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Reg. No. : .....

Name : .....

**Fifth Semester B.Sc. Degree Examination, December 2022**

**First Degree Programme under CBCSS**

**Chemistry**

**Core Course VI**

**CH 1542 : INORGANIC CHEMISTRY III**

**(2018–2019 Admission)**

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1.  $\text{Ti}^{3+}$  ion exhibits purple colour. Give reason.
2. Write the general electronic configuration of transition metals.
3. Transition metals and their compounds have good catalytic properties. Give one compound used as catalyst.
4. Calculate the EAN of Ni in  $(\text{Ni CO})_4$ .
5. What are ambidentate ligands? Give one example.
6. Mention two biological functions of Fe.
7. Give two examples for metallocenes.
8. Name any two ores of Zinc.

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9. Differentiate between calcination and roasting.
10. Name any two tools for measuring nano structures.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Why do Zr and Hf display similar properties?
12. Tetrahedral complexes are high spin. Justify?
13. Find out the hybridisation, geometry and predict the magnetic property of the complex  $[\text{CoF}_6]^{3-}$ .
14. Explain why  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  ion is more paramagnetic than  $[\text{Fe}(\text{CN})_6]^{3-}$ .
15. What are labile and inert complexes?
16. Give one method of preparation of  $\text{Ni}(\text{CO})_4$ .
17. Calculate EAN of the central atom in the following.
  - (a)  $\text{K}_4[\text{Fe}(\text{CN})_6]$
  - (b)  $[\text{Pt}(\text{NH}_3)_6]^{4+}$
18. Why this is difficult to oxidize Mn (II) to Mn (III)?
19.  $[\text{Fe}(\text{CN})_6]^{4-}$  and  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  are of different colors in dilute solutions. Why?
20. Which of the following complex ion is LS and which is HS?
  - (a)  $[\text{CoF}_6]^{3-}$ , (b)  $[\text{Rh}(\text{NH}_3)_6]^{3+}$ . Explain.
21. What is Chelate effect?
22. What are HNCC and LNCC? Give one example for each.
23. What is sigma bonded organometallic compounds? Give one example.

24. What are the functions of Haemoglobin and Myoglobin in biological systems?
25. Explain the process smelting.
26. Write the principle of XRD.

**(8 × 2 = 16 Marks)**

SECTION – C

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

27. Explain the preparation, properties and uses of  $K_2Cr_2O_7$ .
28. What is lanthanide contraction? Mention its consequences.
29. What are high spin and low spin complexes? Explain with examples.
30. Illustrate stereo isomerism in coordination compounds using example.
31. What is Zeiser's salt? Explain the bonding in it.
32. Explain the application of coordination complexes in quantitative analysis.
33. Explain the diamagnetic property of ferrocene on the basis of valence bond theory.
34. Briefly discuss the functions of Na-K pump.
35. Discuss briefly the biological function and toxicity of the following elements :  
(a) Cu (b) Zn (c) Cr (d) Hg
36. Explain Beer-Lambert's Law.
37. Explain Gravity separation and Froth flotation methods for concentration of ores.
38. Describe the principle and applications of Flame Emission Spectroscopy.

**(6 × 4 = 24 Marks)**

## SECTION – D

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

39. Compare lanthanides and actinides based on :
- (a) Electronic Configuration
  - (b) Oxidation states
  - (c) Magnetic properties
  - (d) Spectral properties.
40. What is crystal field splitting? Explain crystal field splitting in tetragonal complexes.
41. Define organometallic compounds. Discuss its classification in detail with example for each class.
42. Explain briefly the mechanism of oxygen transport in biological systems.
43. Write short notes on :
- (a) Zone refining
  - (b) Electro refining
  - (c) Vapour phase refining.
44. Give the principle and applications of
- (a) Thermogravimetry
  - (b) Differential Thermal Analysis
  - (c) Differential Scanning Calorimetry.

**(2 × 15 = 30 Marks)**