

**May 2025**  
**M.Sc.**  
**Fourth Semester**  
**CORE – 11**  
**CHEMISTRY**  
*Course Code: MCHC 4.11*  
**(Inorganic Chemistry - IV)**

*Total Mark: 70*  
*Time: 3 hours*

*Pass Mark: 28*

*Answer five questions, taking one from each unit.*

**UNIT-I**

1. (a) Mention the biological importance of any three of the following trace metals along with its deficiency: 2×3=6
  - (i) Iron
  - (ii) Zinc
  - (iii) Copper
  - (iv) Manganese
- (b) Discuss the structure of chlorophyll and indicate the role of magnesium in chlorophyll. 5
- (c) How does  $\text{Na}^+/\text{K}^+$  pump regulate the cellular volume? 3
2. (a) What are iron-sulphur proteins? Discuss any one in detail. 3+4=7
- (b) What is photosystem-I? 4
- (c) Which metal ion is present in vitamin  $\text{B}_{12}$ ? What is the importance of vitamin  $\text{B}_{12}$  in biosystem? 3

**UNIT-II**

3. (a) Discuss the cooperativity effect in haemoglobin. 5
- (b) With the help of diagram explain the optical spectra of myoglobin. 6
- (c) Explain the function of iron enzyme peroxidases. 3
4. (a) Draw the structure of heme group and discuss the function of hemeproteins. 2+3=5

- (b) With the help of a diagram, explain the EPR spectrum of ferric haemoglobin taking the low field portion of high spin forms of ferric Hb and isolated ferric alpha chains. 6
- (c) Write a short note on the synthetic oxygen carriers based on model systems. 3

### UNIT-III

5. (a) Define metalloenzyme. Explain the role of carboxypeptidase in zinc enzymes. 1+5=6
- (b) Write a note each on the following: 4×2=8
- (i) Ferritin
- (ii) Transferrins
6. (a) What is the biological role of Cu (III) in nature? 1
- (b) Discuss the biochemistry of cobalt in vitamin B<sub>12</sub>. 5
- (c) Write a note each on the following: 4×2=8
- (i) Xanthine oxidase
- (ii) Ceruloplasmin

### UNIT-IV

7. (a) What is toxicity of metal ions? Discuss the toxic effect of lead on humans. What are the antidotes of lead toxicity? 1+3+2=6
- (b) What is chelation therapy? Explain the characteristics of chelating agents used in chelation therapy. 1+4=5
- (c) Write note on itai-itai disease. 3
8. (a) Give four names of platinum complexes with structure used as anticancer drugs. 4
- (b) What is metal deficiency? Explain it by taking zinc and copper metals. 1+3+3=7
- (c) Discuss antimony (Sb) compounds used in cancer treatment. 3

### UNIT-V

9. (a) Explain the photo redox reactions of Ru (II) and Ru (III) complexes. 4
- (b) Discuss the application of synthesis and catalysis in the photochemical reactions of coordination compounds. 4

- (c) Write a note each on the following: 2×2=4
- (i) Quadrupole bonds
  - (ii) Intraligand states
- (d) What do you mean by M-M multiple bonds? 2
10. (a) Discuss the application of chemical actinometry in the photochemical reactions of coordination compounds. 4
- (b) Discuss the photosubstitution reactions of Ru (II) and Ru (III) complexes. 4
- (c) Write a note each on the following: 2×2=4
- (i) Tetragonal prismatic structure
  - (ii) Face sharing bio-octahedra
- (d) What do you mean by a one-dimensional solid? 2
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