

Semester - I
Major Core I: GENERAL CHEMISTRY - I
Course Code: CC2011

Hours Per week	Credits	Total Hours	Marks
4	4	60	100

Objectives

- To gain basic knowledge on classification nomenclature of organic compounds
- To understand the quantum theory and wave mechanical concept
- To understand the chemistry of s - block elements and the principles of volumetric analysis

Course Outcome

COs	<i>Upon completion of this course, students will be able to</i>	PSO Addressed	Cognitive Level
CO - 1	understand the structure and naming of various organic compounds	PSO-1	U
CO - 2	interpret various electronic effects and chemical bonding	PSO-3	An
CO - 3	analyse the periodic properties of elements	PSO-2	An
CO - 4	apply wave mechanical concept in other fields	PSO-6	A
CO - 5	predict the properties of elements and the principle behind volumetric analysis	PSO-6	An

Total Number of Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topics	Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Classification and Nomenclature					
	1	Classification of organic compounds - based on the nature of carbon skeleton and functional groups - classification of C and H atoms of organic compounds (primary/secondary/tertiary)	2	Classify organic compounds	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz, slip test and group discussion
	2	IUPAC system of nomenclature of common organic compounds (upto C-10) - alkanes, alkenes and alkynes. Naming of cycloalkanes, bicycloalkanes with and without bridges and aromatic compounds	4	Know about the IUPAC nomenclature of organic compounds	Lecture and power point presentation	Formative assessment I

	3	Naming of organic compounds with one functional group - halogen compounds, alcohols, phenol, aldehydes, ketones, carboxylic acids and its derivatives, cyano compounds, amines, nitro compounds	3	Learn to name organic compounds with one functional group	Lecture and seminar	
	4	Naming of compounds with two functional groups - naming of compounds with more than one carbon chain. Naming of heterocyclic compounds containing one and two hetero atoms present in five/six membered rings	3	Know to name organic compounds	Lecture with power point presentation	
II	Bonding in Organic Molecules					
	1	Hybridization and geometry - bond angle, bond length, bond strength of C-H and C-C bonds - Van der Waal's interactions, Inter & Intra molecular forces and their effects on physical properties	3	Classify the elements based on the force of attraction and properties.	Question answer session	Evaluation through Multiple choice questions, short test, quiz and slip test
	2	Electronic effects - inductive effect, resonance effect - drawing of resonance structures - conditions for resonance - stability of resonance structures	3	Know about various types of electronic effects	Lecture	Formative assessment I
	3	Hyper conjugation, electromeric effect, steric effect - steric overcrowding - steric inhibition of resonance - steric relief (with examples)	3	Distinguish various effects	Lecture with power point presentation and Group discussion	
	4	Dissociation of bonds - homolysis and heterolysis - radicals, carbocations, carbanions - electrophiles and nucleophiles - Influence of electronic effects - dipole moment - relative strengths of acids and bases - stability of olefins - stability of radicals, carbocations and carbanions	3	Know about electrophiles, nucleophiles and stability of different ions	Lecture with power point presentation	

III Periodic Properties						
	1	Atomic orbitals - Quantum numbers- Principal, Azimuthal, Magnetic and Spin quantum numbers and their significance	2	Know about various quantum numbers and filling up of atomic orbitals	Seminar and power point presentation	Evaluation through Multiple choice questions, short test, quiz and class test Formative assessment II
	2	Principles governing the occupancy of electrons in various quantum levels- Pauli's exclusion principle - Hund's rule- Aufbau Principle, (n+1) rule	2	Learn about different principles governing the occupancy of electrons	Lecture and Problem solving	
	3	Stability of half-filled and completely filled orbitals- inert pair effect. Variation of metallic characters - Factors affecting the periodic properties	2	Remember the factors affecting the periodic properties	Lecture and Problem solving	
	4	Anomalies and variations in atomic radius, ionic radius, electronic configuration	2	Calculate the atomic radius and ionic radius	Problem solving	
	5	Variation of electron affinity and electro negativity, ionization energy, metallic character of elements along the group and periods	2	Distinguish various periodic properties	Illustration, Seminar and Power point presentation	
	6	Influence of various characters on stability, colour, coordination number, geometry, physical and chemical properties	2	Calculate coordination number	Power point presentation	
IV Atomic Structure						
	1	Planck's quantum theory - Photoelectric effect, Compton effect	2	Understand the Plank's quantum theory	Power point presentation and videos	Evaluation through Multiple choice questions, short test, quiz and class test
	2	Bohr's model of hydrogen atom	2	Know Bohr's model of hydrogen atom	Lecture	
	3	Wave particle duality, de Broglie equation, Heisenberg uncertainty principle	2	Learn to derive de Broglie equation	Lecture	

	4	Eigen function and Eigen value - Postulates of Quantum mechanics	2	Differentiate Eigen function and Eigen value	Problem solving	Formative assessment II
	5	Schrodinger's time independent wave equation (no derivation), wave functions and its physical properties -Normalization and Orthogonal function	4	Understand the importance of Schrodinger's wave equation	Lecture	
V	i) s - block elements					
	ii) Principles of Volumetric Analysis					
	1	Position of hydrogen in the periodic table, General characteristics of s - block elements. Compounds of s-block metals - oxides, hydroxides, peroxides, superoxide's-preparation and properties - oxo salts - carbonates - bicarbonates - nitrates - halides and polyhalides	3	Recognize the various metals, oxides and hydroxides	Lecture with power point presentation	Evaluation through Multiple choice questions, short test, quiz and class test Formative assessment I
	2	Extraction of Be and Mg - physical and chemical properties - Uses	2	Understand the extraction process	Lecture with videos	
	3	Complexes of s-block metals - complexes with crown ethers - biological importance sodium and potassium - Organometallic compounds of Li and Be	1	Explicate the biological importance of sodium and potassium	Seminar	
	4	General principles of volumetric Analysis, Types of titrations. Requirements for titrimetric analysis. Concentration systems	1	Know about the principles of volumetric analysis	Power point presentation, seminar	
	5	Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point	2	Understand the criteria of preparation of standard solutions	Demonstration	
	6	Neutralisation-titration curve, theory of indicators, choice of indicators. Use of phenolphthalein and methyl orange	1	Acquire knowledge about the use of indicators.	Demonstration	

	7	Complexometric titrations: Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics. Problems based on titrimetric analysis	2	Analyse the stability of complexes	Problem solving	
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Course Instructor: Dr. R. Gladis Latha

HOD: Dr. G. Leema Rose

Semester I
Allied Chemistry - Botany and Zoology Major
Chemistry for Life Sciences
Course Code: CA2011

Hours Per week	Credits	Total Hours	Marks
4	3	60	100

Objectives:

- To acquire knowledge on atomic structure and bonding
- To understand the importance of photochemistry and catalysis
- To apply the principles of chromatography techniques

Course Outcome

COs	<i>Upon completion of this course, the students will be able to:</i>	PSO Addressed	Cognitive Level
CO-1	remember the structure and bonding in atoms and molecules	PSO-1	R
CO-2	analyse the types of bonding and the ways of expressing concentration in molecules	PSO-2	An
CO-2	understand the concepts of biophysical analysis, catalysis and buffer action	PSO-1	U
CO-3	apply the concepts of photochemistry and chromatography to various chemical processes.	PSO-6	A

Total Number of Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topics	Hours	Learning Outcome	Pedagogy	Assessment/Evaluation
I	Atomic Structure					
	1	Dual nature of electron, de-Broglie equation	2	Acquire knowledge on Dual nature of electron and de-Broglie equation	Lecture, power point presentation and videos	Evaluation through Multiple choice questions, short test, quiz
	2	Davisson and Germer experiment	1	Understand Davisson and Germer experiment	Lecture and power point presentation	
	3	Heisenberg's uncertainty principle and its significance	1	Understand Heisenberg's uncertainty principle and its significance	Lecture, power point presentation and discussion	Formative assessment I

	4	Compton effect - Schrodinger's wave equation and its significance, eigen values and eigen functions, quantum numbers and their significance	3	Distinguish eigen values and eigen functions	Lecture and power point presentation	
	5	Atomic orbitals - significance, shapes, difference between orbit and orbital	1	Differentiate between orbit and orbital	Lecture, power point presentation and illustration	
	6	Rules for filling up of orbitals - Pauli's exclusion principle, Aufbau principle and Hund's rule	2	Know about different principles governing the filling up of orbitals	Lecture and power point presentation	
	7	Electronic configuration of elements up to 20	2	Gain knowledge on the filling up of atomic orbitals	Lecture and power point presentation	
II	Chemical bonding					
	1	Ionic bond, formation of ionic bond, general characteristics of ionic compounds	1	Know about ionic bond and its characteristics	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz
	2	Lattice energy, Born-Haber cycle and its applications	2	Understand lattice energy	Lecture and power point presentation	
	3	Covalent bond - formation of covalent bond with examples characteristics of covalent compounds	2	Gain Knowledge about Covalent bond	Lecture and power point presentation	Formative assessment I
	4	Ionic character in covalent compounds, Fajan's rule	1	Acquire knowledge about Ionic character and Fajan's rule	Lecture and power point presentation	
	5	Coordinate bond - formation of coordinate bond with examples.	2	Understand Coordinate bond formation	Lecture and Power point presentation	
	6	Metallic bond -band theory, conductors, insulators and semiconductors.	2	Explicate the difference between conductors, insulators, semiconductors	Lecture with power point presentation	

	7	Hydrogen bonding - types - inter and intramolecular and effect of hydrogen bonding.	2	Understand Hydrogen bonding and its effect	Lecture with power point presentation	
III	Photochemistry					
	1	Importance of photochemistry, difference between thermal and photochemical reactions. Laws of photochemistry - Beer-Lambert's Law, Grother's- Drapers law and Stark-Einstein's law	3	Differentiate between thermal and photochemical reactions	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment II
	2	Quantum efficiency, Electronic excitations - singlet and triplet states, Jablonski diagram, internal conversion - intersystem crossing - fluorescence, phosphorescence. Difference between fluorescence and phosphorescence	3	Understand various electronic excitations	Lecture and power point presentation	
	3	Types of photochemical reactions based on quantum efficiency ($\phi = 1$, $\phi < 1$ and $\phi > 1$) - primary and secondary process of photochemical reactions	2	Differentiate primary and secondary process of photochemical reactions	Lecture and power point presentation	
	4	Photochemical rate law - kinetics of photochemical combination of H ₂ and Cl ₂ and decomposition of HI	2	Acquire knowledge about kinetics of photochemical combination of H ₂ and Cl ₂ - decomposition of HI	Lecture with power point presentation	
	5	Photosensitization, photosensitizers, chemiluminescence and bioluminescence	2	Differentiate chemiluminescence and bioluminescence.	Lecture with power point presentation	

IV Biophysical Analysis and Catalysis						
	1	Osmosis, osmotic pressure and isotonic solutions	1	Understand Osmosis, osmotic pressure, isotonic solutions	Lecture with power point presentation	Evaluation through Multiple choice questions, short test, quiz
	2	Determination of molar mass by osmotic pressure measurement	2	Acquire knowledge on molar mass by osmotic pressure measurement	Lecture with power point presentation	
	3	Reverse osmosis	1	Understand reverse osmosis	Lecture and power point presentation	Formative assessment II
	4	Adsorption - types, factors influencing adsorption and applications of adsorption	2	Acquire knowledge on adsorption, types, factors influencing adsorption and its applications	Lecture and power point presentation	
	5	Catalysis - types, theories, intermediate compound formation theory and adsorption theory	3	Understand catalysis, types and theories	Lecture and power point presentation	
	6	Enzyme catalysis - Michaelis-Menten equation and theory	3	Understand Enzyme catalysis, Michaelis, Menten equation	Lecture and power point presentation	
V Analytical Chemistry						
	1	Methods of expressing concentration - normality, molarity, molality, mole fraction, ppm and ppb	2	Understand methods of expressing concentration of solution	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz
	2	Ionic product of water - pH and pOH	1	Acquire knowledge about Ionic product of water, pH and pOH	Lecture and power point presentation	
	3	Strength of acids and bases - K_a and K_b , pK_a and pK_b	2	Understand strength of acids and bases	Lecture and power point presentation	
	4	Buffer solutions - examples and theory of buffer action	1	Know about buffer solutions and theory of buffer action	Lecture and power point presentation	

5	Chromatography - classification, Column chromatography - principle, experimental techniques, factors affecting column efficiency and its applications	2	Understand chromatography and column chromatography	Lecture with videos
6	TLC - principle, experimental techniques, advantages, limitations and applications	1	Know about TLC	Lecture with videos
7	GC – principle, experimental techniques and applications	2	Acquire knowledge about GC	Lecture with videos
8	HPLC - principle and experimental technique	1	Understand HPLC	Lecture with videos

Course Instructor: Dr. S. Ajith Sinthuja

HOD: Dr. G. Leema Rose

Semester - I
Part IV: NME
Applied Chemistry - I
Course Code: CNM201

Hours Per week	Credits	Total Hours	Marks
2	2	30	100

Objectives:

- To know the preparation and importance of agrochemicals
- To acquire knowledge about soaps and sugar
- To understand the chemicals used in day to day articles

Course Outcome

CO	<i>Upon completion of this course, the students will be able to:</i>	PSO Addressed	Cognitive Level
CO-1	remember the importance of soaps and detergents	PSO-2	R
CO-2	analyse the characteristics and advantages of agrochemicals	PSO-2	An
CO-2	understand the process of manufacture of sugar and paper	PSO-4	U
CO-3	apply the chemical reactions to synthesize day to day articles	PSO-4	A

Total Number of Contact hours: 30 (Including lectures, assignments and tests)

Unit	Section	Topics	Hours	Learning outcome	Pedagogy	Assessment / Evaluation
I	Fertilizers					
	1	Plant nutrients - macronutrients - micronutrients -need for fertilizers - characteristics of a good fertilizer -role of N, P and K in plant growth	2	Know the role of nutrients and fertilizers in plants	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz
	2	Classification of fertilizers - natural fertilizers - artificial fertilizers - manufacture and uses of artificial fertilizers -urea - calcium cyanamide	2	Classify fertilizers and understand the method of manufacturing	Lecture and discussion	Formative assessment I

	3	Calcium ammonium nitrate - superphosphate of lime- triple superphosphate - potassium chloride. Biofertilizers and their advantages	2	Remember the methods of manufacture of fertilizers	Explanation using equations	
II	Pesticides					
	1	Pesticides- classification based on the use and chemical composition. Insecticides- structure and uses of lead arsenate - calcium arsenate - methoxychlor - baygon - malathion- D.D.T. - BHC	2	Classify and know the structure and uses of pesticides	Lecture	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Fungicides - preparation and uses of limesulphur - bordeaux mixture - sodium sulphate - thallium sulphate	2	Remember the uses and methods of preparation of fungicides	Lecture and group discussion	
	3	Weedicides - structure and uses of butachlor - eptam - DNOC. Rodenticides - preparation and uses of zinc phosphide - aluminium phosphide - warfarin	2	Analyse the characteristics and advantages of weedicides and rodenticides	Lecture and power point presentation	
III	Soaps and detergents					
	1	Soaps -classification -hard soap - soft soap - raw materials -manufacture of toilet soap - transparent soap - liquid soap - medicated soap - herbal soap - cleansing action of soap	3	Acquire knowledge about soaps	Lecture with power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment II

	2	Detergents - classification - examples- advantages of detergents over soaps -detergent action -detergent chemicals-additives - excipients - colors - flavours - environmental hazards	3	Remember the importance of detergents	Lecture and group discussion	
IV	Sugar and Paper industry					
	1	Sugar -manufacture - double sulphitation process - refining and grading of sugar-sugar substitute - saccharin - synthesis and uses - manufacture of ethanol from molasses.	2	Understand the process of manufacture and uses of sugar and sugar substitute	Lecture with power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment II
	2	Paper - manufacture - production of wood pulp by sulphate process - processing - blending - beating - refining and calendaring -	2	Understand the process of manufacture of paper	Lecture and discussion	
	3	Types of paper - printing paper – newsprint paper - writing paper - wrapping paper - bond paper - art paper - blotting paper - tissue paper - parchment paper - cardboard.	2	Remember the types of paper	Peer group teaching	
V	Chemicals in day-to-day life					
	1	Ingredients and preparation of tooth powder - tooth paste - writing inks - gum paste - boot polish - talcum powder	3	Apply chemical principles to prepare articles of day - to-day life.	Lecture with power point presentation	Evaluation through Multiple choice questions, short test,

	2	Ingredients and preparation of sealing wax - agar agar - chalk crayons -liquid blues - camphor tablets - agar battis - phenoyl- moth balls.	3	Apply chemical principles to prepare articles of day - to-day life	Peer group teaching	quiz Formative assessment I
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Course Instructor: Ms. L. Deva Vijila

HOD: Dr. G. Leema Rose

Semester – III
Major Core – III : GENERAL CHEMISTRY - III
Course Code: CC2031

Number of Hours Per week	Number of Credits	Total Number of Hours	Marks
4	4	60	100

Objectives

- To gain knowledge on aromaticity, aromatic compounds and electrophilic substitution reactions.
- To understand the characteristics of (Group 13 and 14) Group 14 and 15)
- To gain knowledge on different colloids and photochemical processes

Course Outcome

COs	Upon completion of this course, the students will be able to:	PSO Addressed	Cognitive Level
CO - 1	gain knowledge on aromatic compounds	PSO -1	U
CO - 2	synthesize aromatic compounds	PSO -4	Ap
CO - 3	remember the characteristics of group 13 and 14 elements	PSO -2	U
CO - 4	predict the chemistry of nitrogen and oxygen family	PSO -2	E
CO - 5	to understand the different colloidal systems	PSO -1	Ap
CO - 6	explain the various photochemical processes	PSO -1	U

Total Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topic	Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Aromatic Compounds					
	1	Aromaticity - definition - Huckel's rule - consequence of aromaticity-structure of benzene - stability, carbon-carbon bond lengths in benzene ring - resonance energy	3	Understand about aromaticity, stability of benzene and resonance energy	Lecture and discussion	Evaluation through Multiple choice questions, short test, quiz
	2	Aromatic electrophilic substitution - general pattern of the mechanism involving σ and π complexes, mechanism of nitration, halogenation, sulphonation	3	Know about Aromatic electrophilic substitution reactions	Lecture and discussion	Formative assessment I

	3	Mercuration, formylation and Friedel-Crafts reaction - Energy profile diagrams. Activating and deactivating substituents - orientation in mono substituted benzenes	2	Gain knowledge about activating and deactivating substituents	Lecture	
	4	Reactions of aromatic side chain - halogenation and oxidation - methods of formation and Chemical reactions of alkylbenzenes	2	Know about reactions of aromatic compounds	Lecture	
	5	Biphenyl, naphthalene and anthracene - synthesis of 3-nitrotoluene, 4-bromonitro benzene, 4-bromoacetophenone, 3-(4-nitrophenyl)prop-1-ene, 3-nitrostyrene	2	Understand about the synthesis of benzene compounds	Question answer session and lecture	
II	p-block elements – Boron and Carbon family (Group 13 and 14)					
	1	General characteristics of elements of Group 13 - extraction of boron physical and chemical properties of boron	3	Know about characteristic, extraction and properties of boron	Lecture with power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Compounds of boron - borax, boric acid, diborane, boron nitride- extraction of Al -physical and chemical properties - uses	3	Know the compounds of boron along with uses	Lecture and illustration	
	3	Compounds of aluminium -Al ₂ O ₃ , AlCl ₃ , alums - alloys of Aluminium. General characteristics of elements of Group 14 - allotropic forms of carbon - structure of graphite, diamond and fullerene	3	Understand clearly about the Allotropic forms of carbon	Lecture and discussion	
	4	Chemistry of charcoal-chemistry of oxides of carbon-preparation of silicon - physical and chemical properties of Si - uses -oxides of silicon - structures of silicates - chemistry of silicones	2	Study about chemistry of silicones	Lecture and discussion	

	5	Manufacture of glass - types of glasses - ceramics - extraction of lead - physical and chemical properties - uses - lead pigments	2	Understand about the extraction, properties and uses of lead	Question answer session and lecture	
III	p-block elements – Nitrogen and Oxygen family (group 15 and 16)					
	1	General characteristics of elements of group 15 - Preparation of nitrogen - physical and chemical properties of nitrogen – uses	2	Know about Characteristic, extraction, properties and uses of nitrogen	Lecture and illustration	Evaluation through Multiple choice questions, short test, quiz
	2	Chemistry of nitrogen - hydrazine, hydroxylamine, hydrazoic acid, nitric acid - nitrogen cycle. Preparation, physical and chemical properties and uses of phosphorus	3	Learn about chemistry of nitrogen compounds	Lecture and illustration	Formative assessment II
	3	Chemistry of PH_3 , PCl_3 , PCl_5 , POCl_3 , P_2O_5 and oxyacids of phosphorous - phosphate fertilizers - super phosphate of lime-triple super phosphate	1	Analyse the effects of phosphate fertilizers and super phosphate	Lecture	
	4	Oxides of nitrogen and Phosphorous - oxoacids of nitrogen and phosphorus. Anomalous behavior of oxygen - allotropy of oxygen and phosphorous	3	Know about allotropy of oxygen and its anomalous behaviour	Lecture with power point Illustration	
	5	Structure of ozone, oxides - peroxides, suboxides, basic oxides, amphoteric oxides, acidic oxides, neutral oxides - oxides of sulphur - oxoacids of sulphur - sulfuryl compounds - extraction - uses - selenium and tellurium	3	Understand about oxides and oxoacids of sulphur	Question answer session and lecture	

IV	Colloids					
	1	Definition -classifications - lyophobic and lyophilic colloids - differences. True solutions, colloidal solutions and suspension - definition and characteristics	3	Know about true, colloidal solutions and suspensions	Lecture	Evaluation through Multiple choice questions, short test, quiz
	2	Preparation of colloidal solutions - dispersion methods and condensation methods- purification of colloidal solutions- optical properties-Tyndall effect	3	Understand about different methods of colloidal solutions	Lecture and discussion	Formative assessment II
	3	Kinetic properties - Brownian motion- electrical properties- Helmholtz and diffuse double layers - electro kinetic or zeta potential - electrophoresis - applications -coagulation	3	Acquire knowledge about kinetic and electric properties	Lecture	
	4	Methods- Hardy Schultz law -Hofmeister series - protective colloids - protective action - gold number -applications	2	Know about methods of colloids	Lecture and discussion	
	5	Emulsions - classification, preparation, Gels - preparation - properties - thixotropy -syneresis- imbibitions - application of colloids	1	Study about emulsions, gels and applications of colloids.	Lecture with power point presentation	
V	Photo Chemistry					
	1	Introduction-comparison of thermal and photochemical reactions Laws of photochemistry - Beer-Lamberts law- Grothus-Drapper law - Stark-Einstein law of photochemical equivalence	3	Know about the Laws of photochemistry	Lecture and discussion	Evaluation through Multiple choice questions, short test, quiz Formative assessment I

2	Quantum efficiency - determination of quantum efficiency - chemical actinometry -consequence of light absorption - Jablonski diagram	3	Gather knowledge regarding quantum efficiency and Jablonski diagram	Lecture	
3	Radiative and non-radiative transitions- primary and secondary processes-fluorescence-phosphoresence – photochemical reactions	1	Understand about primary and secondary processes	Lecture and Illustration	
4	Photochemical rate law- kinetics of photochemical combination of H ₂ and Cl ₂ , H ₂ and Br ₂ and decomposition of HI – energy transfer in photochemical reactions	2	Learn about kinetics of photochemical reactions.	Lecture and Discussion	
5	Photosensitization - photosynthesis in plants – chemiluminescence - thermoluminescence- bioluminescence. Lasers- principle-types- applications.	2	Know about different types of lasers	Lecture wit power point presentation	

Course Instructor: Dr. G. Leema Rose

HOD: Dr. G. Leema Rose

Semester - III
Major Elective I a– Pharmaceutical Chemistry
Course Code: CC2032

Hours / Week	Credits	Total hours	Marks
4	3	60	100

Objectives:

- To understand the classification, sources, design and action of common drugs.
- To impart knowledge on various diseases and treatment.

Course Outcome

CO	Upon completion of this course, the students will be able to:	PSO addressed	Cognitive level
CO-1	to understand the characteristics, classification and sources of drugs	PSO-1	U
CO-2	interpret the chemical structure and pharmacological activities of drugs	PSO-3	E
CO-3	compare the action of various drugs	PSO-2	An
CO-4	design common drugs and interpret their therapeutic uses	PSO-5	Ap
CO-5	identify common diseases, their causes and treatment	PSO-2	An

Total Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topics	Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Classification and sources of drugs					
	1	Important terminologies used in pharmaceutical chemistry - pharmacy - pharmacology - pharmacodynamics - pharmacokinetics- pharmacophore-metabolites- antimetabolites-action mycetes- chemotherapy-pharmacopoeia- pharmacognosy- pharmacotherapeutics	3	Gain knowledge about the various terminologies used in pharmaceutical chemistry	Lecture	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Classification of drugs -drugs acting on central and peripheral nervous system- chemotherapeutic drugs - pharmacodynamic agents	2	Understand the action of drugs and classify them	Lecture	

	3	Drugs for metabolic diseases and endocrine function. Nature and sources of drugs - various sources of drugs	2	Know the sources, nature, functions of drugs	Lecture with power point presentation	
	4	Drug development -pre-clinical and clinical trials	3	Understand the various steps involved in drug development	Lecture	
	5	Patenting and legal issues - chemical and process development	2	Gain knowledge about the importance of patenting	Lecture with power point presentation	
II	Drug Design and chemicals in medicine					
	1	Introduction- physical and chemical properties of drugs	3	Recall the physical and chemical properties of drugs	Question answer session	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Designing of drugs procedures followed lead component methods of lead discovery lead modification	3	Understand the steps involved in designing of drugs	Lecture	
	3	Prodrugs types-applications drawbacks soft drug advantages. Physical and chemical factors of drug design	2	Explain about prodrugs	Lecture with group discussion	
	4.	Chemical structure and pharmacological activities of drugs	2	Draw the structure of various drugs	Group discussion	
	5.	Preparation, properties and uses of alum-aluminium hydroxide gel -phosphoric acid -arsenous anhydride-ferrous fumarate – ferric ammonium citrate - mercury with chalk (Grew powder)	2	Understand the methods of preparing drugs and recall their properties and uses	Lecture method	
III	Drug Action and Metabolism of drugs					
	1	General principles - assay of drugs - biological assay	2	Get idea about general principles and assay of drugs	Seminar	Evaluation through Multiple choice questions,

	2	Absorption - drug distribution - drug metabolism	2	Predict the mechanism of drug absorption	Lecture and power point presentation	short test, quiz Formative assessment II
	3	Biological role of salts of sodium, potassium, calcium, zinc and iodine. Agonist and antagonist. Receptor forces - types - theories	3	Recognize the role of salts in drugs	Lecture	
	4	Mechanism of drug action - actions at extra cellular site - actions at cellular site. Mechanism of different types of drug action	2	Write the mechanisms of drug action	Lecture	
	5	Time response relationships - dose response relationship - biotransformation of drugs. Metabolism of drugs - oxidation -reduction -hydrolysis - conjugation	3	Know the metabolism of drugs	Lecture	
IV	Common Drugs					
	1	Antibacterial drugs -preparation and therapeutic uses of sulpha drugs - sulphanilamide - sulphadiazine - sulphathiazole-sulphafurazole -prontosil. Mechanism of action of sulpha drugs	3	Know about antibacterial drugs	Lecture and Seminar	Evaluation through Multiple choice questions, short test, quiz Formative assessment II
	2	Antibiotics - classification based on chemical structure and biological action - structure and therapeutic uses of chloramphenicol - Penicillin - Streptomycin - Tetracyclin - Erythromycin	3	Know the importance of antibiotics	Lecture and group discussion with power point	
	3	Antiseptics and Disinfectant- distinction between antiseptics and disinfectants. Disinfectant- definition - examples - phenol -preparation and uses -chloroxylenol- structure - properties and uses. Antiseptics- Chloramine T - preparation and uses -crystal violet -structure and uses	3	Differentiate and know the importance of antiseptics and disinfectants.	Lecture	

	5	Antipyretics - definition - examples - aspirin -methyl salicylate -paracetamol, phenacetin - preparation and therapeutic uses	3	Understand the importance of antipyretics	Lecture	
V	Common diseases and treatment					
	1	Insect borne diseases - malaria and filariasis. Airborne diseases - diphtheria-influenza and TB. Waterborne diseases - cholera and typhoid	2	Know about insects borne diseases	Lecture and discussion	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Blood pressure - definition- factors affecting blood pressure- systolic pressure - diastolic pressure - pulse pressure - blood pressure levels. Hyper tension- types - control antihypertensive agents. Hypotension - measurement	3	Understand the reasons and methods of treating blood pressure	Lecture with power point presentation	
	3	Anaemia - symptoms and causes - types - antianaemic drugs - types	3	Realize the causes and symptoms of anaemia	Lecture and group discussion	
	4	Cardio-vascular drugs cardiac-glycosides- cardiovascular action - antiarrhythmic drugs- functions -therapeutic uses	2	Gain knowledge about cardio - vascular drugs	Lecture with power point presentation	
	5	Vasodilators or vasopressor - definition- examples - antianginal drugs -example. Cancer -causes -antineoplastic agents-cis-platin-vinblastine and mustine	2	Explain the importance of vasodilators and antineoplastic drugs	Lecture	

Course Instructor: Ms. L. Deva Vijila

HOD: Dr. G. Leema Rose

Allied Chemistry for Physics Major
Semester III
Inorganic and Physical Chemistry
Course Code: CA2031

Hours / week	Credits	Total hours	Marks
4	4	60	100

Objectives

1. To acquire knowledge on atomic structure and bonding
2. To know about metallurgy and the structure of solids
3. To understand the principles of nuclear reactions

Course Outcome

CO	<i>Upon completion of this course, the students will be able to:</i>	PSO addressed	Cognitive level
CO-1	remember the structure and bonding in atoms and molecules	PSO-1	R
CO-2	know about different types of bonding	PSO-2	Y
CO-2	understand the metallurgical processes and the methods of purification of metals	PSO-6	A
CO-3	understand the concepts of solid state chemistry and nuclear chemistry	PSO-1	U

Total Number of Contact hours: 60 (Including lectures, assignments and tests)

Unit	Module	Topics	Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Atomic Structure					
	1	Dual nature of electron - de-Broglie equation	2	Acquire knowledge on Dual nature of electron and de-Broglie equation	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Davisson and Germer experiment	1	Learn Davisson and Germer experiment	Lecture and power point presentation	
	3	Heisenberg's uncertainty principle and its significance.	1	Understand Heisenberg's uncertainty principle and its significance	Lecture and power point presentation	
	4	Compton effect - Schrodinger's wave equation and its significance	1	Understand Schrodinger's wave equation	Lecture and power point presentation	
	5	eigen values and eigen functions	1	Distinguish eigen values and eigen functions	Lecture and power point presentation	

	6	quantum numbers and their significance	2	Understand the various quantum numbers	Lecture and power point presentation	
	7	Atomic orbitals - shapes - significance - difference between orbit and orbital	1	Differentiate between orbit and orbital	Lecture and power point presentation	
	8	Rules for filling up of orbitals - Pauli's exclusion principle - Aufbau principle - Hund's rule	2	Know about different principle Governing the filling up of orbitals	Lecture and power point presentation	
	9	Electronic configuration of elements	1	Know about the filling up of atomic orbital	Lecture and power point presentation	
II	Chemical bonding					
	1	Ionic bond, formation of ionic bond, general characteristics of ionic compounds	1	Know about ionic bond and its characteristics	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Lattice energy, Born-Haber cycle and its applications	1	Understand Lattice energy	Lecture and power point presentation	
	3	Covalent bond, formation of covalent bond with examples, general characteristics of covalent compounds	1	Gain knowledge about covalent bond	Lecture and power point presentation	
	4	Ionic character in covalent compounds, M.O. theory	1	Acquire knowledge about Ionic character	Lecture and power point presentation	
	5	Fajan's rule. percentage of ionic character and bond moment	1	Understand Fajan's rule	Lecture and power point presentation	
	6	bonding, antibonding and non-bonding molecular orbitals	1	Explicate the difference between bonding, antibonding and non-bonding molecular orbitals	Lecture and power point presentation	
	7	M.O diagram of H ₂ , N ₂ , O ₂ and F ₂ , bond order	2	Draw the M.O diagram of H ₂ , N ₂ , O ₂ and F ₂	Lecture and power point presentation	
	8	Coordinate bond - formation of coordinate bond with examples	1	Understand Coordinate bond formation	Lecture and power point presentation	

	9	Metallic bond, band theory, conductors, insulators and semiconductors	1	Explicate the difference between conductors, insulators and semiconductors	Lecture and power point presentation	
	10	Hydrogen bonding types - inter and intramolecular, effect of hydrogen bonding	2	Understand Hydrogen bonding and its effect	Lecture and power point presentation	
III	Metallurgy and Alloys					
	1	Difference between minerals and ores, metallurgical processes, gravity separation and magnetic separation	3	Differentiate minerals and ores	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment II
	2	Froth floatation process, roasting, calcination, smelting	1	Understand various ore dressing methods	Lecture and power point presentation	
	3	purification of metals, electrolytic refining and zone refining	1	Understand various purification methods	Lecture and power point presentation	
	4	Van - Arkel de-Boer process, Kroll's process. Extraction and uses of Ti ,V, W and Mo	2	Understand the extraction of metals	Lecture and discussion	
	5	Purpose of making alloys, types of alloys - ferrous alloys and non-ferrous alloys and preparation of alloys	2	Gain knowledge on alloys.	Lecture and power point presentation	
	6	Heat treatment of alloys, composition and uses of bronze and german silver	1	Understand the types of alloys.	Lecture and discussion	
	7	Nichrome, monel metal, stainless steel, gun metal and bell metal	2	Gain knowledge on types of metals.	Lecture and discussion	
IV	Solid State Chemistry					
	1	Amorphous and crystalline solids, difference between amorphous and crystalline solids	2	Differentiate amorphous and crystalline solids	Lecture and power point presentation	Evaluation through Multiple choice questions, short test,

	2	Isotropy and anisotropy, elements of symmetry, plane of symmetry, axis of symmetry, centre of symmetry and law of rational indices	2	Understand various symmetry elements	Lecture and power point presentation	quiz Formative assessment II
	3	Miller indices and elements of symmetry of a cubic crystal	1	Gain knowledge on miller indices	Lecture and power point presentation	
	4	Point groups and seven basic crystal system, Bravais lattice	2	Understand basic crystal system.	Lecture and power point presentation	
	5	Bragg's equation-derivation, determination of crystal structure by powder method	3	Gain knowledge on determination of crystal structure	Lecture and power point presentation	
	6	Structure of crystals - diamond, graphite and fullerene. Imperfections in a crystal - Point defect, Schottky defect, Frenkel defect, metal excess defect, metal deficiency defect	2	Understand the structure of graphite and diamond	Lecture and power point presentation	
V	Nuclear Chemistry					
	1	Nuclear forces, nuclear size, atomic mass unit, N/P ratio, packing fraction, mass defect and binding energy	2	Understand packing fraction and binding energy	Lecture and power point presentation	Evaluation through Multiple choice questions, short test, quiz Formative assessment I
	2	Radioactivity - α , β , γ radiations and properties, Soddy's group displacement law	1	Knowledge on α , β and γ radiations	Lecture and power point presentation	
	3	Natural radioactivity - detection and measurement of radioactivity by Geiger-Muller method	2	Know the detection and measurement of radioactivity	Lecture and power point presentation	
	4	Rate of radioactive disintegration, decay constant, half-life period and average life period	1	Gain knowledge on decay constant and half life	Lecture and power point presentation	

5	Nuclear reactions - nuclear fission, principle of atom bomb, nuclear reactor, radioactive hazards and disposal of radioactive waste from nuclear reactors	2	Understand the types of nuclear reactions and nuclear hazards	Lecture and power point presentation
6	Nuclear fusion - principle of hydrogen bomb and stellar energy	1	Understand hydrogen bomb	Lecture and power point presentation
7	Principle and working of cyclotron. Applications of radio activity	2	Gain knowledge on cyclotron	Lecture and power point presentation
8	Radioactive tracers in agriculture, medicine and industry. Radiocarbon dating	1	Gain knowledge on various applications of radioactivity	Lecture and power point presentation

Course Instructor: Dr. M. Anitha Malbi

HOD: Dr. G. Leema Rose

Teaching Plan (2019-2020)

Semester – V

Name of the Course : Organic Chemistry III

Course code : CC1751

CO - No.	Course Outcome Upon completion of course students will be able to	PSO	CL
CO - 1	identify the methods of preparation, properties and reaction mechanism of phenols.	PSO - 4	U
CO - 2	prepare and analyze the reactions of poly nuclear hydrocarbons	PSO - 4	C
CO - 3	recognize the classification, preparation and properties of heterocyclic compounds	PSO - 1	R
CO - 4	evaluate the importance and structure of carbohydrates	PSO - 6	E
CO - 5	understand the inter conversions of carbohydrates	PSO - 1	U
CO - 6	pharmacological activities of drugs	PSO - 8	C
CO - 7.	synthesise various drugs	PSO - 4	C
CO - 8.	evaluate the synthetic uses of drugs	PSO - 5	E

Unit	Module	Topic	Lecture Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Phenols					
	1.	Preparation and properties of phenol	2	To understand the importance of phenol and its methods of preparation	Lecture, Discussion	Evaluation through short test
	2.	Rearrangement reactions with mechanisms	3	To differentiate various reaction mechanisms	Lecture, Discussion	Formative assessment
	3.	Preparation and properties of Nitro phenol, picric acid and amino phenols.	2	To gain knowledge about monohydric phenols	Lecture	Formative assessment
	4.	Preparation, properties and uses of catechol, resorcinol and quinol	3	To get idea about dihydric alcohols	Lecture	Formative assessment, Short test
	5.	Preparation, properties and uses of phloroglucinol.	2	To differentiate trihydric alcohols	Question answer session, Lecture	Formative assessment, Assignment
II	Polynuclear Hydrocarbons					
	1.	Preparation and properties of diphenyl and diphenyl methane.	2	To know about poly nuclear hydrocarbons	Lecture with PPT Illustration	Formative assessment
	2.	Preparation and properties of triphenyl methane and stilbene.	2	To know the properties of aromatic compounds	Lecture, Illustration	Formative assessment
	3.	Haworth synthesis, reactions and structural elucidation of naphthalene and derivatives of naphthalene.	2	To understand clearly about naphthalene.	Lecture, Discussion	Formative assessment, Short test
	4.	Structural elucidation, reactions and uses	4	To study about poly nuclear hydrocarbons	Lecture, Discussion	Formative assessment, Online Quiz

		of anthracene and phenanthrene				
III	Heterocyclic Compounds					
	1.	Preparation and chemical properties of furan	2	To know about different properties of furan	Lecture, Illustration	Formative assessment, Assignment
	2.	Preparation and chemical properties of pyrrole	3	To learn about pyrrole	Lecture, Illustration	Formative assessment
	3.	Preparation and chemical properties of pyridine	4	To analyse the properties of pyridine	Lecture	Formative assessment Short test
	4.	Preparation and chemical properties of quinoline, isoquinoline and indole	3	To recognise the various types of heterocyclic Compounds	Lecture with PPT Illustration	Seminar, Formative assessment
IV	Carbohydrates					
	1.	Preparation and chemical reactions of glucose and fructose	2	To know about different electrolytes	Lecture	Formative assessment
	2.	Epimerization and, mutarotation	1	To understand and differentiate between epimerization and, mutarotation.	Lecture, Discussion	Formative assessment, Short test
	3.	Intercoversion between aldoses and ketoses.	2	To acquire knowledge about interconversions.	Lecture	Short test
	4.	Structural elucidation of maltose and sucrose.	3	To evaluate the structure of disaccharides	Lecture, Discussion	Formative assessment
	5..	Structure of starch and cellulose	2	To know about polysaccharides	Lecture	Formative assessment

V	Drugs and Pharmaceuticals					
	1.	Procedures followed in drug design. Lead components and modification.	4	To know about drug design and modification	Lecture, Discussion	Formative assessment
	2.	Pharmacological activities of drugs, receptors, metabolites and antimetabolites	3	To gather knowledge regarding the Pharmacological activities of drugs	Lecture	Formative assessment
	3.	Synthesis of chloramphenicol, benadryl and paracetamol, anti-inflammatory drugs	1	To understand the synthesis and application of drugs	Lecture, Illustration	Formative assessment, Short test
	4	Synthesis of cardiovascular drugs, antileprosy drug, HIV related drugs.	4	To learn the synthesis and application of various drugs.	Lecture, Discussion	Formative assessment, Seminar

Course Instructor: R.Gladis Latha

HOD: G. Leema Rose

Name of the Course : Inorganic Chemistry II

Course code : CC1752

CO - No.	Course Outcome Upon completion of course students will be able to	PSO	CL
CO - 1	identify the p-block elements in the periodic table.	PSO - 1	R
CO - 2	analyze the properties of p- block elements	PSO - 2	An
CO - 3	compare inorganic and organic polymers	PSO - 2	U
CO - 4	explain the different metallurgical processes	PSO - 8	Ap
CO - 5	compare the stability of different atomic nuclei.	PSO - 7	E
CO - 6	illustrate principle of atom bomb and nuclear reactor.	PSO - 1	Ap

Unit	Module	Topics	Lecture hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
Chemistry of p-block elements - I						
I	1	General characteristics of Boron family with special reference to inert pair effect - extraction of boron – properties and uses.	3	Explain the characteristics of Boron family elements	Lecture	Evaluation through short test
	2	Boron trifluoride and boron trichloride – aluminiumtrichloride- preparation, properties and structure.	2	Gain idea about the compounds.	Lecture	
	3	Hydrides of boron – preparation, properties and structure of diborane and carboranes. Preparation, properties and structure of boron nitride and borazine.	2	Know the characteristics of Boron and its compounds.	Lecture with ppt	
	4	General characteristics– comparison of carbon and silicon – structure of diamond and graphite – Fullerenes (definition and examples).	3	Clear idea about allotropes of carbon	Lecture, showing examples of allotropes	
	5	Metal carbides – classification with examples – their applications in industry. Preparation and uses of silica, silicic acid and silica gel. Silicones – preparation and uses. Silicon carbide – preparation, properties and uses.	2	Know the importance of silica and metal carbides	Lecture with ppt	Evaluation through short test

Chemistry of p-block elements - II						
II	1	General characteristics – allotropes of phosphorous and arsenic. Structure of oxides of nitrogen, structure of oxy acids of phosphorous.	4	Draw the structure of oxides of nitrogen and oxy acids of phosphorus.	Question answer session	Multiple choice questions
	2	Preparation, properties and uses of hydrazine, hydrazoic acid and hydroxyl amine.	3	Understand the characteristics of hydrazine, hydrazoic acid and hydroxylamine.	Lecture.	
	3	Anomalous behaviour of oxygen, allotropes of sulphur, oxyacids of sulphur- Caro's acid and Marshall's acid – preparation, properties and structure.	4	Explain the anomalous behaviour of Oxygen and sulphur.	Lecture with ppt, Group discussion	Short test Formative assessment - I
		General characteristics of halogens, peculiarities of fluorine, inter halogen compounds – definition, preparation, types and structure of XY, XY ₃ , XY ₅ and XY ₇ . Pseudohalogens- preparation and properties of cyanogens, thiocyanogen, selenium cyanogen and azido carbondisulphide, inter pseudohalogen compounds.	2	Understand the characteristics of halogens and pseudohalogens	Group discussion	
Noble gases:						
III	1	Occurrence, electronic configuration and rationalization of	2	Get idea about noble gases.	Seminar	

		inertness of noble gases. Isolation of noble gases from the atmosphere-Rayleigh's and Dewar's method. Hydrates of noble gases.				Short test
	2	Clathrates compounds – preparation, properties and uses. Preparation, properties and structure of XeF ₂ , XeF ₄ , XeF ₆ , XeOF ₂ , XeOF ₄ and XeO ₃ .	4	Explain clathrate compounds.	Lecture using ppt	Assignment
	3	Definition – properties, types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of siloxanes. Preparation and properties of silicates, phosphazenes and polysulphates.	5	Compare inorganic and organic polymers.	Lecture	
Metallurgy and Alloys						
IV	1	. Minerals and ores – difference between minerals and ores, metallurgical processes – gravity separation, magnetic separation, froth floatation, roasting, calcination and smelting. Purification by electrolysis, oxidative refining, zone refining, Mond's process, Van - Arkel de-Boer process and Kroll's process.	3	Differentiate ores and minerals and understand the methods of purification of ores.	Illustration, Seminar	Multiple choice questions Formative assessment - II

	2	Extraction, properties and uses of V, W, Mo and Ti. Poly valency of vanadium.	3	Know the extraction of metals.	Lecture, Group discussion with ppt	
	3	Definition, purpose of making alloys. Types of alloys – ferrous alloys and non ferrous alloys with examples.	3	List the applications of alloys.	Lecture	Quiz
	4	Preparation of alloys- heat treatment of alloys – composition and uses– bronze, german silver, nichrome, monel metal, stainless steel, gun metal and bell metal.	3	Know the composition of different alloys.	Lecture, Illustration	

Nuclear Chemistry

V	1	Nuclear forces- nuclear size- atomic mass unit and N/P ratio. Packing fraction - mass defect-binding energy. Nuclear models- shell and liquid drop. Radioactivity - α , β , γ radiations-their properties. Soddy's group displacement law. Natural radioactivity- detection and measurement of radioactivity by Geiger-Muller method	2	Explain the phenomenon of radioactivity.	Lecture, Quiz	Short test
	2	Rate of radioactive disintegration- decay constant-half life period-average life period. Radioactive equilibrium, artificial radioactivity-artificial transmutation of elements.	3	Calculate decay constant and half life period.	Lecture with ppt	Formative assessment - III
	3	Nuclear reactions- nuclear fission – principle of atom bomb. Nuclear reactor – thermal and fast breeder	3	Gain knowledge about the types of nuclear	Lecture, Group discussion	

		reactor. Radioactive hazards- disposal of radioactive waste from nuclear reactors Nuclear fusion – principle of hydrogen bomb and stellar energy. Principle and working of cyclotron.		reactions.		
	4	Applications of radio activity - radioactive tracers in agriculture, medicine and industry. Radiocarbon dating.	4	Apply radioactivity in different branches of science.	Lecture with ppt	

Course Instructor: L. Deva Vijila

HOD: G. Leema Rose

Name of the Course : Physical Chemistry II
Course code : CC1753

CO - No.	Course Outcome Upon completion of course students will be able to	PSO	CL
CO - 1	list out various types of dilute solutions	PSO - 1	R
CO - 2	determine the various colligative properties	PSO - 2	R
CO - 3	calculate the molar mass using colligative properties	PSO - 4	An
CO - 4	illustrate the different types of systems using thermodynamics	PSO - 2	Ap
CO - 5	interpret and correlate the laws of thermodynamics	PSO - 2	AP
CO - 6	calculate the various kinds of energy	PSO - 5	An
CO - 7	compare the entropy change of difficult processes	PSO - 2	E
CO - 8	assess the absolute entropy of solids, liquids and gases	PSO - 5	E
CO - 9	create the group multiplication table	PSO - 3	C
CO - 10	assign point groups to simple molecules	PSO - 4	C

Unit	Module	Topic	Lecture Hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
I	Solutions and Colligative Properties					
	1.	Solutions of non-electrolytes, solutions of liquids in liquids	1	Know the various types of solutions	Lecture, Discussion	Evaluation through short test, Formative assessment, assignment and MCQs
	2.	vapour pressure of non-ideal solutions, type I, type II and type III	1	Know the vapour pressure of solutions	Lecture	
	3.	Vapour pressure, composition and boiling point Composition curves	1	Understand vapour pressure – composition and boiling point - composition curves	Lecture, Discussion	
	4.	Composition curves of completely miscible binary solutions , type I, type II and type III.	2	Draw curves of completely miscible binary solutions - type I, type II and type III.	Lecture	
	5.	Theory of fractional, azeotropic and steam distillations. Solubility of partially miscible liquid systems.	2	Know fractional, azeotropic and steam distillations.	Lecture	
	6.	Phenol-water system, triethylamine -water system and nicotine-water system.	2	Differentiate upper and lower CST	Lecture, Discussion	
	7.	Colligative properties, definition and examples	1	Understand Colligative properties	Lecture	
	8.	Thermodynamic derivation of relation between concentration and elevation of boiling point	1	Derive the correlation between concentration and elevation of boiling point	Lecture, Discussion	

	9.	Osmosis , reverse osmosis , osmotic pressure and determination of molar mass by depression of freezing point.	3	Derive the correlation between concentration, freezing point and osmotic pressure	Question answer session Lecture	
	10.	Van't Hoff factor degree of association and dissociation.	1	Know Van't Hoff factor	Lecture, Discussion	
II	Thermodynamics - I					
	1.	Chemical thermodynamics, importance of system, boundary and surroundings.	2	Know fundamentals of thermodynamics	Lecture with PPT Illustration	Formative assessment, Short test, MCQs Assignment
	2.	Types of systems - open, closed and isolated. Types of processes - isothermal, adiabatic, isobaric and isochoric, reversible and irreversible process.	2	Differentiate isothermal, adiabatic, isobaric and isochoric, reversible and irreversible process.	Lecture, Illustration	
	3.	Difference between reversible and irreversible process. First law of thermodynamics – different statements.	1	Differentiate reversible and irreversible process	Lecture - Discussion	
	4.	Internal energy and first law , mathematical derivation of first law of thermodynamics. State and path functions	2	Derive first law of thermodynamics	Lecture	
	5.	Heat capacity of a system - heat capacity at constant volume (Cv) and heat capacity at constant pressure (Cp)	1	Relate Cp and Cv	Lecture - Discussion	

		relationship between Cp and Cv				
6.	. Joule Thomson effect ,Joule Thomson Coefficient of ideal, real gases and real gases obeying Vanderwaal's equation definition of .Inversion temperature .	2	Derive Joule Thomson Coefficient of ideal, real gases and real gases and Vanderwaal's equation	Lecture - Discussion		
7.	Derivation of .Zeroth law of thermodynamics ,calculation of ΔE , q, ΔH and w for an ideal and real gas. Enthalpy of a system	1	Calculate of ΔE , q, ΔH and w for an ideal and real gas	Lecture - Discussion		
8.	Enthalpy of combustion, enthalpy of neutralization and enthalpy of formation.	1	Know enthalpy of combustion, enthalpy of neutralization and enthalpy of formation	Lecture - Discussion		
9.	Variation of enthalpy of a reaction with temperature (Kirchoff's equation).	1	Derive Kirchoff's equation	Lecture		
10.	Hess's law of constant heat summation and its applications.	1	Know Hess's law of constant heat summation and its applications.	Lecture		
III	Thermodynamics – II					
1.	Limitation of first law and need for second law of thermodynamics, second law of thermodynamics and spontaneous process	2	Know second law of thermodynamics and spontaneous process	Lecture, Illustration	Formative assessment, Seminar, Short test,	
2.	Carnot's cycle,	1	Know Carnot's	Lecture,		

		efficiency of heat engine and Carnot's theorem.		cycle, Carnot's theorem	Illustration	MCQs Assignment
	3.	Third law of thermodynamics, concept of entropy, entropy changes in reversible and irreversible processes.	2	Know Third law of thermodynamics	Lecture	
	4.	Isothermal, isobaric and Isochoric processes. Entropy of mixing and physical significances of entropy.	2	Give the significance of entropy.	Lecture with PPT Illustration	
	5.	Work function (A), Gibb's Free Energy Function (G) and their significances.	1	Understand Work function (A), Gibb's Free Energy Function (G) and their significances	Lecture - Discussion	
	6.	Derivation of Gibb's Helmholtz equation and its applications.	1	Derive Gibb's Helmholtz equation and its applications.	Lecture	
	7.	Partial molar quantities, partial molar free energy and Gibb's Duhem equation – applications	2	Derive Gibb's Duhem equation and its applications.	Lecture - Discussion	
	8.	Clapeyron equation its applications, Clausius Clapeyron equation and its applications	2	Derive Clausius – Clapeyron equation and applications	Lecture - Discussion	
IV	Thermodynamics – III					
	1.	Thermodynamic treatment of law of mass action Van't Hoff reaction	2	To know Van't Hoff reaction isotherm and its significance.	Lecture	

		isotherm and its significance.				Formative assessment, Short test, MCQs Assignment
	2.	Van't Hoff isochore and significance. Fugacity concept determination of fugacity of real gases	2	Understand the concept of Fugacity and its determination	Lecture, Discussion	
	3.	variation of fugacity with temperature and pressure	1	Know the variation of fugacity with temperature and pressure	Lecture	
	4.	Physical significance of fugacity, Activity and Activity coefficient.	1	To gather knowledge regarding activity and activity coefficient	Lecture, Discussion	
	5.	Nernst Heat theorem and its applications.	1	Derive Nernst heat theorem and its applications	Lecture - Discussion	
	6.	Determination of absolute entropy of solids, liquids and gases, exceptions to the third law of thermodynamics	2	Gather knowledge in the determination of absolute entropy of solids liquids and gases	Lecture	
	7.	Thermodynamic interpretation of Le-chatelier principle statement	2	Able to interpret Le-chatelier principle	Lecture - Discussion	
	8.	Effect of change of temperature and pressure on chemical equilibria.	2	Know the Effect of change of temperature and pressure on chemical equilibria.	Lecture - Discussion	
V	Group Theory					
	1.	Symmetry elements and symmetry	2	To know different	Lecture, Discussion	

		operations. Definition of identity (E) and proper rotational axis.		symmetry operations		Short test, Formative assessment, Seminar
2.		Mirror plane (σ), inversion centre (i) and rotation reflection axis (S_n).	2	To gather knowledge regarding the inversion centre (i) and rotation reflection axis	Lecture	
3.		Symmetry operations generated by symmetry elements- H_2O , NH_3 , BF_3 , $[PtCl_4]^{2-}$, H_2O_2 (Planar, cis and trans) and CH_4 as examples.	3	To understand Symmetry operations generated by symmetry elements- H_2O , NH_3 , BF_3 , $[PtCl_4]^{2-}$, H_2O_2	Lecture, Illustration	
4		Group postulates ,abelian , non-abelian and cyclic group	2	Differentiate abelian and non abelian	Lecture, Discussion	
5.		Group multiplication table	1	Construct Group multiplication table	Lecture	
6.		Molecular point groups , assignment of point groups to simple molecules like H_2O , NH_3 and CO_2	2	To assign point groups to simple molecules like H_2O , NH_3 and CO_2	Lecture - Discussion	
7.		Determination of a point group.	1	To determine point groups for simple molecules.	Lecture - Discussion	

Course Instructor: M. Anitha Malbi

HOD: G. Leema Rose

Name of the Course : Green Chemistry
Course code : CC1754

CO - No.	Course Outcome Upon completion of course students will be able to	PSO	CL
CO - 1	know the principles of green chemistry	PSO - 1	R
CO - 2	design green synthesis	PSO - 5	C
CO - 3	interpret green method for organic synthesis	PSO - 3	E
CO - 4	synthesize various compounds by microwave and ultrasound assisted methods	PSO - 4	C
CO - 5	analyze the important techniques and directions in practicing green chemistry	PSO - 2	An
CO - 6	identify the importance of green chemistry in day to day life	PSO - 8	Ap

Unit	Module	Topics	Lecture hours	Learning Outcome	Pedagogy	Assessment/ Evaluation
Introduction to green chemistry						
I	1	Definition , need for green chemistry and scope of green chemistry.	2	Know the need for green chemistry	Lecture with ppt, Group discussion	Short test
	2	Concept of atom economy , yield , mass intensity and atom economy. Calculation of atom economy, mass intensity, mass productivity and carbon efficiency.	4	Calculate the atom economy, mass intensity, mass productivity and carbon efficiency	Seminar	Multiple choice questions
	3	Different types of reactions and atom economy , addition, substitution, elimination and rearrangements.	2	Differentiate the types of reactions	Illustration, Seminar	Short test
	4	Concept of selectivity, enantioselectivity and chemoselectivity	2	Understand the concept of selectivity	Lecture with ppt	Assignment
	5	Regioselectivity and diastereoselectivity.	2	Know the different types of selectivity	Lecture, Group discussion	Short test Formative assessment - I
Green solvent						
II	1	Super critical fluids, Introduction , extraction of super critical fluids, solvents of super critical fluid , advantages and applications Carbon dioxide as a super critical fluid	4	Learn the extraction and advantages of super critical fluids .	Question answer session	Short test
	2	Features of technique	3		Lecture	

		for using super critical carbon dioxide, advantages and application. Chemical reaction in supercritical water and Near, Critical Water (NCW) , Region		Understand the features of technique for using super critical carbondioxide		Multiple choice questions
	3	Extraction natural products, dry cleaning, supercritical polymerization, hydrogenation and hydroformylation. Ionic liquid as green solvent: Introduction , synthesis of ionic liquids, acidic ionic liquid and neutral ionic liquids , applications in organic synthesis.	4	Know the process of extraction of natural products and applications	Lecture with PPT, Group discussion	Short test Formative assessment - I
Green catalyst						
III	1	Catalysis over view, acid catalyst , basic catalyst, oxidation catalyst,, polymer supported catalyst , photosensitized super acid catalyst and Tetra AmidoMacrocylic Ligand(TAML) catalyst.	3	Understand the different types of catalyst	Seminar	Short test
	2	Biocatalyst, microbial oxidation, microbial reduction, enzyme catalyzed hydrolytic process, per fluorinated catalyst and modified biocatalyst.	4	Know the action of Biocatalyst	Assignment	Assignment on MO diagrams Quiz
	3	Development of mesoporous supports by liquid crystal templating, neutral templatingmethods , heterogeneous catalyst , solid supported catalyst.	5	Compare the Development of mesoporous supports by various methods	Lecture with PPT, Group discussion	Formative assessment - II

Green synthesis						
IV	1	Green synthesis of the following compounds, Adipic acid, Catechol, Benzoyl bromide, Acetaldehyde, Citral, Ibruprofen and Paracetamol	3	Synthesize different compounds by Green synthesis method	Illustration, Seminar	Multiple choice questions
	2	Microwave assisted reactions in water , Hoffmann Elimination, Hydrolysis of benzyl chloride and methyl benzoate , oxidation of toluene and alcohols.	3	Learn the different microwave assisted reactions in water	Lecture, Group discussion	Formative assessment - II
	3	Microwave assisted reactions in organic solvents , Esterification, Fries rearrangement, Claisen Rearrangement , Diels – Alder Reaction and Decarboxylation.	3	Understand the different microwave assisted reactions in organic solvents	Lecture with ppt	Quiz
	4	Ultra sound assisted reactions , Esterification, Saponification, alkylation, oxidation, reduction, coupling reactions and Cannizzaro reactions	3	Learn the different Ultra sound assisted reactions	Lecture, Illustration	Short test
Green reactions involving basic principle of green chemistry						
V	1	Twelve principles of green chemistry – choice of starting materials – biomimetic, multifunctional reagents , materials reagents.	3	Know the twelve principles of green chemistry	Lecture, Quiz	Short test
	2	Combinatorial green chemistry, Green Chemistry in sustainable developments.	3	Understand the importance of Green Chemistry in sustainable developments	Lecture with PPT	Quiz

	3	Importance of Green chemistry in day to day life, versatile bleaching agents and analgesic drugs	4	Learn the Importance of Green chemistry in day to day life	Lecture, Group discussion	Assignment Formative assessment - III
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Course Instructor: .S.Ajith Sinthuja

HOD: G. Leema Rose

Name of the Course : Chemistry for competitive examination

Course code : CSK175

CO - No.	Course Outcome Upon completion of course students will be able to	PSO	CL
CO - 1	recognize and remember theories of atoms	PSO - 1	U
CO - 2	predict chemical bonding	PSO - 2	C
CO - 3	analyse the composition and constituents of atmospheric air	PSO - 8	An
CO - 4	measure the hardness of water	PSO - 5	E
CO - 5	differentiate between metals and non metals	PSO - 2	U
CO - 6	analyse the chemical compounds present in polymers, drugs and fertilizers	PSO - 11	An

Unit	Module	Topics	Lecture hours	Learning outcome	Pedagogy	Assessment/ Evaluation
Matter						
I	1	Definition of matter, physical classification, properties of solids, liquids and gases, changes of physical state.	1	Differentiate between physical properties of solids, liquids and gases,	Lecture discussion	Short test Multiple choice questions Assignment
	2	Chemical classifications of elements, compounds, mixtures.	1	Know the classifications of elements, compounds, mixtures	Question answer session	
	3	Classifications of metals, non metal and metalloids with example. physical states of some important elements.	1	Evaluate the properties of metal and non metal	Illustration lecture method	
	4	Compounds, definition, classifications of inorganic and organic compounds with examples, Some important compounds and their common names and uses. Characteristics of compounds.	1	Differentiate between inorganic and organic compounds	seminar	
	5	Mixtures, definitions- classifications homogenous and heterogeneous examples properties of	1	Evaluate properties of compounds and mixtures.	Lecture with PPT	

		mixtures, differences between compounds and mixtures.				
	6	Separation of mixtures – techniques, principles and examples; Handpicking, sieving, magnetic separation, sublimation, sedimentation, Decantation, filtration, evaporation, Distillation, Crystallization	2	Learn the different techniques of separation of mixtures	demonstration	
Structure of Atoms						
II	1	Atoms, definition, Dalton's atomic theory, atom models, Rutherford, J.J. Thomson and Bohr	1	Understand the atom models	Group discussion	Assignment,
	2	Sub-atomic particles, charges of sub-atomic particles, discoveries of subatomic particles.	1	Know the sub atomic particles	Illustration lecture method	Short test Multiple choice questions
	3	Atomic and mass number isotopes, symbols for elements	1	Remember the symbols for elements	Question answer session	
	4	Principles governing filling up of electrons in the orbitals. Electronic configurations of first twenty	1	Learn filling up of atomic orbitals	lecture method	

		elements.				
Classification of Elements and Periodicity of Properties						
III	1	Classification of elements of Doberiner, Newlands, Mendeleev and modern Periodic tables	1	Remember the different forms of periodic tables	Group discussion	Short test, Multiple choice questions, Online assignment
	2	Group and Periods – classification of elements into s,p,d and f block with examples	2	Learn the classification of the elements	Lecture method	
	3	Periodicity of properties –atomic – ionic radii - ionization potential energy	1	Analyse the variation in periodic properties.	Group discussion	
	4	Electron affinity and electronegativity.	1	Evaluate the variation in Electron affinity and electronegativity	Question answer session	
Chemical Bonding and Non-Metals						
IV	1	Need for the chemical bond formation-introduction to ionic bond, covalent bond, co-ordinate bond and metallic bond- ionic bond formation, lattice energy- formation with example as NaCl	2	Differentiate the types of bonds	Lecture with PPT	Short test, Multiple choice questions
	2	Covalent bond – definition and explanation using H ₂ , O ₂ , N ₂ and CH ₄	1	Identify covalent bond	Lecture method	
	3	Properties of ionic and covalent compounds Noble gases and their applications	1	Learn the properties of covalent bond	Seminar	
	4	Halogens and their applications preparation and uses of Hydrogen, phosphorus and sulphur	1	Know the uses of H, P and S	Group discussion	
	5	Allotropes of Carbon - graphite, diamond and fullerene.	1	Differentiate the allotropes of carbon	Question answer session	

Air and Water						
V	1	Atmosphere, different layers of atmosphere and their compositions, composition of air, uses of various components of air	1	Analyse the components of air	Lecture with PPT	Multiple choice questions, Formative assesment
	2	Air pollution, sources, effects and control measures	1	Evaluate the sources of air pollution	Group discussion	
	3	Water, abnormal properties of water and its explanation using H-bonding- Hard and soft water, temporary and permanent hardness	1	Compare the different water sources and analyse its hardness	Demonstration	
	4	Removal of hardness – Boiling, Clarks process, Zeolite process and washing soda process, Reverse osmosis	1	Learn the methods of removal of hardness	Illustration of lecture method	
	5	preparation and uses of distilled water	1	Understand the uses of distilled water	Group discussion	

Course Instructor : K. Francy

HOD: G. Leema Rose