CHEMISTRY
(Major)
**(4th Semester)**
Course No.:**CHM-DSC-252**
**(Inorganic Chemistry -III)**
*Organometallic and Analytical Chemistry*
**Contact Hours: 60; Credits: 04**
**Full Marks = 100[**End Semester Exam (70) Internal Assessment (30)]
**Pass Marks = 40 [**End Semester Exam (28) Internal Assessment(12)]

**UNIT-1 Organometallic Compounds-I**

Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands.

*Metal carbonyls:* 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series.

*Ferrocene:* Structure and aromaticity. Comparison of aromaticity and reactivity with that of benzene.

**UNIT-2 Organometallic Compounds-II**

Metal Alkyls: Important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds.

Role of triethylaluminium in polymerisation of ethene (Ziegler – Natta Catalyst). Species present in ether solution of Grignard reagent and their structures.

**UNIT-3: Reaction Kinetics and Mechanism**

Introduction to inorganic reaction mechanisms. Substitution reactions in square planar complexes, Trans- effect, theories of trans effect, Mechanism of nucleophilic substitution in square planar complexes, Thermodynamic and Kinetic stability, Ligand field effects and reaction rates, Mechanism of substitution in octahedral complexes.

**UNIT-4: Catalysis by Organometallic compounds**

Study of the following industrial processes and their mechanism:

1. Alkene hydrogenation (Wilkinsons Catalyst)
2. Hydroformylation (Co salts)
3. Synthetic gasoline (Fischer Tropsch reaction)
4. Synthesis gas by metal carbonyl complexes

**UNIT-5: Principles in Qualitative Analysis**

Basic principles involved in analysis of cations and anions and solubility products, common ion effect. Principles involved in separation of cations into groups and choice of group reagents. Interfering anions (fluoride, borate, oxalate and phosphate) and need to remove them after Group II.

**Reference books:**


- Puri, Sharma, Kalia; Principles of Inorganic Chemistry, Vishal Publishing Co.
- Douglas, B.E; Mc Daniel, D.H. & Alexander, J.J., Concepts & Models of Inorganic Chemistry 3rd Ed., John Wiley Sons, N.Y. 1994.
- Lee, J.D. Concise Inorganic Chemistry, ELBS, 1991.
- Greenwood, N. N. & Earnshaw, Chemistry of the Elements, Butterworth Heinemann. 1997.
- Cotton, F. A. & Wilkinson, G., Advanced Inorganic Chemistry, Wiley, VCH, 1999.
- Miessler, G. L. & Donald, A. Tarr., Inorganic Chemistry 4th Ed., Pearson, 2010.
- Shriver & Atkins, Inorganic Chemistry 5th Ed.