Reg. No ..... Name **23P309**

M. Sc. DEGREE END SEMESTER EXAMINATION : NOVEMBER 2023

SEMESTER 3 : CHEMISTRY

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

(For Regular - 2022 Admission and Supplementary - 2021 Admission)

Duration : Three Hours Max. Weights: 30

PART A

Answer any 8 questions **Weight: 1**

1.	What are 1st and 2nd order phase transitons? Give the thermodynamic quanties which are involved in the expressions.	(U, CO 1)
2.	What is the main difficulty encountered in synthesis sodium beta alumina and how can it be overcomed?	(A, CO 1)
3.	What is a metalloid cluster? Give an example for gallium metalloid cluster.	(R, CO 3)
4.	What is inverse piezoelectricity?	(U)
5.	What are cooper pairs?	(U, CO 2)
6.	Write a short note on organometallic dendrimers.	(U, CO 3)
7.	Explain the dehydrohalogenation method for the synthesis of organometallic polymers based on rigid rod polyynes.	(U, CO 3)
8.	Write down the general formula for 1:6 and 1:12 heteropoly anions. Give one example each.	(U, CO 3)
9.	Define epitaxy and topotaxy. Explain how it is significant in preparation techniques.	(U, CO 4)
10.	Discuss briefly the major classes of carboranes. Mention the preparation method involved in each type of carboranes?	(U, CO 3)

(1 x 8 = 8)

PART B

Answer any 6 questions **Weights: 2**

11.	Explain the ring opening polymerisation for the synthesis of [2] ferroceno-phanes having -CH2-CH2 bridges	(A, CO 3)
12.	What are pervoskites? Comment on its magnetic properties.	(U)
13.	Summarize the molecular clusters formed by germanium, tin and lead elements.	(R, CO 3)
14.	Write a note on polymers based on ferrocene. List its important applications.	(U, CO 3)
15.	How does band theory be applicable to MgO?	(A)
16.	Explain briefly the associated properties of C2B10 cages necessitates for drug design application.	(U, CO 3)
17.	Explain how the free energy change vary during the growth of product nuclei in solid state transformation	(A, CO 1)
18.	Explain the principle of sol-gel technique for synthesis of solids. How SiO2 is synthesised by sol- gel method?	(A, CO 1)

(2 x 6 = 12)

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

19. Give an account of different optical properties with special emphasis on phosphors, solid-state lasers, and solar cells. (U)

20. Explain in detail the different types of diffusion mechanisms in solids (A, CO 1)

21. Explain the significant applications of magnetic nanoparticles in data storage and magnetic resonance imaging in detail. (U, CO 4)

22. List some of the homocyclic and heterocyclic inorganic ring systems of Sulphur, Selenium, and Phosphorus. Explain their synthesis, structure and uses (U, CO 3)

(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	1, 2, 17, 18, 20	11
CO 2	Explain stability of organometallic compounds and clusters, and their application as industrial catalysts.	A	5	1
CO 3	Recognize and explain the interaction of different metal ions with biological ligands.	U	3, 6, 7, 8, 10, 11, 13, 14, 16, 22	18
CO 4	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications.	U	9, 21	6

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