

Reg. No .....

Name .....

22P326

**M. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022**

**SEMESTER 3 : CHEMISTRY**

**COURSE : 21P3CHET09 : INORGANIC CHEMISTRY III**

*(For Regular - 2021 Admission)*

Duration : Three Hours

Max. Weights: 30

**PART A**

**Answer any 8 questions**

**Weight: 1**

1. How does magnetic nanoparticle can be used for data storage application? (An)
2. Explain the term photovoltaic effect. (U)
3. What is Josephson's tunneling? (U)
4. Demonstrate the structure and bonding in Pentaborane-9. Determine the number of skeletal electron pairs present in this boron cluster. (An, CO 3)
5. What are 1<sup>st</sup> and 2<sup>nd</sup> order phase transitions? Give the thermodynamic quantities which are involved in the expressions. (U, CO 1)
6. What is shake and bake method for the synthesis of solids? Give one example. (U, CO 1)
7. Provide an insight on the higher boron hydrides with suitable examples. (U, CO 3)
8. Explain alkyl ligand exchange method for the synthesis of organometallic polymers based on rigid rod polyynes. (U, CO 3)
9. Give the synthesis of acrylic and methacrylic ferrocene-derived organometallic monomers. (A, CO 3)
10. Illustrate the role of Zeolites as shape selective catalyst. (U, CO 3)  
**(1 x 8 = 8)**

**PART B**

**Answer any 6 questions**

**Weights: 2**

11. Explain the Czochralski method for crystal growth. (U, CO 1)
12. Discuss the difference in energy bands of conductors and nonconductors. (U)
13. Distinguish between piezo and pyro-electric crystals. (An)
14. Write a note on organometallic dendrimers with suitable examples. (U, CO 3)
15. Explain potential types of phosphorus-sulphur cage compounds. How will you synthesis it? (U, CO 3)
16. Explain the synthetic route for the preparation of 2-ferrocenylethyl derived acrylic monomer. (A, CO 3)
17. Explain the Buerger's classification of phase transition with examples. (U, CO 1)
18. Discuss the role of boron clusters as DNA binders for the treatment of cancer. (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. Explain the steps involved in sol-gel method for the preparation of spinel  $MgAl_2O_4$ , silica glass, indium tin oxide and zeolites. (U, CO 4)
21. Describe the principle and working of solid-state lasers and solar cells. (U, CO 2)
22. Write an account on the various techniques involved in the growth of a single crystal with suitable examples. (A, 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	5, 6, 11, 17, 22	11
CO 2	Explain stability of organometallic compounds and clusters, and their application as industrial catalysts.	A	21	5
CO 3	Recognize and explain the interaction of different metal ions with biological ligands.	U	4, 7, 8, 9, 10, 14, 15, 16, 19	16
CO 4	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications.	U	20	5

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