M.Sc. Chemistry

Semester – 2

CHE407 INORGANIC CHEMISTRY

Credits: 4

COURSE OUTCOMES

 CO1: Predict molecular geometry and electronic structures using VSEPR theory, Walsh diagrams, and Bent's rule, enhancing understanding of bonding and molecular shape. CO2: Analyze aromaticity in conjugated systems and apply theoretical models to evaluate electronic structures of many-electron atoms. CO3: Demonstrate knowledge of the roles of metal ions and enzymes in biological systems, emphasizing their therapeutic applications in medicine. CO4: Explore interactions between metals and nucleic acids, including fluorescence quenching and substitution reactions, electron transfer mechanisms, and complex equilibria in solution chemistry, applying them to real-world scenarios. CO5: Develop practical skills in experimental methods for determining stability constants of metal complexes, enhancing analytical proficiency in coordination chemistry. CO7: Integrate concepts of bioinorganic chemistry to evaluate the significance of metal ions in biological processes and their role in drug development.
 Unit: 1 Chemical Bonding VSEPR, Walsh diagram for tri-atomic molecules, Bent rule and energies of hybridization, VSIP. Simple Huckel theory of linear conjugated systems, cyclic conjugated systems aromaticity. Many electron atoms and angular momenta: The Wave function of many electron systems, application to helium atom, Hartree Self-Consistent field method. Pariser-Parr-Pople appoximation. Unit: 2 Bioinorganic Chemistry
 Hemoglobin and Myoglobin : Cytochromes of the electron transport chain, Cytochrome P-450 enzymes, Coenzyme B12. Zinc Enzymes exploiting acid catalysis: Carbonic anhydrase, Carboxy peptidases, Biological Nitrogen Fixation. The elements of living system: The biological roles of metal ions. Metals in medicine: Chelation Therapy, gold in Rheumatoid antiarthritis drugs, Metallocene, Anticancer agents- Platinum complexes, mechanism of action, aspects of Pt binding to DNA, Metal complexes as radio diagnostic agents, Magnetic resonance imaging. Metal-nucleic acid interactions: Coordination, Non-covalent interactions - intercalation and hydrogen bonding, hydrophobic interactions, DNA strand cleavage. Biological fluorophores, Application of fluorescence quenching in drug-DNA binding studies. DNA binding and mechanistic possibility.
Unit 3 Reaction Mechanism

Chemistry Syllabus M.Sc. SEM 1 and 2

M G SCIENCE INSTITUTE	M.Sc. CHEMISTRY DETAILED SYLLABU
 Mechanism of substitution of substitution reaction of p Effect of leaving group, effe of nucleophile, effect of ten Oxidation-Reduction reaction -Hush theory, one and tw sphere, effect of ions on rat unstable oxidation states, h Unit 4 Applications of Symmetry Molecular spectroscopy 	reaction in square planar complexes. Kinetics platinum (II) complexes. ect of charge, steric effect, solvent effect, effect nperature and other effects. on, electron transfer, tunnelling effect, Marcus vo electron transfer inner sphere and outer te, electron transfer through extended bridges, pydrated electron. and Vibrational spectroscopy: Reducible
representation using 3N ver IR and Raman spectroscopy • Classification of vibrational	ctors as the basis, symmetry selection rules for , modes using internal coordinates as the basis
 Molecular symmetry and cl and π-bonding in AB_n type c Symmetry Adopted Linear operator for finding SALC, B Orbital functions as the bas 	hemical bonding: hybrid orbitals for σ-bonding of molecules. • Combination of Atomic orbitals: Projection Bond vectors as the basis for formation of SALC, is for obtaining SALC.
 Advanced Inorganic Chemistry, By: Co Mechanism of Inorganic Reactions, F. Reaction Mechanism of Coordination Inorganic Chemistry, Shriver and Atkir Inorganic Chemistry, James E. Huheey Group theory and symmetry in chemis R. McWeeny, ELBS. V. Ramkrishnan& M. S. Gopinadhan, G 	otton, Wilkinson, Murillo and Bochmann (1999) Basolo and R. G. Persons, Wiley Pub. Compounds, C. H. Langford and H. B. Gray. ns, Oxford University Press. r, Eilen A. Keiter, Richard L. Keiter, Pearson Education stry, L. H. Hall(McGraw Hill) Coulson's Valence,]