**B. Sc.**

**Programme Specific Outcome**

**Chemistry**

This programme is designed with an objective to cover all important topics of physical, inorganic, organic and analytical branches so that students will be able to use this knowledge in advancement of their career.

PSO1 (Physical Chemistry): In this programme students will learn mathematical concept, significance of states of matter, i.e. gaseous, liquid and solid states, basics of thermodynamics, chemical kinetics, nuclear chemistry, colloidal sols, phase equilibrium, entropy, buffer solutions, phase rule, electrochemistry, photochemistry, UV-VIS , IR, Raman, NMR spectroscopies .

PSO2 (Inorganic Chemistry): Atomic structure Schrodinger wave ,de Broglie's Equation, Ionic, covalent, coordinate bonds , periodic table covering s, p, d, and f block elements , periodic properties. Chemical properties, theories of coordination compounds like Werner, VBT, CFT & MOT. Bioinorganic chemistry nitrogen fixation, concept of hard & soft acids and bases gravimetric analysis. Inorganic polymers, Errors, Magnetic & spectral properties of complexes, Orgel energy level diagrames.

PSO3 (Organic Chemistry): Reaction mechanism electrophilic, nucleophilic substitutions and additions , methods of preparations, important physical and chemical properties, saturated &unsaturated hydrocarbons, structure and substitution reactions of benzene, alcohols, phenols, aldehydes, ketones ,carboxylic acids, acid derivatives like acid chlorides, amides, anhydrides, ammines. Electromagnetic &I R spectroscopy, organic compounds of nitrogen, Carbohydrates nucleic acids i.e., DNA & RNA, fats, oils, and detergents, Organometallic compounds

**Course Outcome for B.Sc. level**

**Chemistry**

**B. Sc. First Year**

**First Paper (Physical)**

Students will be able to understand following points-

CO1: Simple mathematics, derivation of some chemical equations like order of reaction.

CO2: Properties of gases and velocity of gas molecules. Solids, Geometry of crystals, liquid crystals, important applications.

CO3: Chemical Kinetics scope, determination of rate of reaction, factors affecting.

CO4: Understanding phenomena of Radioactivity, theory of nuclear fission and fusion, half life period and its applications.

CO5: Chemical equilibrium, Law of mass action, Colloidal Sols their classification, important properties like kinetic, optical, and electrical, coagulation, Hardy Schultz rule, gold number.

**Second Paper (Inorganic)**

Students will be able to understand following points-

CO1: Atomic orbitals, shape of orbitals and rules for filling of electron in orbitals. Screening effect.

CO2: Periodic properties, factors affecting them, and methods of their evaluation.

CO3: Valence Bond Theory, VSEPR theory, Molecular Orbital theory. Born-Haber cycle, Covalent nature in ionic bond by Fazan's rule, Metallic bond

CO4: Chemistry of noble gases and its compounds.

CO5: ‘s’ and ‘p’ block elements, function of s block elements in bio-system and binary compounds Diborane, higher boranes, borazines, fullerenes and interhalogen compounds, polyhalides.

**Third Paper (Organic)**

Students will be able to understand following points-

CO1: Hybridisation, bond length, bond angles, bond energy, Resonance hyperconjugation, inductive, electromeric, mesomeric, and steric effects.

CO2: Homo- and heterolytic bond fission,electrophiles & nucleophiles ,

CO3: Hydrocarbons preparation, properties & uses. Important reactions- Wurtz, Kolbe, Diels- Alder. Chloroform, carbon tetrachloride preparation, properties electrophilic and nucleophilic substitutions (SN1 &SN2) .

CO4: Stereochemistry- optical isomerism properties, diastereoisomers, resolution of enantiomers, inversion, retention, and racemization.

CO5: Relative and absolute configuration, sequence rule, D&L and R&S systems of nomenclature. Geometrical Isomerism, determination of configuration of geometrical isomers, E & Z system of nomenclature.

**Chemistry**

**B. Sc. Second Year**

**First Paper (Physical)**

Students will be able to learn following points-

CO1: Thermodynamic terms, second and third law of thermodynamics, Carnot cycle, entropy, Nernst heat theorem, Gibbs(G) & Helmholtz (A) functions Thermochemistry; enthalpy, Hess's law of constant heat summation, heat of reaction, buffer action, Henderson-Hazel equation.

CO2: Phase rule and electrochemistry, solid solutions, liquid-liquid mixtures, Raoult's, Henry's, and Nernst law with their applications.

CO3: Basics of electrochemistry

CO4: Types of electrodes, electrolytic and galvanic cells.

 CO5: Surface Chemistry, Adsorption, Catalysis

**Second Paper (Inorganic)**

CO1: Chemistry of first transition series elements.

CO2: Chemistry of second and third transition series elements.

CO3: Coordination compounds, O)Oxidation and Reduction

CO4: Chemistry of lanthanides and actinides

CO5: Acids and Bases, Non aqueous solvents

**Third Paper (Organic)**

CO1: Electromagnetic spectrum: Uv and IR spectroscopy

CO2: Nomenclature and chemistry associated with monohydric, dihydric and trihydric alcohals oxidative cleavage, pinacol-pinacolone rearrangement. Nomenclature, preparation methods, reaction mechanisms for acetylation, carboxylation, Fries rearrangement, Gattermann synthesis, Hauben-Hoesch, Lederer-Manasse and Reimer-Tiemann reactions

Phenols: Nomenclature and chemistry, structure and bonding

CO3: Preparation, properties of aldehydes and ketones. Knoevanagel, Gattermann -Koch, Cannizaro, Rosenmund, Perkin, Wittig, Reformatsky, Mannich, and Diels-Alder

CO4: Chemistry of Carboxylic acids, preparation of Lactic, tartaric, citric acids and their important chemical properties. Ehers: nomenclature, preparation and properties

CO5: Organic compounds of nitrogen: nitro alkanes, nitro arenes, halonitro arenes

**B. Sc. Fifth Semester**

Students will be able to understand following points-

CO1: Photochemistry and UV-Visible spectroscopy, luminiscence, fluorescence and phosphorescenc, UV-Visible spectroscopy in identification of organic compounds.

CO2: Ammines, Nitroderivatives, and Carbohydrates, basicity of ammines, mechanism of reactions like Carbonyl Ammine, Hoffmann Bromamide, Gabrial Phthalimide, electrophilic aromatic substitution.

CO3: Classification of bioelements, functioning and molecular structure of metal-porphyrin complexes like Haemoglobin molecule.

CO4: Role of alkali & alkaline earth metal ions.

CO5: Basics of analytical chemistry including types of errors& minimization, importance of precesion and accuracy ,gravimetric analysis, co precipitation, post precipitation and Inorganic polymers like silicones, phosphonitrilic chlorides, their methods of preparation, properties, and molecular structures.

**B. Sc. Sixth Semester**

Students will be able to understand following points-

CO 1: Infrared, Raman, NMR Spectroscopy, Theory and applications

CO2: Surface phenomena in physical chemistry, Born Oppenheimer approximation, heterogeneous catalysis.

CO3: Classification, structures, and stereochemistry of Amino acids, and Nucleic acids Fats, Oils and detergents along with characteristic properties , organometallic compounds.

CO4: Magnetic moments of transition metal complexes with L-S coupling. Electronic spectra, electronic transitions, types, selection rules, Orgel energy diagrams

CO5: Water analysis includes determination of hardness, acidity, alkalinity, BOD, COD & DO.