

Reg. No.:



Name:

University of Kerala

W7789

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

CHEMISTRY

UK1DSCCHE100 - INORGANIC CHEMISTRY I

Academic Level: 100-199

2025-Admission

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

**Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark
Each.Answer all questions**

Qn No.	Question	CL	CO
1	Two strands of a DNA molecule are held together by bonds.	RE	2
2	Identify the orbital for the quantum number $n=3, l=1$.	RE	1
3	Give an example each for sp^3 and sp^3d hybridized molecules.	UN	2
4	Name the rule which explains the extra stability of half-filled and completely filled orbitals.	UN	1
5	Give two examples for biodegradable polymers.	UN	3
6	Identify the number of significant digits/figures in the numbers: 0.046 and 7.4220.	UN	4

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	Compare primary standard and secondary standard.	UN	4
8	An industrial wastewater treatment plant is using reverse osmosis to remove dissolved salts. What is the principle behind this method, and how does it work?	UN	3
9	Identify the hybridization of carbons and give the structures of ethene and ethyne.	AP	2
10	Calculate the wavelength associated with a bullet of mass 1g travelling with a velocity of $3 \times 10^4 \text{ cms}^{-1}$. ($h = 6.62 \times 10^{-27} \text{ ergs}$).	AP	1

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) An atom contains an electron with the following quantum numbers: $n = 4, l = 2, m_l = -1, m_s = +\frac{1}{2}$ Based on these quantum numbers: (a) Identify the subshell and orbital in which the electron is present. (b) Write all possible values of m_l for this subshell and draw the orbital diagram. (c) Calculate the total number of orbitals and the maximum number of electrons possible in the subshell. (d) Determine the possible sets of quantum numbers for all electrons in the $n = 4$ shell. OR B) State Slater's rules for calculating the effective nuclear charge. Apply them to calculate the effective nuclear charge for the 4s electron in Mn (Z=25).	AP	1, 1
12	A) Calculate the lattice enthalpy of MgO based on the following data. Illustrate the principle of your calculation. The formation enthalpy of MgO(s) is -602 kJ/mol. Sublimation energy of Mg = $+150$ kJ/mol Ionization energy of Mg $\rightarrow$ $Mg^{2+} = 738 + 1451 = 2189$ kJ/mol Bond dissociation energy of $O_2 = +498$ kJ/mol (per mole of O_2) First electron affinity of O = -141 kJ/mol Second electron affinity of O = $+844$ kJ/mol OR B) Analyse how the VSEPR theory accounts for the different molecular geometries of SF_6, PCl_5, and H_2O. In your analysis, explain how variations in the number of bond pairs and lone pairs around the central atom influence the final three-dimensional shapes of these molecules.	AN	2, 2
13	A) Critically evaluate any three environmental movements in India highlighting its relevance and outcomes. OR B)	EV	3, 3

Qn No.	Question	CL	CO
	Analyze the relationship between greenhouse effect and global warming, and discuss the strategies to reduce greenhouse gas emissions.		
14	A) Design a comprehensive experimental procedure to determine the unknown concentration of hydrochloric acid solution using sodium carbonate. Justify the selection of indicators, describe the preparation of the standard solution, and discuss how accuracy, precision, and significant figures are maintained throughout the process. OR B) Design a suitable volumetric experiment for finding the hardness of water.	CR	4, 4