

**B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2026****SEMESTER 6 : CHEMISTRY****COURSE : 19U6RCHE09 : INORGANIC CHEMISTRY***(For Regular 2023 Admission and Supplementary 2022/2021/2020/2019 Admissions)*

Time : Three Hours

Max. Marks: 60

**PART A****Answer all (1 mark each)**

1. What type of defect create F-centres in the crystal?
2. Write the formulae of (i) potassium trioxalatoaluminate(III) (ii) dichlorobis(ethane-1,2-diamine)cobalt(III).
3. What are closo-carboranes?
4. What are the important applications of fluorocarbons?
5. Write any two consequences of Frenkel defects.
6. Why salts of  $Ti^{4+}$  and  $V^{5+}$  are colourless?
7. How would you account for the following order in the acid strengths of the oxoacids of chlorine;  $HClO_4 > HClO_3 > HClO_2 > HClO$ .
8. Name the coordination compound  $[Cr(H_2O)_5(NCS)]Cl_2$  according to IUPAC system of nomenclature.

**(1 x 8 = 8)****PART B****Answer any 6 (2 marks each)**

9. What are interstitial defects? Give examples.
10. When two isomers of  $[Pt(NH_3)_2Cl_2]$  reacts with thiourea, one product is  $[Pt(tu)_4]^{2+}$  and the other is  $[Pt(NH_3)_2(tu)_2]^{2+}$ . Identify the initial isomers and explain the results
11. Identify the optically active complexes from the following: Give justification.  
a)  $[Co(en)_3]^{3+}$  b) cis-  $[Co(en)_2Cl_2]^+$  c) trans-  $[Co(en)_2Cl_2]^+$
12. What is lanthanide contraction?
13. On the basis of crystal field theory, write the electronic configuration of  $d^4$  in terms of  $t_{2g}$  and  $e_g$  in an octahedral field when (i)  $\Delta_0 > PE$  (ii)  $\Delta_0 < PE$ .
14. What are super acids? Give an example.
15. Calculate the number of cesium ions and chloride ions in a unit cell of CsCl.
16. What are cryptands? Give an example.

**(2 x 6 = 12)****PART C****Answer any 4 (5 marks each)**

17. Defects in ionic solids may be introduced by adding impurity ions. Explain
18. Explain, why  $[NiCl_4]^{2-}$  is paramagnetic while  $[Ni(CO)_4]$  is diamagnetic using valence bond theory?
19. Metal excess compounds are called n-type semiconductors and metal deficient compounds are called p-type semiconductors. Account for the statement.
20. Discuss the MO diagram of  $[FeF_6]^{3-}$  and explain its magnetic behavior.
21. Explain the trend in the atomic and ionic size of first row elements of the transition series.
22. Explain the electronic configuration and oxidation states of lanthanides by taking suitable examples.

**(5 x 4 = 20)**

**PART D**  
**Answer any 2 (10 marks each)**

23. Explain the preparation, properties, and bonding in diborane.
24. Write down the similarities and differences between lanthanides and actinides.
25. Discuss the postulates of Crystal field theory. Draw and explain the crystal field splitting of d-orbitals in octahedral complexes. On the basis of CFT, account for the fact that  $[\text{CoF}_6]^{3-}$  is paramagnetic while  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic.
26. What is trans effect? Describe the various applications of trans effect. Using trans effect, outline the synthesis of cis and trans isomers of  $[\text{Pt}(\text{Cl})_2(\text{C}_2\text{H}_4)(\text{NH}_3)]$  starting from  $[\text{PtCl}_4]^{2-}$  and other ligands.

**(10 x 2 = 20)**