Reg. No…….. Name…….. **26P205**

**M. Sc. DEGREE END SEMESTER EXAMINATION - APRIL 2026**

**SEMESTER 2: CHEMISTRY / PHARMACEUTICAL CHEMISTRY**

**COURSE: 24P2CHET05 / 24P2CPHT05: INORGANIC CHEMISTRY- II**

*(For Regular 2025 Admission and Improvement/Supplementary 2024 Admission)*

Time: Three hours Max. Weight: 30

**PART A**

**Answer any 8 questions**

**Weight : 1**

1. Identify any two geometries and examples for complexes having coordination number 8. (CO1)
2. $[Ni(CN)_4]^{2-}$ is square planar whereas $[NiCl_4]^{2-}$ is tetrahedral. Why? (CO1)
3. Derive the term symbol for a $d^3$ ion. (CO2)
4. What is Curie's law? How is it modified? (CO2)
5. What are inert and labile complexes? Give examples. (CO3)
6. State Marcus-Hush Principle. (CO3)
7. Explain the effect of $H^+$ ion in the rate of substitution reactions of chelate complexes. (CO3)
8. Draw the optical isomers of the complex $[Co(ox)_3]^{3-}$. (CO4)
9. Briefly explain symbiosis in coordination complexes. (CO4)
10. Give two examples for sandwich complexes of actinoids. (CO5)

**(1 x 8 = 8)**

**PART B**

**Answer any 6 questions**

**Weights : 2**

11. Discuss the different factors affecting the stability of complexes, specially mention the thermodynamic aspects – Irving William order. (CO1)
12. Describe nephelauxetic effect and its significance in the covalent bonding of metal complexes. (CO1)
13. What are Racah parameters, and how do they help in understanding the electron-electron repulsion in transition metal complexes? (CO2)
14. What are the limitations (demerits) of Orgel diagrams in the interpretation of electronic spectra? (CO2)
15. What is trans effect? Sketch the efficient route for the synthesis of $[PtCl_2(NH_3)(PPh_3)]$. (CO3)
16. Explain the Marcus theory for outer sphere mechanism with a suitable example. (CO3)
17. Discuss the structures of Prussian blue and related compounds. (CO4)
18. Explain the different factors affecting linkage isomerism. (CO4)

**(6 x 2 = 12)**

## PART C
## Answer any 2 questions

**Weights : 5**

19. (a) Discuss the merits and demerits of crystal field theory taking suitable examples.
(b) What is pairing energy? Sketch the splitting of d orbitals in the following cases and calculate the CFSE. **(CO1)**
(a) $K_2PtCl_6$ (b) $[Zn(NH_3)_4]^{2+}$

20. Discuss the following:
(a) Gouy method for the determination of magnetic moment of complexes.
(b) Temperature Independent Paramagnetism (TIP). **(CO2)**
(c) Anomolous magnetic moment.

21. (a) Compare the dissociative and associative mechanisms of octahedral substitution reactions.
(b) Discuss the kinetics and mechanism of base hydrolysis in octahedral substitution reactions. **(CO3)**

22. Discuss the coordination chemistry of lanthanoids and actinoids and explain their electronic spectra and magnetic properties, comparing the similarities and differences between these two series of elements. **(CO5)**

**(5 x 2 = 10)**