Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2022-2023

Course Handout (Part - II) Date: 16-1-2023

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CHEM F343
Course Title : Inorganic Chemistry III
Instructor-in-charge : PROF. R. KRISHNAN

Course Description: Overview of coordination complexes, molecular magnetism and magnetic materials. Introduction to Bioinorganic chemistry - the essential bio-selective metal ion accumulation, storage, transport mechanisms, and the structural and mechanistic aspects of metalloenzymes. Toxicity of some metal ions - mercury, cadmium, copper, arsenic, etc. Medicinal inorganic chemistry – Application of inorganic molecules for medicines and chelation therapy. Emerging topics in current inorganic chemistry.

Scope and Objectives: Inorganic elements play vital role in our material and biological systems for the structural stabilizations and functioning for proteins and enzymes. The scope and objective of the course is to learn importance and extended applications of inorganic chemistry in nature from biosystems to applied material chemistry for a healthy life in our ecosystem.

Text Book:

T1. E. Ochiai, "Bioinorganic Chemistry: A Survey", Academic Press, 2008.
T2. Donald R. Askeland, Pradeep P. Phule, The Science and Engineering of Materials", Fourth Edition, Thomson, 2003.

Reference Books:

R1. K. Hussain Reddy, "Bioinorganic Chemistry", New Age International Publishers, 2009.
R2. I. Bertini, H. B. Gray, S. J. Lippard, J. S. Valentine, "Bioinorganic Chemistry", Viva, 1998.
R3. Keith F. Purcell and John C. Kotz, "Inorganic Chemistry", Cengage Learning, 2010.
R4. Recent research journal papers.

Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-3	Coordination chemistry	Metal coordination complexes: an overview	R3
4-6	Magnetic materials	Magnetic properties and metal clusters	T2(Ch 19)
7	Bioinorganic chemistry	Introduction to Bioinorganic Chemistry	T1
8-10	Metal in medicine	Medicinal inorganic chemistry	R2(Ch 9)
11-14	Metal ion storage	Metal ion storage, transport and biomineralization	R2(Ch 1), R4
15-17	Oxygen carriers	Oxygen carriers: Iron and copper in biological systems	R2(Ch 4)
18-20	Oxygenases	Oxygenation reaction: iron and copper	R2(Ch 5)
21-23	Electron transfer	Electron transfer and redox processes in biological systems	R2(Ch 6)

24-27	Metal-sulfur proteins	Metal-sulfur proteins and metalloenzymes	R2(Ch 7)
28-29	Photosynthesis	Photosynthesis and artificial photosynthetic models	R2(Ch 7), R4
30	Vitamin B_{12}	Cobalt in biological systems	R2(Ch 2), R2
31-32	Ca, Mg and Zn	Calcium, magnesium and zinc in biological systems	R2(Ch 2,3)
33-35	Other essential elements	Ni, Mo, V in biological systems	R4
36-37	Metal-Nucleic acid	Metal-Nucleic acid interactions	R2(Ch 8)
38-39	Environmental inorganic chemistry	Toxicity of metal ions and environmental bioinorganic chemistry	Class notes
40-42	Recent inorganic topics	Recent selected research topics in inorganic chemistry	R4

Evaluation Scheme: (**Total 200 Marks)**

Components	**Duration**	**Marks (Weightage)**	**Date & Time**	**Nature of Component**
Midsem Test	1.5 h	60 (30%)	16/03 4.00 - 5.30PM	CB
Class test/Assignments	--	60 (30%)	Continuous	OB
Compre. Exam	3 h	80 (40%)	16/05 AN	CB

***** OB-Open book; CB-closed book

Surprise tests and assignments will be conducted during the class hours. The surprise tests components will be of a short answer type based on the lectures covered recently.

Learning outcome of this course:

- Learn and realize the important roles of inorganic chemistry in our biological and material world.
- Exploring the specific functions and mechanisms of action of various metal containing enzymes.
- Medicinal applications of inorganic compounds.

Make-up policy: Make up would be considered only for very genuine reasons *such as institute deputation outside for sports/cultural fest, hospitalization (with appropriate documentary proof), marriage ceremony of own brother/sister (not cousins*). There will not be any makeup possible for the surprise test class components.

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.

Chamber Consultation Hours: Tuesday, 4:00 – 5:00 PM
Notices: Notices, if any, concerning the course will be displayed on CMS.

Instructor in charge

PROF. R. KRISHNAN