Programme: M. Sc. Part-II (Inorganic Chemistry)
Course Code: ICC-501
Title of the Course: Coordination and organometallic Chemistry
Number of Credits: 03 **Effective from AY:** 2019-20

Prerequisites for the course:	The students with MSc-I Chemistry are eligible for this course.	No. of lectures
Course Objectives:	1. To make understand the electronic structure of compounds of d-block elements. 2. To provide sufficient knowledge of CFT and MOT in coordination and organometallic compounds. 3. To understand interpretation of magnetic and electronic properties of coordination compounds. 4. To understand fundamental concepts of inorganic chemistry reaction mechanisms 5. To provide knowledge on applications of organometallic compounds in homogenous catalysis.	
Course Outcomes:	1. The students will be able to understand the electronic structure of coordination and organometallic compounds. 2. They will be well equipped with knowledge of CFT and MOT 3. They will be in position to understand the magnetic and electronic properties. 4. The concepts of inorganic reactions will be clear to them. 5. They will know the applications of organometallic compounds in industries	
Content:	**1. Electronic structure of coordination compounds**: 1.1 Crystal field theory and its applications: a) Octahedral compounds; b) tetrahedral compounds; c) square-planar compounds and other geometries; d) tetragonally distorted compounds (Jahn-Teller Effect); e) octahedral vs tetrahedral 1.2 Ligand filed theory: a) σ bonding; b) π-bonding **2. Magnetic Properties coordination compounds** a) diamagnetism, b) paramagnetism; c) ferromagnetism, d) antiferromagnetism, d) temperature dependence magnetism; Curie law, Curie-Weiss Law.; e) spin cross over phenomenon **3. Spectra of coordination compounds** 3.1 Electronic structure of atoms: a) spectroscopic terms; b) classification of microstates and energies of the terms; d) Racah parameters 3.2 Electronic spectra: a) ligand field transitions; b) selection rules; c) spectroscopic terms of complexed ion; d) correlation and Orgel diagrams; d) Tanabe-Sugano diagrams; e) Charge-Transfer bands: LMCT transitions and MLCT transitions; f) Luminescence **4. Inorganic reaction mechanisms**: 4.1 Substitution reactions in coordination compounds; b)	8 hr 2 hr 8 hr 8 hr

	thermodynamic considerations; c) kinetic considerations; d) substitution reactions in octahedral compounds; e) substitution reactions in square planar compounds. 4.2 Electron transfer reactions: inner sphere and outer sphere mechanism, Frank Condon principle, Marcus equation **5. Organometallic compounds and reactions** Significance of 18 electron rule, metal carbonyls & nitrosyls, reactions of organometallic compounds, metal centered catalysis in complex compounds, homogenous catalysis such as hydrogenation, hydro formulations, coupling reactions and isomerization of alkanes. Asymmetric catalysis, stereochemically rigid molecules.	10 hr
Pedagogy	Mainly lectures / tutorials / assignments /self-study or a combination of some of these could also be used to some extent.	
Text books / Reference books	1. P.W. Atkins, T.L. Overton, J.P. Rourke, M.T. Weller & F.A. Armstrong 2010, *Shriver & Atkins' Inorganic Chemistry*, Oxford University Press, 2010, 5th Ed. 2. J.E. Huheey, E.A. Keiter & R.L. Keiter, *Inorganic Chemistry: Principles of structure and reactivity*, Pearson, 2014, 4th Ed. 3. J.D. Lee, *Concise Inorganic Chemistry*, Chapman and Hall, 1996, 5th Ed. 4. F.A. Cotton, G. Wilkinson & P.L. Gaus, *Basic Inorganic Chemistry*, John Wiley, 1995, 3rd Ed. 5. F.A. Cotton & G. Wilkinson, *Advanced Inorganic Chemistry*, Wiley Eastern, New Delhi, 1984, 3rd Ed. (4th & 5th Eds. preferred) 6. D. Banerjee, *Coordination Chemistry,* Tata McGraw–Hill, New Delhi, 1994 7. N.N. Greenwood & A. Earnshaw, *Chemistry of the Elements*, Pergamon Press, Exeter, Great Britain, 1984. 8. G. Rodgers, *Introduction to coordination, solid state and descriptive Inorganic chemistry*, McGraw–Hill, 1994.	