

DEPARTMENT OF CHEMISTRY

Programme Outcome:

The expected outcome of the course is to equip students with the concepts, principles, theories and practical applications of Chemistry to facilitate the students in pursuing their higher studies in chemistry, to boost their career and employment options and to apply chemistry in their everyday life.

The programme encourages the students towards logical thinking and also to think outside of the box so as to enable them to make correct decisions when encountered with different challenges in life.

Course Outcome:

Course Name		Course Outcomes
Chem EH-101	INORGANIC	To develop interest and understanding about the basic concepts of the subject. the states of matter, structure of atom, nucleus and radioactivity, chemical periodicity, chemical bonding, structure and physical properties of inorganic molecular entities
	ORGANIC	From this course the students will be able to learn about the hybridisation of orbitals, the concepts of acids and bases dipole moment, types of reagents and intermediates, configurational and conformational isomerism – Fischer, Newman and sawhorse projections , alkanes / cycloalkanes, alkenes/ alkynes, aromatic hydrocarbons and aromaticity.
	PHYSICAL	From this course the students will have knowledge about - Theories and laws of real gases, liquid state, the various crystalline structures and their defects and colloids and their properties. They will also be able to analyse the difference between them and apply the knowledge acquired to solve problem relating to those topics.
	PRACTICAL (ORGANIC-ELECTIVE)	Systematic qualitative analysis of organic compounds for the detection of elements and one functional group and the preparation of derivative.
	(PRACTICAL ORGANIC - HONOURS)	Systematic qualitative analysis of organic compounds for the detection of elements with two functional groups, determination of melting point of the compound, identification of the compound and preparation of derivative and determination of its melting point.
Paper: Chem EH -201	INORGANIC	The students can apply their knowledge and understanding about reactions, reagents, acidity and basicity, pH and redox potential on the prospective of qualitative and quantitative analysis.
	ORGANIC	From this course the students will be able to learn about reactions of alkyl/aryl halides -nucleophilic substitution and elimination reactions. The classification, nomenclature, structure and bonding including chemical reactivities of alcohols, phenols, aldehydes and ketones.
	PHYSICAL	From this course the students will demonstrate an

		<p>understanding of various Thermodynamic terms and thermodynamic functions and parameters, laws of thermodynamics, Concept of heat and work.</p> <p>Macromolecules and concept of number average and weight average molecule weights and methods for the molecular weight determinations Enthalpies of various reactions and adsorption isotherms . From knowledge and understanding of the above topics, they can perform calculations and apply to experiments.</p>
	PRACTICAL (PHYSICAL)	<p>Students will learn how to determine: heat of neutralization of strong acid by strong base, Molecular weight by Rast method, velocity constant for decomposition of Hydrogen peroxide in presence of catalyst, solubility of salts at two different temperatures and to determine the heat of solution, velocity constant of the hydrolysis of methyl acetate catalysed by acid . Study of heat of dilution of sulphuric acid and to determine the strength of unknown acid.</p>
Paper: Chem EH-301	INORGANIC	<p>Students will understanding the core criteria of the periodic table; preparation, physical, chemical properties , structure and uses of compounds of elements belonging to s, p, d and f blocks; advance studies on bonding and structures in coordinate compounds, uses and practical on qualitative analysis.</p> <p>The students will be aware of the importance of the elements of the periodic table and how to analyst and separate various elements through qualitative estimation.</p>
	ORGANIC	<p>From this course the students will learn about the nomenclature, structure, bonding and chemical reactivities of carboxylic acid, nitro compounds, amines and diazo compounds. Use of organometallic compounds in organic synthesis and active methylene compounds.</p>
	PHYSICAL	<p>From this course the students will learn about-Carnot's cycle and Carnot's theorem, various other thermodynamic parameters, osmosis and reverse osmosis with applications, Law governing dilute solutions and colligative properties with derivations of important equations involved. They will gain knowledge about homogeneous and heterogeneous equilibria and principle involved. they will be able to determine rates of various chemical reactions both theoretically and experimentally and also observe the effect of catalyst and determine energies of activation of such reactions.</p>
	PRACTICAL (INORGANIC)	<p>This paper will impart skills and knowledge in estimation of compounds through preliminary test such as nature, colour and solubility of compound: Dry Test and Wet test for Acid, Basic and interfering radicals, removal of interfering radical, group separation and group analysis.</p> <p>The students will developed skills and learning about salt analysis and can apply their knowledge in estimation of</p>

		compounds present in water, food etc.
Paper: Chem EH-401	INORGANIC	<p>This paper's content consists of environmental studies on earth's atmosphere, waste-water treatment, solid waste disposal and radioactive waste; advance chemistry in Organometallic, Inorganic polymers, Interhalogens, polyhalides and pseudohalides; preparation and their applications.</p> <p>The students will be enlightened about the consequences and impact on environment, chemical applications and industrial development.</p>
	ORGANIC	From this course the student will learn about the classification, nomenclature, synthesis and reactions of monosaccharides, amino acids, urea, drugs, heterocyclic compounds, fats, oils, soaps, detergents and dyes.
	PHYSICAL	From this course the student will learn about laws in electrochemistry and electrical properties like solubility product and common ion effect and conductances etc. and apply them in experiments. Learn about strong acids and bases and weak acid and bases and derivation of hydrolysis constant for their salts, electrochemical cells, types of electrodes and to determine their EMF. Be able to examine different types of phase diagrams of one component and two component systems and types of types of liquid liquid mixtures.
	PRACTICAL(I NORGANIC)	The students will developed skills about quantitative estimation of radicals and can apply their knowledge in estimation of radicals in soil, water etc.
Paper: Chem EH-501	INORGANIC	<p>This paper is an Advance Studies on theories and applications such as CFT, MOT, molecular symmetry and magneto-chemistry; Error analysis, complexometric titration; organic reagent used in analysis and advanced study on nucleus and reactivity.</p> <p>The students gain information about the various theories that prove the formation and stability of different types of chemical entities and their properties. Therefore, they can apply their knowledge in predicting and elucidating of chemical structures. They can also apply their knowledge on accuracy, precision and error of readings.</p>
	ORGANIC	From this course the student will learn about the relative strengths of acids and bases, and the different factors effecting acidity and basicity. The different dienes, polymers, uses of inorganic reagents and organic synthesis. The R and S nomenclature, and the goals principles and techniques of green chemistry.
	PHYSICAL	From course the student will learn about the importance of Maxwell's Distribution Law and Maxwell-Boltzmann

		distribution in determining various types of molecular speeds and their calculations. Critical phenomena in gases. Physical properties and chemical constituents of liquids and molecular structure forces of interactions in molecules. Symmetry elements in crystals and Law of symmetry, defects in crystals and crystal structure determination. Partial molal quantities, chemical potential, Maxwell's relations, variation of chemical potential with temperature and pressure, Gibbs-Duhem equation, Nernst heat theorem Third Law of thermodynamics and application to determination of entropy and concept of residual entropy. Catalysed reactions and types. Michaelis-Menten equation, Theory of Reaction rates with regards to unimolecular and bimolecular reactions.
	PRACTICAL(Part B ORGANIC)	Students will learn separation of binary organic mixtures based on acid base concept and determination of their melting points ii) Preparation of organic compounds.
	PRACTICAL(Part C PHYSICAL)	Students will learn how to: perform Acid base titrations using a conductometer and potentiometer. Determine :velocity constant for decomposition of hydrogen peroxide using catalyst, heat of solution of calcium chloride, and to determine lattice with the help of Born-Haber cycle, critical solution temperature of phenol-water system, kinetics of the reaction between potassium persulfate and potassium iodide at two temperatures and then to determine activation energy, adsorption of charcoal and verification of Freundlich's isotherm, surface tension of liquid by drop weight method, viscosity - composition of given unknown mixture partition coefficient of solute between two immiscible solvents, pKa value of different sets of buffer by pH metric titration using glass electrode.
Paper: Chem EH-601	INORGANIC	The students will gain knowledge and understanding about the important elements in the biological system. They are made aware about different spectroscopic methods and can apply it in the elucidation of compounds. They are also introduced into nanotechnology.
	ORGANIC	From this course the students will learn about reactions and structure of disaccharides, classifications, isolation, structural elucidation, synthesis of terpenoids and alkaloids, proteins vitamins and their biological importance. The enzymes coenzymes, photochemical reactions, pericyclic reactions and use of mass, UV-visible, IR and NMR for structural elucidation.
	PHYSICAL	From this course the students will learn about- Idea of thermodynamic probability and entropy. Boltzmann distribution for degenerate and non degenerate cases. And idea of partition function. Failure of classical mechanics, black body radiation Planck's radiation Law, Photo electric effect

		<p>and Compton effect, heat capacity of solids, postulates of quantum mechanics model systems with derivation of wave function and energy expression, particle in a box, rigid rotor harmonic oscillator, quantum numbers and their importance. Introduction to molecular spectroscopy and spectrometers. Born-Oppenheimer approximation and degrees of freedom. Rotational and vibrational spectra of diatomic molecules with derivations and applications. Isotope effect. Beer-Lambert's Law, Einstein Law, Concept of potential Energy curves, Frank-Condon Principle, Jablonski diagram, Fluorescence and phosphorescence photochemical and photosensitized reactions and quantum yield. Activity, ionic activity, mean ionic activity, electrophoretic and relaxation effects. Onsager equation. Wien and Debye-Hückel effects, Debye-Hückel theory and limiting law. Solubility of sparingly soluble salts and ionic strength of medium. Concentration cells with and without transport liquid junction potentials, EMF and its measurement, Calculation of thermodynamic parameters from EMF. Applications of electrodes and potentiometric titrations with examples.</p>
	<p>PRACTICAL (INORGANIC)</p>	<p>The students developed skills how to separate radicals in a mixture and quantitatively estimate the amount of each radical present in it. The students can apply their knowledge in estimation of radicals in soil, water etc.</p>