

M. Sc. DEGREE END SEMESTER EXAMINATION – APRIL 2025
SEMESTER 2: CHEMISTRY / PHARMACEUTICAL CHEMISTRY
COURSE: 24P2CHET05 / 24P2CPHT05: INORGANIC CHEMISTRY- II
(For Regular - 2024 admission)

Time: Three hours

Max. Weight: 30

PART A**Answer any 8 questions****Weight: 1**

1. What is CFSE? Arrange the following complexes in the increasing order of Δ_o (CO1)
2. What are π -acceptor ligands? Arrange the isoelectronic ligands CN^- , CO, NO^+ in the order of their π -accepting ability. (CO1)
3. Name the levels and their relative energies obtained by the splitting of F term under the influence of an octahedral field for d^7 configuration. (CO2)
4. What is spin-only magnetic moment? Give its formula. (CO2)
5. Give two examples for Sandwich complexes of actinoids. (CO5)
6. State Marcus-Hush principle. (CO3)
7. What are replacement reactions in metal complexes? Give an example. (CO3)
8. Draw the possible isomers of $[\text{Cr}(\text{en})_3]^{3+}$. Comment on their optical activity. (CO4)
9. What is the basic principle of Optical Rotatory Dispersion (ORD)? (CO4)
10. What is a term symbol in the context of lanthanide ions? Give the term symbol of Ce^{3+} . (CO5)

(1 x 8 = 8)**PART B****Answer any 6 questions****Weights: 2**

11. Explain Jahn Teller distortion in octahedral complexes with example. (CO1)
12. Briefly discuss the evidence of covalency in metal- ligand bond in complexes. (CO1)
13. What are correlation diagrams for d^1 and d^9 , and how do they help in understanding electronic transitions? (CO2)
14. Explain the significance of Tanabe-Sugano diagrams and how they differ from Orgel diagrams. (CO2)
15. How will you explain the stability of a complex based on thermodynamic and kinetic criteria? (CO3)
16. What is trans effect? How is it explained using π -bonding theory? (CO3)
17. How do electronic and steric factors influence the stability of different linkage isomers? (CO4)
18. Describe the role of macrocycles and crown ethers in metal coordination. How do they influence metal selectivity? (CO4)

(2 x 6 = 12)

PART C

Answer any 2 questions

Weights: 5

19. Briefly explain the crystal field splitting of d-orbitals in (a) tetrahedral complexes (b) octahedral complexes and (c) square planar complexes. (CO1)
20. Describe the electronic spectra of $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ using appropriate Orgel diagrams. (CO2)
21. Explain the inner sphere electron transfer mechanism with reference to Taube's mechanism. How do inner sphere and outer sphere electron transfer reactions differ from each other? (CO3)
22. a) Explain the phenomenon of lanthanide contraction, discussing its causes and consequences. (CO5)
(b) Describe the methods used for the separation of lanthanides, focusing on ion-exchange and solvent extraction techniques.

(5 x 2=10)