



**Avinashilingam Institute for Home Science and Higher Education for Women  
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)  
Re-accredited with A++ Grade by NAAC. Recognised by UGC Under Section 12B  
Coimbatore - 641 043, Tamil Nadu, India**

**Continuous Internal Assessment – II, April, 2025  
II Semester**

**Class : I PG  
Branch: Chemistry**

**Time : 2 hours  
Max. Marks: 60**

**23MCHC08 – Inorganic Chemistry – II**

Course Outcomes:

CO1 : Ability to classify molecules into point groups

CO2 : Knowledge of applications of group theory

CO3 : Understanding the chemistry of cage, chain complexes

CO4 : Familiarization of general characteristics of f-block elements and magnetic properties of their complexes

CO5 : Knowledge on nuclear reactions and applications

**Part A**

**6 x 1 = 6**

**Choose the Correct Answer**

- Pick out order a class of  $C_{3v}$  point group CO1 K2  
a. 6, 3      b. 3, 3      c. 4, 2      d. 2, 1
- Identify  $D_{3h}$  from the following CO1 K1  
a.  $BCl_3$       b.  $H_2O$       c. Ethylene      d. Benzene
- Linear molecules without centre of inversion belong to CO2 K2  
a.  $C_{Dv}$       b.  $D_{\infty h}$       c.  $C_{\infty}$       d.  $D_{\infty}$
- The order of ease of complex formation tendency of lanthanides with ligands CO4 K3  
can be given by  
a.  $Ln^{4+} > Ln^{3+} > Ln^{2+}$     b.  $Ln^{2+} > Ln^{3+} > Ln^{4+}$     c.  $Ln^{3+} > Ln^{2+} > Ln^{4+}$     d.  $Ln^{4+} < Ln^{3+} > Ln^{2+}$
- The colour of  $Ln^{3+}$  ions of  $4f^0$ ,  $4f^7$ , and  $4f^{14}$  electronic configurations are ----- CO4 K2  
a. Yellow      b. Green      c. Orange      d. Colorless
- The tripositive ions of La and Lu are CO4 K2  
a. Paramagnetic    b. Diamagnetic    c. Ferromagnetic    d. Cannot predict

**Part B**

**3 x 6 = 18**

**Answer ALL questions**

**Each answer should not exceed 400 words or two pages**

- a. Identify the point group for the following CO1 K3  
a. Pyridine    b. Acetylene    c. Cyclohexane (chair form)  
(or)
- b. Write the matrix representation for  $C_{2v}$  CO2 K3
- a. Write the important rules of irreducible representation CO2 K1  
(or)
- b. Explain non abelian group with reference to  $NH_3$  CO2 K2

9. a. Discuss about the factors affecting the rates of direct electron transfer reactions. CO4 K3  
(or)
9. b. Write notes on lanthanide contraction and its consequences. CO4 K3

**Part C**

**3 x 12 = 36**

**Answer ALL questions**

**Each answer should not exceed 800 words or four pages**

10. a. Construct character table for  $C_{3v}$  and explain the properties of irreducible representation with reference to  $C_{3v}$  CO1 K3  
(or)
10. b. Draw and explain the flow chart for the identification point groups by yes or no method CO1 K3
11. a. Explain the great orthogonality theorem and its significance CO2 K2  
(or)
11. b. Explain in detail about inner sphere mechanism of electron transfer CO4 K4  
in complexes by having  $[Co(NH_3)_5Cl]^{2+}$  and  $[Cr(H_2O)_6]^{2+}$  as examples
12. a. Discuss about the colour and absorption spectra of  $Ln^{3+}$  ions. CO4 K3  
(or)
12. b. Compare and Contrast between lanthanides and actinides. CO4 K4

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Staff In-Charge:  
Dr. M. Gowri &  
Dr. M. Amutha Selvi