Roll.No. | 22PCHCT1002

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Chemistry - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - I

22PCHCT1002 -Structural Inorganic Chemistry and Photochemistry

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Describe the structure and significance of Perovskite-type compounds (ABX_3)
2. Explain the Meissner effect and discuss its significance in superconductivity.
3. Discuss the synthesis, structure and bonding in borazine. Why is it called "inorganic benzene"?
4. Describe the synthesis, classification, bonding and significance of carboranes.
5. Explain the role of MLCT (Metal to Ligand Charge Transfer) in the photochemistry of Ru(II) polypyridyl complexes.
6. i) Differentiate between Type I and Type II superconductors.
   ii) Write a short note on the magnetic behaviour offerrites.
7. i) Compare and contrast the Zinc Blende and Wurtzite structures.
   ii) Differentiate between vacancy and interstitial diffusion mechanisms.
8. Explain the bonding involved in trinuclear metal clusters with a suitable example.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Discuss the formation, structure, and properties of spinels and inverse spinels with suitable examples.
   ii) Explain in detail the chemical vapour deposition method of solid-state synthesis.
10. i) Describe the structure and superconducting properties of the $YBa_2Cu_3O_7$ (YBCO) oxide system.
    ii) Discuss the structure and electrical behaviour of intrinsic and extrinsic semiconductors.
11. i) Classify silicates based on their structure. Give one example for each type
    ii) Write an account on isopoly acids of molybdenum and tungsten.

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12. i) Compare the reactivity of Cr(III) and Co(III) complexes in photo substitution reactions.
    ii) Evaluate the application of $[Ru(bpy)_3]^{2+}$ in DSSCs. What makes this complex suitable for solar cell applications?

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. i) Explain metal-metal bonding in the compounds $(Re_2Cl_8)^{2-}$. How many bonds exist between the Re atoms?
    ii) Discuss the synthesis, structure, and bonding in boranes. Apply Wade's Rule to explain the structure of B_5H_9 and B_4H_{10}.

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