Semester	5
Paper Number	C3CH230541T
Paper Title	Inorganic Chemistry 5
No. of Credits	4
Theory/Composite	Theory
No. of periods assigned	Th: 4
Name of Faculty member(s)	Dr. Sanjib Ganguly, Dr. Debanjan Dhar
Course description/objective	Theory: 1. To understand the basic principles of bonding for coordination compounds 2. To appreciate the principles of Crystal Field Theory and Ligand Field Theory 3. To understand the applications of bonding theories in explaining the chemistry of coordination compounds 4. To understand the role of Molecular Orbital Theory and its applications to coordination compounds
Syllabus	Annexure Core Course
Reading/Reference Lists	Theory: 1. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970. 2. Atkin, P. Shriver & Atkins' Inorganic Chemistry, 5th Ed., Oxford University Press (2010). 3. Cotton, F.A., Wilkinson, G. and Gaus, P.L., Basic Inorganic Chemistry 3rd Ed.; Wiley India. 4. Sharpe, A.G., Inorganic Chemistry, 4th Indian Reprint (Pearson Education) 2005. 5. Huheey, J. E.; Keiter, E.A. & Keiter, R.L. Inorganic Chemistry, Principles of Structure and Reactivity 4th Ed., Harper Collins 1993, Pearson,2006.

	6. Mingos, D.M.P., Essential trends in inorganic chemistry. Oxford University Press (1998). 7. Housecraft, C. E.; Sharpe, A. G., (2018), Inorganic Chemistry, 5th Edition, Pearson. 8. Wulfsberg, G (2002), Inorganic Chemistry, Viva Books Private Limited.
Evaluation	Theory: 100 Internal: 30 (CIA:20, Other mode of Assesment:5, Attendance: 5) Semester Exam:70
Paper Structure for Theory Semester Exam	Answer SEVEN out of NINE questions, of 10 marks each.

Module 1: Bonding in Coordination Complexes-1

Concept of Effective Atomic Number (EAN) and EAN rule for stability of complexes; concept of 18-electron and 16-electron rules and their applications to organometallic complexes; VBT in simple coordination complexes: examples and major drawbacks;

Module 2: Bonding in Coordination Complexes-2

Crystal Field Theory: Splitting of d-orbitals in octahedral, tetrahedral, and square planar complexes; factors affecting the splitting of d-orbitals; spectrochemical series of ligands; concept of CFSE/ LFSE and calculations; concept of high-spin, low-spin, and spin state crossover in transition metal complexes;

Module 3: Applications of Crystal Field Theory

Jahn Teller (JT) theorem and its application in coordination complexes; static and dynamic JT-effect with explanations and illustrations; Application of CFT in lattice enthalpy, hydration enthalpy, redox potential, and prediction of spinel/ inverse spinel structure of transition metal and mixed metal oxides.

Module 4: Molecular Orbital Theory in Coordination Complexes

Major drawbacks of CFT; Nephelauxetic Effect and Nephelauxetic parameter, MOT for octahedral complexes: construction of LGOs (qualitative) and energy level diagram; explanation of π– bonding (Ligand to Metal π–donation and Metal to Ligand π–donation) by MOT; explanation of spectrochemical series.