

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – APRIL 2019

CH 3813– COORDINATION CHEMISTRY

Date: 03-04-2019
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer any **FOUR** questions.

(4 × 10 = 40)

1. a) Explain the synthesis of Schiff base macrocyclic metal complexes with an example.
b) Discuss whether the following complexes possess orbital contribution to the magnetic moment: d^2 (Oh) and d^7 (Td). (5+5)
2. Describe the possible electronic excitations of metals ions with d^2 configuration in octahedral environment using Orgel diagram.
3. Explain the principle involved in the polarographic analysis of metal complexes.
4. Discuss any three evidences which support crystal field theory.
5. What are inert and labile complexes? Explain the effect of electronic configuration of d^1 to d^9 to predict whether the metal complexes are inert or labile.
6. Predict whether the following oxides are spinel or inverse spinel i) Mn_3O_4 ii) $ZnFe_2O_4$.
7. Briefly explain the role of coordination compounds in *in vivo* and *in vitro* nitrogen fixation.
8. Explain the role of g- and A-tensors in characterizing the EPR spectrum of metal complexes.

Part-B

Answer any **THREE** questions.

(3 × 20 = 60)

9. a) Discuss the principle involved in explaining the ESR spectrum of metal complexes with $[Cu(salen)_2]^{2+}$ as an example.
b) How does cyclic voltammetry help in analyzing the electrochemical reversibility of coordination compounds? (10+10)
10. Explain the principle involved in the analysis of metal complexes by the Mossbauer spectroscopy and explain how the metal complexes of Fe^{3+} and Fe^{2+} are differentiated.
11. Write a brief note on static and dynamic Jahn-Teller effect. Which d^n configuration leads to weak and strong Jahn-Teller distortion in octahedral and tetrahedral complexes?
12. a) Explain the mechanism and factors affecting the inner and outer sphere electron transfer reaction of metal complexes.
b) What is trans effect? Discuss its mechanism with suitable example. (10+10)
13. a) Discuss in detail the trans effect.
b) Discuss why is the trans effect of CO higher than that of pyridine. (10+10)
14. Compare the specific role of the enzymes (i) carboxy peptidase and (ii) carbonic anhydrase. (10+10)
