1. Atomic structure and chemical bonding. Quantum theory, Heisenberg’s uncertainty principle Schrodinger wave equation (time independent) interpretation of the wave function, particle in a one-dimensional box, quantum numbers, hydrogen atom wave functions.

Shapes of S.P. & D orbitals, ionic bend; Lattice energy Born-Haber cycles, Fajans rule, dipole moment, characteristics of ionic compounds, electrohegativity differences Cevalent and its general characteristics, valence here approach Concept of resonance and resonance energy Electonis configuration of H2-H2N202P2, No, CO and H2 molecules in terms of molecular orbital approach. Sigma and pi bonds. Bond order, bond strength & bond length.

2. Thermodynamics: Work, heat and energy First law of thermodynamics. Enthalpy, heat capacity Relationship between Cp and Cv. Laws of thermochemistry, Kirchell equation Spontaneous and non-spontaneous changes, second law of thermodynamics, Entropy changes, in gases for reversible and irreversible processes, Third law of the


6. **Concentration cells** : liquid junction potential, application of e.m.f. measurements of fuel cells.


8. General chemistry of 'd' block elements.
(a) Electronic configuration, introduction to theories of bonding in transition metal complexes. Crystal field Theory and its modifications, applications of the theories in the explanation of magnetism and electronics spectra of metal complexes.

(b) Metal Corbonyls : Cyclopentadienl, Olefin and acetyliens complexes.

(c) Compounds with metal-metal bonds and metal atom clusters.

9. General Chemistry of 'f' block elements : Lanthanided and actinides; Separations, Oxidation states, magnetic and spectral properties.

10. Reactions in non-aqueous selvents (liquid ammonia and sulphur dioxide).

PAPER -II

Reaction Mechanisms : General methods (both kinetic and non-kinetic) of study of mechanisms of organic reactions illustrated by examples. Formation and stability of reactive intermediates (Carbocations, carbanions, free radicals, carbenes, nitrenes and benaynes).

SN1 and SN2 mechanisms - H1, H2 and E1 CB eliminations -cis and trans addition of carbon to carbon double bonds - mechanism of addition to carbon oxygen double-Michael addition-addition to conjugated carbon-carbon double bonds-aromatic electrophilic and nucleophilic substitutions allylic and benzylic; substitutions.


3. Chemistry of the following name reactions ;
4. Polymeric Systems:

(a) Physical Chemistry of Polymers, End group analysis, Sedimentation, Light Scattering and Viscosity of Polymers.

(b) Polyethylene, Polystyrene, Polyvinyl Chloride, Ziegler Natta Catalysis, Nylon Terylene.

(c) Inorganic Polymeric Systems: Phosphonitric halide compounds; Silicones; Borazines.

Friedel-Craft reaction, Reformatsky reaction, Pinacol - Pinacolons, Wagner-Meerwein and Beckmann rearrangements, and their mechanisms - uses of the following reagents in organic synthesis: 05 04 HI04, NBS, diborane, Na-liquid ammonia, NaBH4, LiAIH4.

5. Photochemical reactions of organic and inorganic compounds: types or reactions and examples and synthetic uses - Methods used in structure determination; Principles and applications of UV-visible, IR, IH, NMH and mass spectra for structure determination of simple organic and inorganic molecules.


(i) Rotational spectra of diatomic molecules (infrared and Raman), isotopic substitutions and rotational constants.

(ii) Vibrational spectra of diatomic linear symmetric, linear asymmetric and bent tri-atomic molecules (infrared and Raman).
(iii) Specificity of the functional groups (Infrared and Raman).

(iv) Electronic Spectra-Singlet and triplet states, conjugated double bonds, A aB unsaturated carbonyl compounds.

(v) Nuclear magnetic Resonance: Chemical Shifts, spin-spin coupling.

(vi) Electron Spin Resonance; Study of inorganic Complexes and free radicals.