

Exam. Code : 103205

Subject Code : 1350

B.A./B.Sc. 5th Semester**CHEMISTRY (Inorganic Chemistry—A)**

Time Allowed—Three Hours] [Maximum Marks—35

PART—A

Note :— All questions are compulsory. Each question carries 1 mark. The maximum length of answer can be 1/3rd of a page.

1. Which out of Co^{+2} and Co^{+3} will have higher magnetic moment and why ?
2. What is CFSE ? Which complex is more stable, one having lesser CFSE or more CFSE ?
3. What do symbols S, L and J signify ?
4. Differentiate between rate of reaction and rate law.
5. What is the sign of magnetic susceptibility X for paramagnetic and diamagnetic substances ?
6. What is Wilkinson catalyst ? Give its geometry.
7. Why 17-valence electron species $\text{Mn}(\text{CO})_5$ dimerises forming $\text{Mn}_2(\text{CO})_{10}$ but $\text{V}(\text{CO})_6$ does not ?
8. What are Orgel diagrams ? What are its limitations ?

PART—B

Note :— Attempt any **TWO** questions from each section.
Each question carries **4.5** marks. The maximum length of answer can be up to five pages.

SECTION—I

9. Discuss the factors affecting the magnitude of crystal field splitting.
10. (a) Explain crystal field splitting of d-orbitals in case of tetrahedral complexes.
(b) Calculate the number of unpaired electrons in $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ complex ions.
11. What are ferromagnetic and antiferromagnetic substances ? Describe the importance of Curie temperature and Neel temperature in the magnetic behaviour of substances.

SECTION—II

12. What are selection rules for d-d transitions ? Under what conditions these are relaxed ? Discuss why tetrahedral complexes give intense spectra.
13. What are term symbols ? Derive spectroscopic terms for p^2 configuration on the basis of Russel Saunders coupling and assign the ground state.

14. (a) Discuss the mechanism of nucleophilic substitution reactions in square planar complexes.
- (b) What is chelate effect ? Discuss the stability of complexes with size and number of chelate rings.

SECTION—III

15. What are organometallic compounds ? Give two examples with structures. Discuss classification of organometallic compounds on the basis of nature of bonding.
16. What is Zeise salt ? Draw its structure and discuss the bonding in it in detail.
17. What is EAN ? Calculate EAN in the following :
- (i) $[\text{Mn}(\text{CO})_5(\text{C}_2\text{H}_4)]^+$
- (ii) $\text{Mo}(\text{CO})_6$
- (iii) $\text{HCo}(\text{CO})_4$
- (iv) $\text{Cr}(\text{C}_6\text{H}_6)_2$