

Marks : 200

PAPER - I (Marks:100)

Course Outline

1. **Atomic structure:-** Quantum theory, Schrodinger equation, Particle in box, hydrogen atom. Hydrogen molecule ion, hydrogen molecule. Theories of hydrogen and metallic bonding.
2. **Electrochemistry:-** Ionic equilibria, theory of strong electrolytes; Debye-Huckel theory of activity coefficients, galvanic cells. membrane equilibria and fuel cells. Theories of Acids and Bases, glass electrode. measurement of pH. Electrolysis. overvoltage and corrosion
3. **Thermodynamics:-** First law of thermodynamics, internal energy, enthalpy functions, Thermochemistry, Entropy and second law of Thermodynamics, Free energy and chemical equilibrium
4. **Chemistry of Following Elements:-** Oxygen, Carbon, Chlorine, Silicon, Nitrogen. Phosphorus.
5. **Metallurgy of the Following Elements:-** Copper, Aluminum, Iron and Silver.
6. **Inorganic Chemical Industries:-** Sulphuric Acid, Fixation of Nitrogen, Chemical Fertilizers, Semi-conductivity devices, Cement, Glass and Ceramics.
7. **Chemistry of Transition Elements:-** General characteristics of the group based on the electronic configuration of the elements, Complex compounds. Nature of Coordinate Bond, Historical development, Applications of Valence Bond, Molecular Orbital and Crystal Field Theories to explain the structures of the Complex Compounds.
8. **Pollution:-** Water, air.

PAPER - II (Marks: 100)

1. **Theory of chemical Bonding:-** Elements of Valence bond and molecular orbital theories (idea of bonding, non-bonding and anti-bonding orbitals) Sigma and Pi bonds. Hybridization. Shape of molecules.
2. **Chemical Kinetics:-** Rate law and its determination Order of reaction. Experimental methods. Temperature Dependence of rate constants. Study of mechanism of a few selected reactions (1st and 2nd under reaction only).
3. **Surface Chemistry and Catalysis:-** Physical adsorption and chemisorptions. Surface area determination. Homogeneous and Heterogeneous Catalysis. Acid-base and Enzyme Catalysis.
4. **Physical Organic Chemistry:-** Elements of Organic reaction mechanism Optical and Geometric Isomerism Conformational analysis, Resonance, H Bond and its effects on the properties of Organic Compounds.
5. **Organic Halogen Compounds: -** Types and Synthetic application, Grignard Reagents.
6. **Chemistry of Carbonyl Compounds:-** Types of Carbonyl Compounds. Preparation and reactions of Aldehydes and ketones
7. **Aromatic Chemistry: -** Structure of Benzene with particular reference to Mechanism of Electrophilic Substitution Reactions.
8. **Organic Nitrogen Compounds:-** Diazonium Salts amid their synthetic applications, Preparation and reactions of Aromatic Amino Compounds, Introduction to the Study of Dyes with particular reference to Azodyes.
9. **Chemistry of Natural Products:-** Elementary study of Carbohydrates, Oils and Fats, Alkaloids and Vitamins.
10. **Industrial Organic Chemistry:-** Organic Polymers, Fermentation processes including preparation of Anti-Biotic, Petro-Chemical Industry.

11. Suggested Readings

	Title	Author
1.	Advanced Inorganic Chemistry 3rd Ed.	Cotton, F.A. and Wilkinson Geoffrey
2.	Inorganic Chemistry, 3rd Ed.	Huckey, James E. 1983

3. Physical Chemistry 3rd Ed. Barrow, Gardon M.
4. Physical Chemistry 5th Ed. Moore, Walter J.
5. University Chemistry Mahan, B.H.
6. Introduction to Organic Chemistry 2nd Ed. Streitwieser, A. Jr.
7. Mechanism & Structure in Organic Chemistry Gould, Edwards
8. Organic Chemistry 2nd Ed. Morrison, Robert Thornton & Boyd R.N.