

UNIT-IV

Supramolecular chemistry-I - Introduction, nature of supramolecular interactions, cation binding hosts, crown ethers, lariat ethers, podands, cryptands, spherands, macrocyclic and template effects, calixarenes, siderophores, binding of anions- two dimensional and cyclophane hosts, guanidinium based, organometallic and neutral receptors, anti-crowns, hydride sponge and other Lewis acid chelates, binding of neutral molecules, solid states clathrates, fullerene as guest, host and superconducting intercalation compounds.

UNIT-V

Supramolecular chemistry-II - Templates and self-assembly-tennis balls and soft balls, catenanes and rotaxanes, helicates, molecular knots, supramolecular photochemistry, semiochemistry, molecular electronic devices-switches, wires and rectifiers, dendrimers

Books Recommended :

1. Photochemistry, J.G Cavert and J.N. Pitts, Wiley
2. Molecular Photochemistry, N.J. Turro, Benjamin
3. Fundamentals of Photochemistry, K.K. Rohatgi Mukherji, New Age
4. Photochemistry, R.P. Wayne, Butterworth
5. Analytical Chemistry of Macrocyclic and Supramolecular compounds, S.M. Khopkar
6. Supramolecular Chemistry, J.M. Lehn, VCH
7. Supramolecular Chemistry, J.W Stead and J.L. Atwood, John Wiley.

ELECTIVE PAPERS

PAPER-III (A) COORDINATION AND ORGANOMETALLIC CHEMISTRY

Time: 3 Hrs.

M.M. 100

Note: The paper will be divided into THREE sections.

Section-A : Ten questions (short type answer) two from each Unit will be asked. Each question will be of one mark and the candidates are required to attempt all questions. **Total 10 marks**

Section-B : Five questions (answer not exceeding 250 words) one from each Unit with internal choice will be asked and the candidates are required to attempt all questions. Each question will be of 10 marks.

Total 50 marks

Section-C : Four questions may be in parts covering all the five Units (answer not exceeding 500 words) will be asked. The candidates are required to attempt any TWO questions. Each question will be of 20 marks.

Total 40 marks

UNIT-I

Complexion equilibria - complex ion equilibrium in solution, stability constants (step wise and overall stability constants), factors affecting stability constants, methods of determining stability constants

UNIT-II

Coordination compounds - I.R spectra of transition metal complexes, theoretical principles and interpretation of experimental observations, isomerism of coordination compounds, magnetic properties of coordination compounds, paramagnetism, ferro-and anti-ferromagnetism, measurement of magnetic susceptibility and temperature effect.

Optical activity of coordination compounds, symmetry requirements for optical activity, study of ORD, circular dichroism, cotton effect with special reference to complexes of Cr, Co, Ni and Pt .

UNIT-III

Reaction mechanism of transition metal complexes - Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes, kinetics, application of valence bond and crystal field theories, kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, anation reactions, reactions without metal ligand bond cleavage, substitution reactions in square planar complexes, the trans effect, mechanism of the substitution reaction, redox reactions, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, cross reactions and Marcus Hush theory, inner sphere type reaction.

UNIT-IV

Metal storage transport and biomineralization, ferritin, transferrin and siderophores

Calcium in biology - Calcium in biology in living cells, transport and regulation, molecular aspects of intermolecular processes, extracellular binding proteins

Metalloenzymes - Zinc enzymes-carboxypeptidase and carbonic anhydrase, iron enzymes-catalase, peroxidase and cytochrome P-450, copper enzymes-superoxide dismutase, molybdenum oxatransferase enzymes-xanthine oxidase, coenzyme vitamin B₁₂.

Metal - nucleic acid interactions - Metal ions and metal complex interactions, metal complexes-nucleic acids.

UNIT-V

Transition metal π -complexes - Transition metal π -complexes with unsaturated organic molecules, alkenes, alkynes, allyl, diene, dienyl, arene and trienyl complexes, preparations, properties, nature of bonding and structural features, important reactions related to nucleophilic and electrophilic attack on ligands and to organic synthesis, Transition metal compounds with bonds to hydrogen

Fluxional organometallic compounds - Fluxionality and dynamic equilibria in compounds such as η^2 -olefin, η^2 -allyl and dienyl complexes.