

Reg. No. : .....

Name : .....

**Fourth Semester B.Sc. Degree Examination, May 2021**

**Career Related First Degree Programme under CBCSS**

**Group 2(a) : Biochemistry and Industrial Microbiology**

**Complementary Course IV**

**CH 1431.7 BIOINORGANIC AND ELECTROCHEMISTRY**

**(2013, 2015 – 2018 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Each question carries **1** mark.

1. Give an example for hexadentate ligand.
2. In coordination compounds the negative groups or neutral molecules attached to central metal atom are called \_\_\_\_\_.
3. The hemoglobin molecule contains \_\_\_\_\_ globular protein subunits.
4. States Kohlrausch's law.
5. What is transference number?
6. Write down the total reaction in a Daniel cell.
7. What is the mathematical expression for Nernst equation?
8. What is molecular ion peak?
9. What does Markovnikov's rule state?
10. What is Hofmann's rule?

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight** questions. Each question carries **2** marks.

11. What are the important postulates of Werner's theory?
12. Name of the following coordination compounds
  - (a)  $[\text{CoBr}(\text{NH}_3)_5]\text{SO}_4$
  - (b)  $[\text{Fe}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$
  - (c)  $[\text{Co}(\text{SO}_4)(\text{NH}_3)_5]^+$
  - (d)  $[\text{Fe}(\text{OH})(\text{H}_2\text{O})_5]^{2+}$
13. What is the difference between photosynthesis and respiration?
14. What is Bohr Effect?
15. What is the difference between equivalent conductance and molar conductance?
16. What is the basic difference between Hittorf method and moving boundary method?
17. What is the difference between a reversible and irreversible cell? Give examples.
18. For the cell reaction,  $\text{Mg(s)}/\text{Mg}^{2+}(\text{aq})//\text{Ag}^+(\text{aq})/\text{Ag}$ ; Calculate the equilibrium constant at 298K. Given:  $E^\circ \text{Mg}^{2+}/\text{Mg} = -2.37\text{V}$  and  $E^\circ \text{Ag}/\text{Ag} = 0.80\text{V}$ .
19. What is metastable peak?
20. After ionization and fragmentation occur, what does the mass spectrometer do to provide a mass spectrum?
21. Write a general mechanism for electrophilic substitution in a benzene ring by giving the essential steps involved?
22. What is known as benzyne?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Explain the structural isomerism in co-ordination compounds with example.
24. Explain the magnetic properties of co-ordination compounds based on VBT.
25. List the trace elements and their functions in human body.
26. Explain Hittorf's method for the determination of transport number.
27. Write a note on potentiometric titrations.
28. What is meant by standard electrode potential? Explain the principle underlying the determination of standard electrode potential.
29. Explain the appearance of  $m/z = 44$  in the mass spectrum of  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}=\text{O}$
30. Explain the difference between  $\text{SN}^1$  and  $\text{SN}^2$  mechanisms.
31. Explain the mechanism of electrophilic addition of hydrogen halides to carbon-carbon double bond.

(6 × 4 = 24 Marks)

### SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Explain crystal field theory. Discuss the splitting of d- orbitals in the case of octahedral and tetrahedral complexes.
33. Explain the mechanism of  $\text{O}_2$  and  $\text{CO}_2$  transportation in Haemoglobin and Myoglobin.
34. Explain conductometric titrations with examples. What are its advantages over conventional methods?
35. Explain the mechanism of dehydration of alcohol and dehydrohalogenation of alkyl halides?

(2 × 15 = 30 Marks)