Elective Paper IV (Group A)

Organometalls in organic synthesis & Coordination Chemistry **60 Hrs.**

1. **Organometallic Reagents** **24 Hrs**.

   a. Principle, preparations, properties and applications of the following in organic synthesis with mechanistic details.

   b. Group I and II metal organic compounds
      Li, Mg, Hg, Cd and Zn compounds.

   c. Transition metals
      Cu, Pd, Ni, Fe, Co and Rh compounds.

   d. Other elements
      S, Si, B and Te compounds.

2. **Symmetry operations of the molecular point groups (O_h, T_d & D_{4h}).** **4 Hrs**.

   Point groups of following stoichiometries in coordination compounds:

   a. MA_6, MA_5B, Cis- & trans-MA_4B_2, fac- & Mer-MA_2B_3

   b. MA_4, MA_3B & MA_2B_2

   c. MA_4, MA_3B, MA_2B_2 & MABCD

3. **Russel Saunder's states, Hund's rules ground state energy terms**, **6 Hrs**.

   Interelectron repulsion parameter, variation of Recah B & C parameter in different transition series, spin orbit coupling parameters. Spectrochemical series and effect of covalency, Nephelauxetic series.

4. **Temperature undependent paramagnetic (TIP) behaviour.** **6 Hrs**.

   Quenching of orbital angular momentum by ligand fields. The magnetic properties of A, E and T terms. Electron delocalization and the magnetic properties of complexes with A, E and T ground terms. Application of magnetic measurements to structure determination of transition and non-transition metal complexes.

5. **Classification and nomenclature of macrocycles.** **8 Hrs**.

   Type of macrocyclic ligands-design synthesis by coordination template effect. Synthesis and characterization of complexes of macrocyclic polyamines and polyether. Applications of macrocyclic complexes.

6. **4 Hrs**.

   Transition metal complexes with molecular nitrogen and molecular oxygen. Synthesis, important reactions and bonding.

7. Photochemical Reactions **8 Hrs**.

   Basics of photochemistry: Absorption, excitation, Frank-condon principle, Energy dissipation by radiative and non-radiative processes, quantum yield.

   (i) Photosubstitution and photoaquation reactions in chromium(III)complexes.

   (ii) Photosubstitution and photoredox reactions in cobalt(III) complexes.

   (iii) Ligand photoreactions.