



Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: OCT 2024
Faculty: Science and Technology

Program: B.Sc.

Semester: V

SET: A

Program (Specific): B.Sc. General

Course Type: DSEC- II

Class: T.Y.B.Sc.

Max. Marks: 35

Name of the Course: Inorganic Chemistry -I

Course Code: CH-504

Time: 2Hr

Paper: IV

Instructions to the candidate:

- 1) There are 4 sections in the question paper. Write each section on separate page.
- 2) All Sections are compulsory.
- 3) Figures to the right indicate full marks.
- 4) Draw a well labelled diagram wherever necessary.

SECTION: A

Q1) Rewrite the sentence with correct option.

5 × 1 = 5 Marks

1. According to MOT, metal ion contributes _____ atomic orbitals.

- (a) 4 (b) 5 (c) 6 (d) 9

2. According to VBT, pi bond is formed when _____ orbital overlaps with _____ orbital.

- (a) Filled Ligand, Empty Metal (b) Filled Metal, Empty Ligand
(c) Filled Ligand, Filled Metal (d) Empty Metal, Empty Ligand

3. _____ = $\frac{4}{9} \Delta_o$.

- (a) Δ_{sp} (b) Δ_{tbp} (c) Δ_t (d) Δ_{tet}

4. In tetrahedral complexes _____ orbitals become stable, as per CFT.

- (a) t_2 (b) t_{2g} (c) e (d) e_g

5. In a polymer, the smallest repeating unit is called as _____.

- (a) tetramer (b) trimer (c) dimer (d) monomer

Q2) Answer the following: (ANY 4)

4 × 1 = 4 Marks

1. Name the hybridisation seen in tetrahedral complexes.
2. Define outer orbital octahedral complexes.
3. Define CFSE.
4. Give the criteria for weak field octahedral complexes.
5. Write the formula to calculate magnetic moment of complex.
6. Draw the structure of borazole.

SECTION: B

Q3) Answer the following: (ANY 4)

4 × 2 = 8 Marks

- i. Name the geometry and hybridisation seen in $[\text{CoF}_6]^{3-}$ complex.
- ii. Give any two limitations of VBT.
- iii. State any two assumptions of MOT.
- iv. Calculate CFSE for $[\text{CoF}_6]^{3-}$ complex. ($Z = 27$)
- v. Give two examples of square planar complexes.
- vi. Give any two applications of silicones.

SECTION: C

Q4) Answer the following: (ANY 4)

4 × 2 = 8 Marks

- a) State Electroneutrality principle. Draw the diagram for $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ with 50% covalent bonding.
- b) State any two assumptions of VBT.
- c) Calculate CFSE for d^5 ion in strong and weak octahedral field.
- d) Name any two factors affecting Δ_o .
- e) Draw MO diagram of $[\text{CoF}_6]^{3-}$ complex.
- f) State any two differences between Inorganic and Organic polymers.

SECTION: D

Q5) Answer the following: (ANY 2)

2 × 5 = 10 Marks

1. Explain $[\text{MnCl}_4]^{2-}$ complex with help of VBT. ($Z=25$)
2. Discuss Jahn Teller theorem with an example.
3. Write a short note on Nephelauxetic effect.
4. Explain Charge transfer spectra.
