



**SECOND SEMESTER 2023-24**  
**Course Handout (Part II)**

Date: 09.01.2024

In addition to Part-I (General Handout for all courses appended to the Timetable) this portion gives further specific details regarding the course.

**Course No.** : CHEM F241  
**Course Title** : Inorganic Chemistry-II  
**Instructor-in-charge** : Himanshu Aggarwal  
**Instructor** : Himanshu Aggarwal and Sounak Roy

1. **Scope and Objective of the Course:** Theories of coordination chemistry, electronic spectroscopy and magnetism of complexes, organometallic chemistry and chemistry of lanthanides and actinides.
2. **Text Book:** T1. "Inorganic Chemistry" Huheey J. E., Keiter, Ellen A., Keiter, Richard L., Medhi, O.K.; 4<sup>th</sup> ed., Pearson.  
**Reference Books:** R1. "Concise Inorganic Chemistry", Lee, J.D. 5<sup>th</sup> Edition, Wiley, India Edition.  
R2 "Inorganic Chemistry", Shriver, D.F.; Atkins, P.W.; Overton T. L., Rourke, J. P., Weller, M. T., Armstrong, F. A. 4<sup>th</sup> edition, Oxford.  
R3 "Concepts & Models of Inorganic Chemistry" B. Douglas, D. McDaniel and J. Alexander 3<sup>rd</sup> Edn, Wiley India.

**3. Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-2	Coordination chemistry	Coordination chemistry: Bonding VB theory applied to coordination compounds	T1:Chapter1 4: 424-428
3-5	Crystal Field Theory (CFT)	Crystal Field Theory (CFT): Crystal field splitting; d orbitals in different crystal fields; applications of CFT	T1:Chapter 14: 428-444
6-8	Molecular orbital theory	Molecular orbital theory	T1:Chapter 14: 444-459

9-12	Electronic spectra of complexes, Magnetic properties of complexes	Electronic spectra of complexes, Magnetic properties of complexes	T1:Chapter 15: 461-492
13-15	Structure Nomenclature	Structure – Nomenclature, Coordination numbers 1, 2, 3, 4, 5, 6, 7 Generalization about coordination numbers Isomerism: Linkage and other types of isomerism Chelate effect	T1:Chapter 16: 495-539 Lecture notes
16-20	Reactions of coordinated complexes	Reactions – Nucleophilic substitution reactions, Kinetics, Mechanisms	T1:Chapter 17 (542-569) and Lecture notes
21-30	Organometallic chemistry	The 18-electron rule Metal-carbonyl complexes Nitrosyl complexes Dinitrogens Alkyls Carbenes, Carbynes, Carbides Alkenes Alkynes Metallocenes	T1:Chapter 18 and Lecture notes
31-38	Catalysis and reaction mechanisms.	Catalysis by organometallic compounds Stereo chemically non-rigid molecules	T1:Chapter 19 (634-661)  T1:Chapter 6 (196-202)
39-40	Lanthanide and actinide chemistry	Descriptive chemistry of metals - The Lanthanides and Actinides	T1:Chapter 13 (407-419) Lecture notes

#### 4. Lab Component

There will also be a small lab component which will include lab visits, demonstration of the instruments (both in real and through videos) used for the characterization of coordination/organometallic compounds, and discussions related to the demonstrations.

## 5. Evaluation Schedule:

Component	Duration	Weighting (%)	Date and Time	Nature of Component
Class tests, Assignments and presentations	-	30	Continuous	Open Book
Mid Semester Test	90 min	30	12/03 - 11.00 - 12.30PM	Closed Book
Comprehensive Examination	120 min	40	09/05 FN	Closed Book

6. **Chamber consultation hour:** To be announced in the class.
7. **Make-up for tests:** May be granted only for genuine cases.
8. **Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.
9. **Notices:** All notices for this course will be displayed in the Chemistry Notice Board.

Instructor-in-charge

**CHEM F241**

