

CHEMISTRY

BSc I year

Paper I - Inorganic Chemistry

- To understand and apply De-Broglie equation, Quantum numbers, Heisenberg Uncertainty Principle, Pauli Exclusion Principle in chemistry
- To understand the derivation of Schrödinger's wave equation, applications of Aufbau Principle & Hund's rule of maximum multiplicity in case of orbital concepts.
- To learn the Periodic Table and understand the atomic properties and applications of these properties.
- To understand and apply different theories of chemical bonding in molecules and their limitations and applications. Students should be able to differentiate between bonding on basis of electro negativity and electro positivity.
- Students should understand and apply the concept of hybridisation in inorganic molecules.
- Students should understand the properties of ionic solids and its defects and semiconductors.
- Students should understand about the elements present in S-Block and P-Block and their biological role.

Paper II - Organic Chemistry

- To make students understand the structure and bonding in organic molecules. They should be able to apply the concepts of Hybridisation, Resonance, Hyper
- conjugation, Aromaticity and Hydrogen Bonding to justify properties of organic compounds.
- Students should be able to classify various types of Organic Reaction Mechanisms and Reactive Intermediates and substantiate giving suitable examples.
- Students need to study Alkanes and Cycloalkanes on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties. The concept of Baeyer's Strain Theory, Theory of Strainless Rings and Banana Bonding in Cycloalkanes and their role in structural isomerism should be grasped by the students.
- Students need to understand Isomerism in organic compounds. They study types of structural isomerism (geometrical and conformational) and stereo isomerism (optical).

The students should be able to differentiate between conformation and configuration, relative and absolute configuration etc.

- Students need to study Alkenes, Cycloalkenes, Dienes and Alkynes on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study Arenes on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study Alkyl halides, Alkenyl halides and Alkynyl halides on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study the synthesis, properties and uses of Polyhalogen compounds like Chloroform, Carbon tetra chloride, DDT and BHC.

Paper III - Physical Chemistry

- Introduction to mathematical concept including logarithmic relations, curve sketching, basics of integration, differential and probability.
- Understand elementary knowledge of computer languages, hardware and software, binary to decimal conversion and vice versa.
- Understand critical phenomena of real gases, molecular velocities and liquefaction of gases.
- Understand about liquid crystal structure and their application.
- Determine the crystal structure and understand the laws of crystallography.
- Students learn about the calculation of Miller Indices, Bragg's equation and numerical.
- Elementary knowledge of colloids, classification and properties should be imparted to the students.
- Students study about mathematical determination of simple chemical reactions (first and second order) under chemical kinetics.

BSc IIInd year

Paper I - Inorganic Chemistry

- Students should be aware of the properties of d-block and f-block elements.
- Students should have knowledge of co-ordination compounds, effective atomic number, ligands, nomenclature, isomerism, co-ordination number.

- Students should know about different theories of complex compounds like Werner's theory, Crystal Field theory, Valence Bond theory and Molecular Orbital theory.
- Students should have knowledge of Acid and Bases and their modern concepts.
- The students should know about non-aqueous solvents.

Paper II - Organic Chemistry

- Students need to be introduced to Absorption spectrum, wavelength, wave numbers and their units.
- Students should be able to analyse and interpret UV and IR spectra of simple organic compounds.
- Students need to study Mono, di and Tri Hydric alcohols on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study Nomenclature, Structure and Bonding, Preparation methods, Acidic character and Chemical properties of phenols.
- Students need to study Nomenclature, Structure and Bonding, Preparation methods, Acidic character and Chemical properties of Ethers and Epoxides.
- Students need to study Mono, di and Tri, Saturated and unsaturated Aldehydes and ketones on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study Mono and di, saturated and unsaturated Carboxylic Acids on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study compounds containing nitrogen (Nitroalkanes, Alkyl Nitrites, Nitroarenes, Halonitroarenes, Amines, Aromatic amines, Diazonium compounds) on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.

Paper III - Physical Chemistry

- Understanding The First Law of Thermodynamics (concept of internal energy, Heat, Work done).
- Understanding heat capacity and Joule Thomson effect and its application and numerical based on these concepts.
- Understanding Hess's law, heat of reaction, Enthalpy of neutralisation and Kirchhoff's equation under thermo chemistry.

- Students need to be aware of Carnot's cycle, its efficiency, concept of Entropy and the second Law of Thermodynamics.
- Students need to be aware of electrical transport including molar and equivalent conductance and its measurement by different methods.
- Students need to be aware of types of electrodes, electrolytic, galvanic and concentration cell and measurement of EMF of cell.
- Students need to be aware of equilibrium constant, free energy and reaction isotherm and reaction isochore under the topic chemical equilibrium.
- Students need to be aware of knowledge of phase equilibrium including derivation of Gibb's phase rule, phase equilibrium of one and two component systems.

BSc IIIrd year

Paper I - Inorganic Chemistry

- Knowledge of crystal field splitting in octahedral tetrahedral and square planar complexes.
- Understanding thermodynamics and kinetic stability, metal complexes and substitution reactions of square planar complexes.
- Knowledge of magnetic behaviour, magnetic susceptibility, magnetic moment, L-S coupling and application of magnetism.
- Knowledge of electronic transition, spectrochemical series, Orgel energy level diagram and Tanabe -Sugano energy level diagram.
- Knowledge of inorganic polymers (silicones and phosphazenes)
- Knowledge of organometallic compounds, 18 electron rule and metal carbonyl.
- Knowledge of hard and soft, acids and bases, role of essential and trace elements in biological systems.
- Students are expected to understand chemical composition of haemoglobin and myoglobin.

Paper II - Organic Chemistry

- Students need to be introduced to NMR spectroscopy (Nuclear Magnetic Resonance), Radiowaves, units of radiation, magnetic field, shielding, deshielding, chemical shift, spin-spin splitting and coupling constant.
- Students should be able to analyse and interpret NMR spectra of Hydrogen (H^1) in simple organic compounds.

- Students need to study Organometallic and Organosulphur compounds on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study five and six membered Heterocyclic compounds (Pyrrole, Furan, Thiophene and Pyridine) on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study Heterocyclic compounds (Indole, Quinoline and Isoquinoline) on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to study carbohydrates (Glucose and Fructose) on basis of Nomenclature, Classification, Methods of Preparation, Physical Properties and Chemical properties.
- Students need to be aware of configuration, conversion, mutarotation and determination of ring size and structure of monosaccharides, disaccharides and polysaccharides.
- Students need to study introduction to structure, classification, stereochemistry of amino acids, peptides and nucleic acids (DNA, RNA).
- Students need to study fats, oils and detergents.
- Students need to study synthetic polymers (PVC, Nylon, Tereylene, Rubber, Urethane etc.) involving addition and condensation polymerisation.
- Understand classification, structures, chemistry and synthesis of natural and synthetic dyes.

Paper III- Physical Chemistry

- Introductory Quantum mechanics including Planck's Radiation Law, Photoelectric Effect, Heat Capacity, Bohr's Model, Compton Effect.
- Understanding physical properties and molecular structure including optical activity, dipole moment and its measurement, magnetic properties its measurement and importance.
- Knowledge of elementary Quantum Mechanics, Schrödinger wave equation, particle in one-dimensional box, Schrödinger wave equation for H-atom and wave functions and numerical.
- Understand Molecular Orbital Theory, construction of MO by LCAO H_2^+ ion, calculation of energy levels from wave function.

- Introduction of spectroscopy, electromagnetic radiation basic features of different spectrophotometers.
- Understand different types of spectrum like Rotational spectrum, IR spectrum, Raman spectrum and Electronic spectrum.
- Knowledge of laws of photochemistry, Jablonski diagram, kinetics of photochemical reaction.
- Understand solution, dilute solution and colligative properties.