2023

M.Sc.

Fourth Semester

CORE – 11

CHEMISTRY

Course Code: MCHC 4.11

(Inorganic Chemistry - IV)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

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

UNIT–I

1. (a) Mention two trace elements along with their functions and toxicity in biological systems. 2½+2½=5
   (b) Discuss the structure and functions of haemoglobin. 4
   (c) What is photosynthesis? Discuss any of the two photochemical reactions. 2+3=5

2. (a) What are cryptates? Give an example of a cryptate formed by an alkali metal. 2+2=4
   (b) What are metalloporphyrins? Mention the role of Mg in chlorophyll. 2+2=4
   (c) What are non-heme proteins? Discuss any non-heme protein in detail. 2+4=6

UNIT–II

3. (a) What is Bohr effect? Discuss with diagram how haemoglobin and myoglobin binds oxygen at different partial pressure of oxygen in the lungs and in muscles. 1+4=5
   (b) Discuss the evidence for Fe(II) in oxymyoglobin and oxyhaemoglobin by giving the ligand field energy diagram. 6
   (c) Write notes on the iron enzymes “peroxidases”. 3

4. (a) Discuss the mechanism of oxygenation of haemoglobin and myoglobin. 6
   (b) Explain the EPR spectrum of ferric-haemoglobin by taking the low field portion of high spin form of ferric Hb and isolated ferric alpha chains. 5
   (c) Discuss iron enzymes "catalases". 3

UNIT–III

5. (a) Discuss the biochemistry of Co in vitamin B_{12}. 5
   (b) Explain the iron storage and transport with respect to ferritin and transferrin. 2½+2½=5
   (c) Write notes on the following: 2×2=4
      (i) Superoxide dismutase
      (ii) Ceruloplasmin

6. (a) Define metalloenzymes. Explain the role of carboxypeptidase in zinc enzymes. 1+4=5
   (b) Write notes on the following: 2½×2=5
      (i) Xanthine oxidase
      (ii) Siderophores
   (c) Give a brief account on biomineralization and B_{12} coenzymes. 4

UNIT–IV

7. (a) Draw the structure of carboplatin. Discuss its uses in medical field and side effects. 1+2+2=5
   (b) Discuss the symptoms of selenium toxicity. 5
   (c) Write notes on the following: 2×2=4
      (i) Copper metal deficiency
      (ii) Itai-itai disease

8. (a) What is chelation therapy? What is the full the of DMSA and DMPS? What are the side effects of chelation therapy? 1+1+3=5
   (b) Explain toxicity of Cd from occupational exposure. 4
   (c) What are the symptoms of lead poisoning? 2
   (d) Write short notes on uses of metals for diagnosis. 3

UNIT–V

9. (a) Write short notes on the following: 2×2=4
   (i) Metal-metal states
   (ii) Intraligand states
   (b) Discuss the photosubstitution reactions of Ru(II) and Ru(III) complexes. 4
   (c) Discuss the application of synthesis and catalysis in the photochemical reactions of coordination compounds. 4
   (d) What do you mean by photosubstitution reactions? 2

10. (a) Write short notes on the following: 2×2=4
   (i) Quadrupole bonds
   (ii) Face sharing bio-octahedra.
   (b) Explain the photo redox reactions of Ru(II) and Ru(III) complexes. 4
   (c) Discuss the application of chemical actinometry in the photochemical reactions of coordination compounds. 4
   (d) What do you mean by metal cluster? 2