

Course No.	Course Name	L-T-P-Credits
CY 503	Organometallic and Bioinorganic Chemistry	3-0-0: 03
Prerequisite: NIL		
Course Objectives:	The main objective of the course is to explain the synthesis, bonding, structure and properties of organometallic compounds and to provide an overview of the various types of reactions involving organometallic compounds. Another objective is to comprehend the application of organometallic compounds as a catalyst in various synthesis and its function of various biological systems involving metals.	
Course Outcomes:	After successful completion of the course, students will be able to: <ol style="list-style-type: none"> 1. Explain and rationalize the synthesis, structure, bonding, properties and reactivity of both main group and transition metal organyls. 2. Understand the basic concepts of bioinorganic chemistry. 3. Understand the function and transport of alkali and alkaline earth metals in the biological systems. 4. Describe the important roles of metal ions in metalloproteins/metalloenzymes. 	
SYLLABUS		
Module	Contents	Hours
I	Organometallic Chemistry 18 electron rule, synthesis, structure and bonding in polynuclear carbonyl, nitrosyl and dinitrogen complexes. Structure and bonding in metal alkyls, carbenes, carbynes, alkenes, alkynes and allyl complexes. Synthesis and bonding in cyclobutadiene and pentadienyl complexes, metallocenes, preparation, properties and bonding in ferrocene – MO theory, metal-arene complexes (cycloheptatriene and tropylium complexes, cyclooctatetraene complexes), fluxional molecules.	08
II	Reactions of Organometallic Compounds Oxidative addition and reductive elimination reactions, ortho metalation reaction, insertion and eliminations, β -elimination reaction, nucleophilic and electrophilic attack of co-ordinated ligands.	08
III	Catalysis by Organometallic Complexes Alkene hydrogenation, hydroformylation, Monsanto acetic acid process, synthesis gas, synthetic gasoline, Wacker process, Isomerisation, metathesis and Ziegler-Natta polymerization.	08

IV	<p>Bio-inorganic Chemistry Inorganic elements in biological systems, metalloporphyrins, dioxygen binding, transport and utilisation, model compounds for oxygen carriers; Electron transfer complexes (Ferredoxins and Rubredoxins), photosynthesis, Active transport of cations across membranes, Na⁺/K⁺ pump, heavy metal toxicity and chelate therapy.</p>	12
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Essential Readings:

1. J. E. Huheey, E. A. Keiter and R. L. Keiter, "Inorganic Chemistry: Principles of structure and reactivity", Pearson Education, 4 th Edition, 2006.
2. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann, "Advanced Inorganic Chemistry", Wiley, 6 th Edition, 1999.

Supplementary Readings:

1. B. D. Gupta and A. J. Elias, "Basic Organometallic Chemistry: Concepts, Syntheses and Applications", Universities Press, 2 nd Edition, 2013.