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**second SEMESTER 2023-2024**

**Course Handout (Part ‑ II)** Date: 09-01-2024

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 B12 | 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 | Recent inorganic topics | Recent selected research topics in inorganic chemistry | R4 |

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

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| --- | --- | --- | --- | --- |
| **Components** | **Duration** | **Marks**  **(Weightage)** | **Date & Time** | **Nature of Component** |
| Midsem Test  Class test /Lab/Assignments /presentation  Compre. Exam | 1.5 h  --  3 h | 60 (30%)  60 (30%)  80 (40%) | 13/03 - 2.00 - 3.30PM  Continuous  11/05 AN | CB  OB  CB |

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

Surprise tests / Assignments / Lab / Presentation will be conducted during the class hours or during extra class based on the requirements. 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

