D 140644 **(Pages : 2)** **Name.....**

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2026

(CBCSS)

Chemistry

CHE2C06—CO-ORDINATION CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

Answer any **eight** *questions.*

Each question carries a weightage of 1.

1. What are macrocyclic ligands ? Give two examples.
2. What do you mean by thermodynamic stability of a metal complex Explain.
3. Do you find any difference in the geometry of the following metal complexes ?

   $[Cr(H_2O)_6]^{3+}$, $[Fe(H_2O)_6]^{3+}$, $[Mn(H_2O)_6]^{3+}$.

   Give reasons for your answer.
4. Calculate the CFSE for a complex with Δ = 25000 cm^{-1} and pairing energy P = 15000 cm^{-1}.
5. Derive the term symbols for Fe^{2+} and Cu^{2+}.
6. A solution of $MnSO_4$ is almost colourless ; but that of $KMnO_4$ is intensely coloured ; why ?
7. How is ESR spectrum recorded ?
8. Is $[Ni(en)_3]^{2+}$ labile or inert ? Explain your choice.
9. Explain photoaquation reactions of metal complexes with an example.
10. What are metal complex sensitizers ? Give two examples.

(8 × 1 = 8 weightage)

Turn over

Section B

Answer any **six** *questions.*

Each question carries a weightage of 2.

11. Differentiate between macrocyclic effect and template effect, giving suitable examples.

12. The magnetic moment of $[MnBr_4]^{2-}$ and $[Mn(CN)6]^{3-}$ are 5.9 and 2.9 BM respectively. Using VBT, assign geometries of these complexes.

13. How do Orgel diagrams differ from Tanabe-Sugano diagrams.

14. How Mössbauer spectroscopy is useful for the study of spin crossover in iron (II) complexes. Explain with an example.

15. Discuss the D mechanism involved in the substitution reactions of octahedral metal complexes.

16. Write a note on metal complex sensitizers.

17. Describe the pH-metric method for determining the stability of metal complexes.

18. What are prompt and delayed photochemical reactions ? Explain with suitable examples.

(6 × 2 = 12 weightage)

Section C

Answer any **two** *questions.*

Each question carries a weightage of 5.

19. Compare valence bond theory, crystal field theory and molecular orbital theory in the study of structure and bonding in transition metal complexes.

20. Describe the Gouy method for determining the magnetic moment values of metal complexes. What is the importance of Pascal's constants in this experiment ?

21. Discuss the application of infrared spectroscopy in the study of transition metal complexes.

22. What is *trans* effect ? Discuss the theories and any *one* application of *trans* effect

(2 × 5 = 10 weightage)