

Reg. No.:



Name:

University of Kerala

W7790

First Semester FYUGP Degree Examination, December 2025

Discipline Specific Core Course

CHEMISTRY

UK1DSCCHE101 - FUNDAMENTALS OF 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	The quantum numbers $n=4$ and $l=3$ corresponds to.....	RE	1
2	The rule governing the covalent character in an ionic bond is known as	RE	2
3	Identify the indicator preferred for the titration of a strong acid against a weak base.	UN	4
4	Give the electronic configuration of chromium.	UN	1
5	Predict the value of ΔG for a spontaneous process.	UN	3
6	Identify the shape of the ammonia molecule.	UN	2

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	Differentiate between intermolecular and intramolecular hydrogen bonding with examples.	UN	2
8	Mole fraction is a dimensionless quantity . why? How does it help in expressing the composition of a mixture?	UN	4
9	Between Mg and Al, identify the element with the higher first ionisation energy and provide justification.	AP	1
10	The enthalpy of neutralisation between a strong acid and a strong base remains constant. Verify the statement.	AP	3

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) Apply Hund's rule to show the electronic configuration of nitrogen and oxygen atom. Explain the reasons for extra stability of half filled and completely filled orbitals. OR B) An electron has the quantum numbers: $n = 3$, $l = 2$, $m = -1$, $s = +\frac{1}{2}$ Using this information: (a) Identify the subshell and orbital (b) State the number of orbitals and the shape of this orbital. (c) Using Pauli's Exclusion Principle, explain whether another electron can occupy the same orbital and with what spin?	AP	1, 1
12	A) Illustrate the Born-Haber cycle for the formation of sodium chloride and examine how each step contributes to the overall lattice energy. OR B) Comment on the hybridization of water and beryllium chloride. Analyze the bond angle and geometry.	AN	2, 2
13	A) Evaluate that the heat capacity at constant pressure C_p is greater than the heat capacity at constant volume C_v. OR B) a) Calculate the standard enthalpy of formation of CH_3OH from the following data. $\text{CH}_3\text{OH}(\text{l}) + 2 \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{l})$ ($\Delta H = -726 \text{ kJmol}^{-1}$) $\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$ ($\Delta H = -393 \text{ kJmol}^{-1}$) $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l})$ ($\Delta H = -286 \text{ kJmol}^{-1}$) (3 marks) b) Evaluate the significance of Gibb's-Helmholtz equation (4 marks)	EV	3, 3
14	A) Write the difference between a hazard and a risk and prepare risk assessment chart for physical and chemical hazards and their preventive measures.	CR	4, 4

Qn No.	Question	CL	CO
	OR B) Design a method to standardize NaOH solution using HCl, specifying the indicator to be used and the theory behind the choice of indicator.		