

Exam. Code : 103205

Subject Code : 1328

B.A./B.Sc. 5th Semester

CHEMISTRY

(Inorganic Chemistry— IV)

Time Allowed—3 Hours] [Maximum Marks—35

Note :—There are **EIGHT** questions. Candidates are required to attempt any **FIVE** questions. All questions carry equal marks.

SECTION—A

1. (a) Discuss the crystal field splitting in octahedral complexes. 3
- (b) How does crystal field theory explain the magnetic character of coordination compounds? 3
- (c) Write electronic configuration of d^4 high spin octahedral complex. 1
2. (a) Explain the factors affecting crystal field splitting. 3
- (b) Write a note on spectrochemical series. 3
- (c) What is CFSE? Calculate CFSE for d^1 tetrahedral ion. 1

SECTION—B

3. (a) What is magnetic susceptibility? How do you determine it with Gouy's method? What are advantages of this method? 3
- (b) Discuss magnetic properties of Ni(II) octahedral, tetrahedral and square planar complexes with examples. 3
- (c) What is ferromagnetism and antiferromagnetism? 1
4. (a) What is magnetic moment? Calculate the expected magnetic moment (spin magnetic moment only) in BM for following ions :
(i) Mn^{2+}
(ii) Ni^{2+}
(iii) Cu^+ 3
- (b) What is Curie's law? Discuss variation of magnetic susceptibility with temperature. 3
- (c) Orbital contribution is quenched, what do you understand by this term? 1

SECTION—C

5. (a) What are microstates? Calculate the number of microstates for d^1 and p^3 configuration. 3
- (b) Derive the spectroscopic terms for d^2 configuration using L-S coupling. 3
- (c) What are Orgel diagrams? What are its limitations? 1

6. (a) What are electronic transitions ? Discuss two selection rules for electronic spectrum of transition metal complexes. 3
- (b) Discuss why colour of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ appears violet. <https://www.gnduonline.com> 3
- (c) Define L-S coupling. 1

SECTION—D

7. (a) What is Zeise's salt ? Give its method of preparation, draw its structure and discuss the main features of its bonding. 3
- (b) Discuss preparation, properties and bonding in organoaluminium compounds. 3
- (c) What is Wilkinson's catalyst ? Give its structure. 1
8. (a) What are organometallic compounds ? Outline the preparation of organolithium compounds. Draw the structure of methyl lithium tetramer. 3
- (b) What is hapticity ? Give examples of ligands of various hapticities. 3
- (c) Draw structure of ferrocene. Is it an organometallic compound ? 1