

MC-01
INORGANIC CHEMISTRY

(Question will be set from each unit/section with internal choice)

Marks - 100

120 Hrs. (4Hrs/Week)

Units	Topics	
I	<p>Stereochemistry and Bonding in Main Group Compounds</p> <p>VSEPR, Walsh diagrams (tri- and penta - atomic molecules), $d_{\pi}-p_{\pi}$ bonds, Bent rule and energetic of hybridization, some simple reactions of covalently bonded molecules.</p> <p>Metal-Ligand Bonding</p> <p>Limitation of crystal field theory, molecular orbital theory, octahedral, tetrahedral and square planar complexes, π-bonding and molecular orbital theory.</p>	<p>12 Hrs.</p> <p>15 Hrs.</p>
II	<p>Electronic Spectra and Magnetic properties of Transition Metal Complexes</p> <p>Spectroscopic ground states, correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of dq, B and β parameters, charge transfer spectra, spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical information, anomalous magnetic moments, magnetic exchange coupling and spin crossover.</p> <p>Metal π-Complexes</p> <p>Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structural elucidation, important reactions of metal carbonyls; preparation, bonding, structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes; tertiary phosphine as ligand.</p>	<p>24 Hrs.</p> <p>18 Hrs.</p>
III	<p>Reaction Mechanism of Transition Metal Complexes</p> <p>Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes, kinetic 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 reaction. Redox reactions, electron transfer reactions, mechanism of one electron transfer reaction, outersphere type reactions, cross reactions and Marcus & Hush theory, inner sphere type reactions.</p>	<p>24 Hrs.</p>
IV	<p>Metal-Ligand Equilibria in Solution</p> <p>Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin, determination of binary formation constants by pH-metry and spectrophotometry</p>	<p>8 Hrs.</p>
V	<p>Metal Cluster</p> <p>Higher boranes, carboranes, metallaboranes and metallocarboranes. Metal carbonyl and halide clusters, compounds with metal-metal multiple bonds.</p> <p>Isopoly and Heteropoly Acids and Salts</p>	<p>15 Hrs.</p> <p>4 Hrs.</p>