

**M.Sc. DEGREE END SEMESTER EXAMINATION- OCTOBER 2024****SEMESTER 3 : CHEMISTRY****COURSE : 21P3CHET09 : INORGANIC CHEMISTRY III***(For Regular 2023 Admission and Supplementary 2022/2021/ Admissions)*

Duration : Three Hours

Max. Weights: 30

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

1. Give the explanation for varying bond length and bond angle for phosphorous oxide cage like compounds. (E, CO 3)
  2. Explain Wade's rule. Find out the cluster  $C_2B_4H_8$  come under which type of carboranes. (An, CO 3)
  3. Distinguish between Type-I and Type-II superconductors. (An, CO 2)
  4. Distinguish between reconstructive and displacive phase transitions with examples. (A, CO 1)
  5. Explain the term super-paramagnetism. (U, CO 4)
  6. What is YBCO? Give its synthesis and importance. (U, CO 1)
  7. Write a short note on organometallic dendrimers. (U, CO 3)
  8. Explain alkyl ligand exchange method for the synthesis of organometallic polymers based on rigid rod polyynes. (U, CO 3)
  9. How  $\alpha$  and  $\beta - P_4S_4$  are synthesized? Give their structures. (U, CO 3)
  10. Explain the term photovoltaic effect. (U)
- (1 x 8 = 8)**

**PART B****Answer any 6 questions****Weights: 2**

11. Explain with suitable example the principle and method for the crystal growth by hydrothermal method. (A, CO 1)
  12. Explain the ring opening polymerisation for the synthesis of [2] ferrocenophanes having  $-CH_2-R$  bridges. (U, CO 3)
  13. Explain potential types of phosphorus-sulphur cage compounds. How will you synthesis it? (U, CO 3)
  14. Discuss the types of metal clusters formed by group 13 elements. Explain each cluster with suitable examples. (U, CO 3)
  15. Give an account of high-temperature superconductors. (U, CO 2)
  16. Write a note on polymers based on ferrocene. List its important applications. (U, CO 3)
  17. What are Hume-Rothery compounds? What is the basis of this naming? Explain. (U, CO 1)
  18. What are spinels? Analyze its magnetic properties. (U)
- (2 x 6 = 12)**

**PART C****Answer any 2 questions****Weights: 5**

19. Explain the ring topological approach of born hydrides. How we can explain the bonding in boranes using these approach. Give the styx number and structures of  $B_5H_{11}$  and  $B_{10}H_{14}$ . (A, CO 3)
  20. Discuss various physical and chemical deposition techniques used to obtain high quality thin films. (U, CO 4)
  21. Give an account on piezoelectricity, pyroelectricity, and ferroelectricity. (U)
  22. What are solid electrolytes? Discuss their types and applications. (U, CO 1)
- (5 x 2 = 10)**

OBE: Questions to Course Outcome Mapping

CO	Course Outcome Description	CL	Questions	Total Wt.
CO 1	Describe the key concepts of inorganic and organometallic chemistry including those related to synthesis, reaction chemistry, and structure and bonding.	U	4, 6, 11, 17, 22	11
CO 2	Explain stability of organometallic compounds and clusters, and their application as industrial catalysts.	A	3, 15	3
CO 3	Recognize and explain the interaction of different metal ions with biological ligands.	U	1, 2, 7, 8, 9, 12, 13, 14, 16, 19	18
CO 4	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications.	U	5, 20	6

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;