

Program Outcomes (PO) for Under Graduate Programmes in subject of Chemistry.

PO1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study
PO2	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO3	Problem Solving	Capability of applying knowledge to solve scientific and other problems
PO4	Individual and Team Work	Capable to learn and work effectively as an individual , and as a member or leader in diverse teams, multidisciplinary settings
PO5	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions
PO6	Modern Tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO7	Science and Society	Ability to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO8	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life
PO9	Environment and Sustainability	Ability to design and develop modern systems which are environmentally sensitive and to understand the importance of sustainable development
PO10	Ethics	Apply ethical principles and professional responsibilities in scientific practices

Ist Year (Ist Semester)

Chemistry-I Inorganic Chemistry (Theory)

Course Outcomes:

- CO1:** To study and explain the Radial and angular nodes, Schrodinger equation, quantum numbers and their significance in describing shapes of s,p and d orbitals.
- CO2:** Able to understand the classification of periodic table and its related properties.
- CO3:** To apply VSEPR theory in explaining shapes of some inorganic molecules/ions and ionic character of covalent bonds in molecules.
- CO4:** To learn about the structure of ionic solids as lattice, its defects, lattice energy, solvation energy and polarisability of ions.

Chemistry-II Physical Chemistry (Theory)

Course Outcomes:

- CO1:** To understand the behavior of ideal and real gases and their corresponding phenomenon and variables.
- CO2:** To understand the Maxwell distribution law for gaseous molecules and measure its different type of velocities corresponding to temperature.
- CO3:** To study the Physical properties of liquids like surface tension, viscosity and their measurements.
- CO4:** To understand the morphology of crystalline solids and have knowledge about various types of symmetries present in different solids also able to describe X-rays diffraction and Bragg's law.

Chemistry-III Organic Chemistry (Theory)

Course Outcomes:

- CO1:** Have sound knowledge of the basic organic chemistry like electron displacement effects with suitable examples.
- CO2:** Get information about the types of structural and stereoisomers, optical isomerism, and different nomenclature like D/L, RS, cis/trans, E/Z etc. of various organic compounds.
- CO3:** To understand the various types of reactions and reactive intermediates.
- CO4:** Learn nomenclature of various type of alkanes and cycloalkanes, preparation and their chemical reactions.

Ist Year

Chemistry Practical-I)

Course Outcomes:

- CO1:** To gain knowledge about Preparation of standard solutions used in the lab.
- CO2:** Know about Redox ,iodometric titrations and complexometric titrations.
- CO3:** To study the concept of surface tension and its determination by various methods.
- CO4:** To know about viscosity and its measurements by using Ostwald's viscometer
- CO5:** To learn about, how to Purify organic compounds by crystallisation(with alcohol and water), sublimation and distillation.
- CO6:** Able to prepare various organic compounds and also their derivatives.
- CO7:** To study the process of sublimation and crystallization of camphor and phthalic acid.
- CO8:** Able to analyze qualitatively inorganic cations and anions using paper chromatography.

Ist Year (IInd Semester)

Chemistry-I Inorganic Chemistry (Theory)

Course Outcomes :

- CO1:** To know the concept and able to explain types and effect of hydrogen bonding, van der waals forces, and theories of metallic bonds with reference to conductors and their applications.
- CO2:** To know about the diagonal relationship among s-block elements, and learn about chemistry of noble gases.
- CO3:** To know about the physical and chemical properties of p-block elements.
- CO4:** To understand the different structural and chemical properties related to group 13-17th elements of periodic table.

Chemistry-II Physical Chemistry (Theory)

Course Outcomes:

- CO1:** To have the knowledge about the concepts of rates of chemical reactions and its applications in derivation of reactions of various orders and half-life
- CO2:** To understand the theories of reaction rate.
- CO3:** To understand the electrolytic conduction, its factors and different theories like Arrhenius theory, Ostwald's dilution law.
- CO4:** To understand the application of Kohlrausch's Law, conductivity measurements (Determination of degree of dissociation along with concept of pH and pK)

Chemistry-III Organic Chemistry (Theory)

- CO1:** To understand the concept of alkene, synthesis, chemical reactions along with their mechanism.
- CO2:** Know about Huckel's rule of aromaticity and various methods of preparation of aromatic Hydrocarbons and their chemical reactions.
- CO3:** To understand the concept of dienes, alkynes, their synthesis and chemical reactions along with their mechanism.
- CO4:** To get the knowledge about the nomenclature of alky/aryl halides, synthesis and chemical properties.

B. Sc. (IIIrdSemester)

Inorganic Chemistry-III (Theory)

Course Outcomes :

- CO1:** To know about chemistry of d-block elements
- CO2:** To have knowledge about structure and properties of some compound of transition elements: TiO_2 , VOCl_2 , FeCl_3 , CuCl_2 etc.
- CO3:** To understand the basic terms related to coordination, werner's theory valence bond theory of transition metal complexes.
- CO4:** To have good knowledge about fundamental concepts non- aqueous solvents.

Physical Chemistry-III (Theory)

Course Outcomes :

- CO1:** To know about the laws and concepts of thermodynamics and their applications in thermochemical calculations.
- CO2:** To have knowledge about joule-Thomson coefficient for ideal gas and real gases.
- CO3:** To understand the basic terms related to chemical equilibrium and derive the law thermodynamically,
- CO4:** To have good knowledge about fundamental concepts of phase equilibrium and their applications in studying one and two-component systems including eutectics.

Organic Chemistry-III (Theory)

Course Outcomes:

- CO1:** Have knowledge of various absorption laws (Beer-Lambert law), molar absorptivity, analysis UV spectra and application of UV spectroscopy in structure elucidation.
- CO2:** To have good knowledge about alcohols & phenols.
- CO3:** To synthesize and know reactions of epoxides.
- CO4:** To discuss synthetic application of carboxylic acid and acid derivatives.
- CO5:** To have good knowledge about hell volhardzelinskyreaction,relatives stability of acyl derivatives.

B. Sc. II Year (IVth Semester)

Inorganic Chemistry-IV (Theory)

Course Outcomes :

CO1: Have knowledge about the general characteristic of lanthanide

CO2: Sound knowledge about electronic structure of lanthanide, oxidation state magnetic properties complex formation.

CO3: To understand ionic radii, lanthanide contraction.

CO4: Have knowledge about occurrence, separation of lanthanides, lanthanide compounds

CO5: To understand the general characteristics of actinides, separation of Np, Pu, Am from uranium.

CO6: Able to understand the properties of lanthanide and actinide with transition metals.

CO7: To know about theory of qualitative and quantitative analysis.

CO8: To understand the common ion effect, solubility product, theory of precipitation, coprecipitation, postprecipitation, purification of precipitates.

Physical Chemistry-IV (Theory)

Course Outcomes :

CO1: To know about second law of thermodynamics, Carnot cycle and its efficiency

CO2: To understand the concept of entropy – entropy as a state function..

CO3: To have sound knowledge about 3rd law thermodynamic, Nerst heat theorem .

CO4: To be able to solve various numerical problems thermodynamics.

CO5: To be able to understand of various topic of electrochemistry like reversible & irreversible cells, gas electrodes, Nerst equation, standard hydrogen electrode liquid junction potential, potentiometric titration. .

Organic Chemistry-IV (Theory)

Course Outcomes:

CO1: Get knowledge about the principle of IR absorption spectroscopy, Hooke's law, selection rules.

CO2: Get knowledge about the application of IR spectroscopy in structural elucidation of simple organic compound.

CO3: To have knowledge about classification, structures and important reactions of amines.

CO4: Get knowledge aromatic diazonium salts.

CO5: To have knowledge about classification, structures and important reactions of aldehyde & ketones..

B. Sc. IInd Year (IVth Semester)
Chemistry-IV (Practical)

Course Outcomes:

- CO1:** To verify the Beer's Lambert law using potassium permanganate and potassium dichromate and also quantitation of these analytes.
- CO2:** To prepare simple coordination complexes viz. Cuprous chloride, tetra-ammine cupric sulphate, chrome alum, potassium trioxalatochromate(III) and Nickel Hexammine chloride.
- CO3:** Able to find out critical solution temperature of phenol water system.
- CO4:** To determine the enthalpy of solution of calcium chloride enthalpy of neutralization and ionization using different combinations of acids and bases.
- CO5:** To perform hydrolysis of ethyl acetate and find out rate constant of the reaction.
- CO6:** To identify extra elements present in various solid organic compounds.
- CO7:** Able to identify functional group present in organic compounds.
- CO8:** Able to measure melting point, solubility behaviour, pH range, flame testing etc. of organic Compounds.
- CO9:** To perform gravimetric analysis and also able to analyze quantitatively copper, nickel and aluminium in the given solution.