjp publishers, 2008, Tamil Nadu Book House Chennai, 2008 2. B.S.Bahl, Arun Bahl, Advanced Organic chemistry, S.Chand& company,2004

Books for Reference

- Puri B.R, Sharma and Pathania, Elements of Physical Chemistry, Vishal publishing Co. 2013 – 2014.
- 2. B.K. Sharma, Industrial Chemistry Goel Publishing House, 2003, Meerut.

SEMESTER IV					
Part IV	Skill Based Elective II Pharmaceutical Chemistry				
Code :18UCHS41	Hrs./Week:4	Hrs/ Sen	n 60	Credits:4	

Vision

Inculcating the basic knowledge about disease, preventive measures and drugs

Mission

- Rationalize the causes and curative measures of various diseases
- Apply Indian medicinal plants for diseases
- Know about the first aid to be done during emergency
- Create an awareness about hypertension and diabetes

Course Outcomes

CO No.	Upon completion of this course, students will be	PSOs	CL
	able to	addressed	
CO 1	Understand the importance of drugs and their mode of	4	Un
	action		
CO 2	Know the causes of common diseases and their	3, 4, 7	Re
	treatment		
CO 3	Apply Indian medicinal plants for treatment.	3	Ар
CO 4	Aware about first aid rules and first aid box	4,7	Ар
CO 5	Predict common poisons and their antidotes.	3, 4, 7	Ev
CO 6	Estimate the sugar and cholesterol levels in blood.	4, 5, 7	Ev
CO 7	Describe about the cardiovascular drugs	3, 4, 7	Un
CO 8	Know about diabetics and its treatment	4, 7	Re

Unit I Classification and metabolism of drugs

Classification of drugs – biological Classification –(drugs acting on central nervous system and peripheral nervous system, Chemotherapeutic drugs, pharamcodynamic agent, metabolic deseases and endocrine function) and chemical classification-metabolism of drugs bio transformation-oxidative, reductive and hydrolytic biotransformations — conjugate reactions — glucuronides ,amino acids, ethereal sulphate, methylated and acetylated conjugations. Absorption of drugs-routes of administration-factors that affect absorption.

Unit II Causes of common diseases and their treatment by drugs

Common diseases and their treatment:

Insect borne diseases-malaria, filariasis, plague,

Air borne diseases-diphtheria, whooping cough, influenza, measles, mumps, common cold, tuberculosis(T.B)

Water borne diseases-cholera, typhoid, dysentery,

Disorder of digestive system-Jaundice

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 cum Hands on Training

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 -blood parameters (glucose, cholesterol, protein etc.,- automatic analyser - 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

Blood pressure types and treatment -Hypertension-primary and secondary hyper tension treatment, hypo tension-measurement.

Functions and uses of the following drugs- cardiovascular drugs-antiarrhythmic drugsquinidine-antihypertensive agents- (hypotensive drugs) — clonidine and reserpine.

Unit V Diabetes and some common drugs

Diabetes types – Diabetes insipidus and diabetes mellitus – control of Diabetes –oral hypoglycemic agents –sulphonyl urease -tolubutamide, chlorpropamide, biguanides-phonformin and metformin.

Anti Convulsant agents-structure and uses of Barbiturates-Phenobarbitone, amylobarbitone, pentobarbitone sodium, hydantoin- diphenyl hydantoin and diazepam.

Anaesthetics- definition, charatcteristics – classification based on mode of action-general Anaesthetics, local Anaesthetics-advantages and disadvantages of vinyl ether, halothane, tricholroethylene and thiopental sodium.

TEXT BOOKS

- 1. Text Book of pharmaceutical chemistry Jayashree Ghosh S.Chand and company, New Delhi 2003.
- 2. Applied Chemistry Bhagavathi Sundari MJP Publishers, 2008

Books for References

- 1. Fundamental Concepts of Applied chemistry, Jayashree Ghosh, S.Chand and Company, New Delhi 2006.
- 2. Pharmaceutical chemistry-Dr.S. Lakshmi Sultan Chand & Sons, NewDelhi.
- Medicinal chemistry- Ashutosh Kar 1997 New age International (P) Limited, New Delhi 2004.

SEMESTER IV				
Self Study II Informative Chemistry				
Code :18UCHSS2 (Optional)		Credits : +2		

Vision

Encouraging the students to learn independently

Mission

- Make the students aware of the latest news in chemistry
- Enable the students to handle the chemicals safely
- Realize the hazardous chemical effects and the need to save our planet
- Appreciate the contributions made by pioneers in chemistry

Course Outcome

CO No.	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO - 1	recognize contribution of chemistry to the nation	5	Re
CO - 2	know the national resource centers	1,7	Re
CO - 3	facilitate the structure and types of MOOCs	5	Cr
CO - 4	practice flip class rooms	5	Ар
CO - 5	apply the concepts of Reduce, Reuse and Recycle	7	Ар
CO - 6	know the methods of disposal of Chemical waste	7	Re
CO - 7	recognize the impact of chemical reactions on our	5	Re
	planet earth		
CO - 8	identify the Nobel laureates in Chemistry	4	Re

SEMESTER IV				
Self Study II	Informative	e Chemistry		
Code :18UCHSS2 (Optional) Credits : 2				

Unit I Latest chemistry informations

Development of Chemistry - challenges – contribution of chemistry to the nation – research in emerging trends in Chemistry - National resource centers – prohibition of chemical weapons – plastic pollution – chemical disasters.

Unit II Chemistry education in modern era

ICT enabled learning- self learning using available e-content - e-learning through MOOC, MOOC platforms - structure and types of MOOCs – Change in learning methods of Chemistry education in India - Flip class rooms.

Unit III Safety in chemistry laboratory

General precautions – hygiene in chemistry laboratory - some common laboratory practices Need for safe disposal – methods of safe disposal of chemical waste - Safe disposal of solids - Safe disposal of liquids/Solutions - Reduce, Reuse and Recycle.

Unit IV Chem applications

Chemical reactions – impact on our planet earth – forensic chemistry – methods of finger print detection - hydrocarbons in fossil fuels - combustion reaction of hydrocarbons - need to change our dependence on fossil Fuels – green house effect - ocean acidification- green fuels

Unit V Nobel Laureates in Chemistry

Noble prizes in chemistry from 2013 – 2018.

Reference

*Course Material is available in the Department of Chemistry

SEMESTER I & II					
Allie Practical – I Allied Biochemistry Practical					
Course Code:21UCBAR1Hrs/Week : 2Hrs/ Sem : 30Credits : 1					

OBJECTIVE:

- To train the students to get a clear idea on qualitative analysis of biomolecule.
- To understand the volumetric analysis estimation of biomolecule.
- To know the basic concepts of saponification number and pH metre.

Qualitative and Quantitative Analysis

Analysis of Simple Biomolecule

- I. Qualitative analysis of carbohydrates.
- II. Qualitative analysis of amino acids.
- III. Colour reactions of Proteins.

Volumetric Analysis

- I. Estimation of Glycine by formal titration.
- II. Estimation of Ascorbic acid.
- III. Estimation of Protein by Biuret method.
- IV. Determination of Saponification number of oil.
- V. Estimation of Carbohydrate by anthrone method.
- VI. Preparation of Buffer and Determination of its pH using pH meter.

BOOKS FOR REFERENCE:

- 1. Arthur D. Vogel. *Vogel's Textbook of Quantitative Chemical Analysis*.sixth Edition. 2004.
- RaghupatiMukhopadhyay, PratulChatterjee. Advanced Practical Chemistry. Books and Allied (P) Ltd., Third Edition.2007.

SEMESTER I					
Skill Enhancement Course – I Professional English for Chemistry - I					
Course Code: 21UCHPE1Hrs/Week : 2Hrs/ Sem : 30Credits : 2					

OBJECTIVES:

- To enhance the language skills of first year chemistry students.
- To acquire knowledge about the effective communication.
- To create competence level of I year students.

Course Outcomes

CO No.	Upon completion of this course, students will be	PSOs	CL
	able to	addressed	
CO 1	express their capability in using the language English	9,10	Un
	in Chemistry.		
CO 2	understand the importance of learning English.	9,10	Un
CO 3	express the Language in a confident manner.	9,10	Un
CO 4	compare the need of the English language and its role.	9,10	An
CO 5	demonstrate the importance of writing English.	9,10	Ар
CO 6	familiar with the texts.	9,10	An
CO 7	interpret the importance of listeningand to develop	9,10	Cr, Ev
	knowledge and to improve competency		
CO 8	know about the professional skills and identify the	9,10	Re
	language level by themselves.		

SEMESTER I					
Skill Enhancement Course –I Professional English for Chemistry - I					
Course Code: 21UCHPE1	Hrs/Week : 2	Hrs/ Sem : 30	Credits : 2		

UNIT 1: Communication

Listening: Listening to audio text and answering questions - Listening to Instructions

Speaking: Pair work and small group work.8

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

Why Carrot is orange in colour? - Antoine Lavoisier -Father of Chemistry - The invention of Saccharine - Invention of Hydroxychloroquinone - Marie Curie.

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.

The spirit of chemical sciences- the effect of greenhouse gas emission- History of matches and lighters, Invention of Vaseline.

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

Alfred noble- his life and work- The soap Bubble- an introduction to nuclear chemistry-Synthetic polymers -biomass and biofuels.

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

Bhopal disaster - Xrays- J.J. Thomson Biography and Noble prize - Invention of Anaestheia - Acid Base Chemistry - Home Volcanoes.

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

First hydrogen bomb –Detecting Hazards - How molecules are formed ? - Industrial chemistry- Food Adulteration.

References:

Britannica, T. E. (Ed.) Marie Curie from Encyclopædia Britannica, (2020, April 16).

Wikipedia, T. E. (Ed.).. Marie Curie, (16, June 2020)

https://en.wikipedia.org/wiki/Carrot

https://www.historyofinformation.com/detail.php?id=2928

https://www.britannica.com/biography/Antoine-Lavoisier

Audio and Video link

https://www.acs.org/content/acs/en/molecule-of-the-

week/archive/s/saccharin.html#:~:text=Saccharin%20was%20the%20first%20widely,sweet% 20taste%20on%20his%20hand.

https://en.wikipedia.org/wiki/Marie Curie

https://en.wikipedia.org/wiki/Hydroxychloroquine

https://www.ukessays.com/essays/chemistry/green-chemistry-and-its-applications.php

https://www.discovermagazine.com/the-sciences/the-accidental-inventor

https://theconversation.com/a-short-history-of-anaesthesia-from-unspeakable-agony-tounlocking-consciousness-74748

https://edu.rsc.org/resources/collections/on-this-day-in-chemistry

SEMESTER II

Skill Enhancement Course -	II Pro	ofessiona	l English	for Che	mistry -	Π

Course Code: 21UCHPE2	Hrs/Week : 2	Hrs/ Sem : 30	Credits : 2

Objectives:

- To elevate the students creativity and innovation skills.
- To mould the students to develop employability skills.
- To enhance the mind flexibility to meet the workplace competence.
- To improve the writing reports and language skills.

Course Outcomes

CO No.	Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	discuss with the groups effectively.	9,10	Un
CO 2	understand the importance of writing English.	9,10	Un
CO 3	express the Language without fear.	9,10	Un
CO 4	adapt easily into the workplace environment.	9,10	An
CO 5	inculcate the real values of English and to identify the hidden potential of their own competence.	9,10	Ap, Re
CO 6	familiar with the comprehensional activities and exercises.	9,10	An
CO 7	attend the interview with boldness and enthusiastically.	9,10	Cr
CO 8	know about the impact of English in education.	9,10	Re

Unit 1: Communicative Competence

Listening – Listening to two talks/lectures by specialists on selected subject specific topics - (TED Talks) and answering comprehension exercises (inferential questions).

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions.

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages.

Nano technology and applications, Natural and Artificial dyes, Green chemistry and its applications.

Unit 2: Persuasive Communication

Listening: Listening to a product launch- sensitizing learners to the nuances of persuasive communication.

Speaking: Debates – Just-A Minute Activities.

Reading: Reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions.

Writing: Dialogue writing- writing an argumentative /persuasive essay.

Process of photosynthesis- Alchemist - Periodic table for Chemist, Cements.

Unit 3: Digital Competence

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (usingvideo conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging tonurture interests – subject related)

Reading: Selected sample of Web Page (subject area)

Writing: Creating Web Pages.

Reading Comprehension: Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.

Polymers - Applications of Spectroscopy -fly ash bricks, Composites,

Chemistry – The Central Science.

Unit 4: Creativity and Imagination

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites .

Speaking: Making oral presentations through short films - subject based

Reading: Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based)

- Creating blogs, flyers and brochures (subject based)
- Poster making writing slogans/captions(subject based)

Photochemistry, Environmental Chemistry, Glass, Abrasives

Unit 5: Workplace Communication Basics of Academic Writing

Speaking: Short academic presentation using PowerPoint.

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting.

Writing an introduction, paraphrasing.

Punctuation(period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)

Capitalization (use of upper case)

Role of Chemist, Antibiotics, Industrial Chemistry, Paints.

References:

- 1. <u>https://www.nano.gov/you/nanotechnology-benefits</u>
- <u>https://www.google.com/search?q=natural+and+artificial+dyes&rlz=1C1CHBD_enIN868IN8</u> <u>68&oq=natural+and+artificial+dyes&aqs=chrome..69i57j0i22i30l3j0i390l2.1894j0j7&sourcei</u> <u>d=chrome&ie=UTF-8</u>
- 3. <u>https://en.wikipedia.org/wiki/Photosynthesis</u>
- 4. <u>https://en.wikipedia.org/wiki/Periodic_table</u>
- https://www.psd1.org/cms/lib/WA01001055/Centricity/Domain/30/The_Spirit_of_Chemical _Science.pdf
- 6. <u>https://en.wikipedia.org/wiki/The_Alchemist_(novel)</u>
- https://www.livescience.com/60682polymers.html#:~:text=Polymers%20are%20materials%20made%20of,tough%2C%20like%20 epoxies%20and%20glass.
- 8. <u>https://en.wikipedia.org/wiki/Pharmaceutical_industry</u>

SEMESTER- III						
Skill Based Elective Agricultural Chemistry						
Course Code : 21UCHS31	Hrs/Week : 2	Hrs/ Sem : 30	Credits : 2			

Objectives:

- To facilitate the students to know the basic knowledge about agriculture and soil
- To realize the importance of agriculture
- To understand the chemistry behind fertilizers and pesticides
- To get an idea about vermin composting
- To analyze the quality of drinking water
- To know the various water treatment methods

Course Outcome:

CONo.	Upon completion of this course, students should be able to	PSOaddre ssed	CL
CO- 1	understand the importance of soil its constituents, fertility and to promote agriculture.	1,7	Un
CO- 2	have an overview of the macro and micronutrients and their functions	1,7	Re
CO- 3	know the preparation and importance of fertilizers in agriculture	1,7	Ар
CO-4	aware of the harmful effects of pollutants Produce vermi compost and gobar gas	2, 3, 8	An,Cr
CO- 5	realize the importance of pesticides and insecticides	1,7	Ар

CONo.	Upon completion of this course, students should be able to	PSOaddre ssed	CL
CO-6	rationalise the environmental hazards of pesticides	4, 7	Ap
CO-7	understand the water quality standards and water quality parameters and analyse the case studies of heavy metal pollution like Hg, As, and Cd.	1,4,2, 3, 7	Un
CO-8	understand the processes used for purification of municipal water and treat waste water by using different methods	4,7, 8	Un, Cr

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.

Unit II: Fertilisers

Natural and synthetic manures-qualities of a good fertilizer- classification of fertilizers – nitrogeneous fertilizers - Preparation and importance of urea-calcium cyanamide - super phosphate-triple super phosphate- potassium chloride-potassium nitrate - DAP, mixed fertilizers (NPK) and human effluent from gobar gas plant as a manure. Vermiculture -vermi compost.

Unit III: 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 ofDDT, BHC, lead arsenate,bordeaux mixture. Biopesticides – definition – examples – applications.

Unit IV: Water Quality Parameters Water quality standard for drinking water (WHO)-Water quality parameters-pH, EC, alkalinity, Total acidity, hardness, DO, BOD, COD, Methaemoglobinemia) – Eutrophication- Case studies- Hg, As, and Cd. (Minamata, arsenic poison in West Bengal, Itai-itai)

Unit V: Water Treatment Methods

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.

Hands on Training:

1. Analysis of carbon, nitrogen, potassium, phosphorous, zinc and calcium in soil using mini lab for soil analysis.

- 2. Determination of BOD and COD of water samples
- 3. Determination of pH and conductivity of water from different sources.
- 4. Determination of DO and hardness of water.

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. Jayashree Ghosh. Text Book of Pharmaceutical Chemistry. NewDelhi:S. Chand and company, 2003.
- 2. BagavathiSundari K . Applied Chemistry. MJP Publishers, 2008.

Books for Reference:

- 1. Sharma B. K. Industrial Chemistry. Goel Publishing House. Fifth Edition, 1993-94.
- 2. Sindhu P.S. Environmental Chemistry. New Age International Publishers, 2010.
- Dr Joshi. S.R *Biopesticides- A Biotechnological Approach*. New Age International (P)
 Ltd., Publishers, 2020.