Roll No.

Total No. of Pages : 02

Total No. of Questions : 11

B.Sc. (Honours) Chemistry (Sem.-5) LIGAND FIELD THEORY Subject Code : BHCL306-19 M.Code : 90742 Date of Examination : 21-12-22

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of EIGHT questions carrying TWO marks each.
- 2. SECTION-B contains EIGHT questions carrying FOUR marks each and students have to attempt any SIX questions.
- 3. SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.

SECTION-A

- 1. a. What are symmetry elements?
 - b. What do you understand by S4?
 - c. What is ground state term for d^2 and d^3 configuration?
 - d. What is spectroscopic term for p^3 configuration?
 - e. What are the factors affecting bandwidth?
 - f. What is Racah parameter?
 - g. Calculate the term symbol for ground state of Co^{+3} ?
 - h. Why metal complexes are coloured?

SECTION-B

- 2. a) What is dihedral plane of symmetry?
 - b) What is the symmetry elements for BF₃ molecule?

- 3. Explain the absorption spectra for Co(II) octahedral and Co (II) tetrahedral complex?
- 4. Differentiate between LS coupling and JJ coupling.
- 5. What is spectrochemical series? Discuss.
- 6. Discuss the low field ground state term for d4 system.
- 7. What are selection rule for electronic transition in transition metal complexes?
- 8. What is Orgel Diagram? Discuss.
- 9. What is Crystal Field Stabilization Energy? Give calculation of CFSE for high spin and low spin d⁵ metal ion in spherical ligand environment.

SECTION-C

- 10. a) Discuss the Jahn-Teller distortion. Explain the Jahn-Teller distortion in Cu^{2+} complexes.
 - b) What are the limitations of the crystal field theory?

OR

- a) Draw combined Orgel diagram for d⁹ octahedral complexes?
- b) Deduce the point group for NH_3 and H_2O ?
- 11. a) Explain reducible and irreducible representations. Write the great orthogonality theorem and its consequences.
 - b) What is Crystal field stabilization energy for high spin d4 octahedral complex?

OR

- a) Discuss the splitting pattern of G, H and I term.
- b) Discuss the ground state term form p^3 , d^7 term.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.