C 23314 (Pages : 2) Name.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2022

(CBCSS)

Chemistry

CHE 2C 06—CO-ORDINATION CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend* **all** *questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.*
4. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Section A

Answer any **eight** *questions.*
Each question carries a weightage of 1.

1. Differentiate between thermodynamic stability and kinetic stability of metal complexes.
2. How do π-bonding ligands help in the stabilization of metal complexes with low oxidation states? Explain with suitable examples.
3. Calculate the CFSE for d^4 high-spin octahedral and d^5 low-spin octahedral metal complexes.
4. Which ligand gives higher splitting energy (Δ value) ; H_2O or OH^-? Substantiate your answer.
5. How do Orgel diagrams differ from Tanabe-Sugano diagrams ?
6. Explain the terms ; Curie temperature and Niel's temperature.
7. What happens to the ν(C=N-) stretching frequency in N-salicylideneaniline on complexation with Cu^{2+} ? Explain.
8. How infrared spectroscopy can be used to identify monodentate and bidentate (chelating) NO_3^- groups ?

Turn over

9. What is anation reaction ? Explain with an example.

10. Explain photoisomerization reactions of metal complexes giving an example.

(8 × 1 = 8

Section B

Answer any **six** *questions.*
Each question carries a weightage of 2.

11. Derive the relationship between step-wise stability constant and overall stability co metal complex.

12. What is Jahn-Teller effect ? Discuss its consequences in the structure and spectra of metal complexes.

13. State and explain Curie-Weiss law.

14. Illustrate the use of ESR spectroscopy in the study of ambidentate co-ordination of ligand nitrogen and oxygen towards copper(II) ion.

15. Discuss the factors which influence the rates of substitution reactions in metal comple

16. Explain the Marcus theory of outer-sphere electron transfer reaction.

17. Explain the photoisomerization and photorecemization reactions of metal complexes wi examples.

18. Discuss the principle involved in Gouy method for magnetic moment measurement.

(6 × 2 = 12 w

Section C

Answer any **two** *questions.*
Each question carries a weightage of 5.

19. Discuss the factors that favour the stability of metal complexes. Describe the spectroph method for determining the stability of a metal complex.

20. Critically evaluate valence bond theory, crystal field theory and molecular orbital the study of bonding in transition metal complexes.

21. Bring out the principle and experimental set up involved in Mossbauer spectroscopy. Ex this technique is useful in the structural study of iron complexes.

22. Describe the D, A and I mechanisms of substitution reactions in octahedral metal complex out the factors which favour these mechanisms.

(2 × 5 = 10 w