



Reg. No.:

Name:

W7989

University of Kerala
First Semester FYUGP Degree Examination, December 2025
Discipline Specific Core Course
CHEMISTRY
UK1DSCCHE101 FUNDAMENTALS OF CHEMISTRY I
Academic Level: 100-199
2024 Admission

Time: 1 Hour 30 Minutes

Max. Marks: 42

Part A.
6 Marks. Time: 6 Minutes
Objective Type. 1 Mark Each. Answer All Questions
(Cognitive Level: Remember/Understand)

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	The diagonally adjacent element to Be that exhibits similar properties is	Remember	CO-1
2.	Which one among the molecules has zero dipole moment: NO ₂ , SO ₂ , CO ₂ .	Remember	CO-2,3
3.	The value of free energy change at equilibrium is	Understand	CO-4
4.	What is the pH range at the equivalence point of a weak acid-strong base titration?	Understand	CO-5,6
5.	Which ion is isoelectronic with fluoride ion: Li ⁺ , Cl ⁻ , Ca ²⁺ , O ²⁻	Understand	CO-1
6.	How many lone pairs and bond pairs in XeF ₄	Understand	CO-2,3

Part B.
8 Marks. Time: 24 Minutes
Short Answer. 2 Marks Each. Answer All Questions
(Cognitive Level: Understand/Apply)

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	Give the set of quantum numbers for the valence electron of copper (Z=29)	Understand	CO-1
8.	Give the order of stability and bond length in O ₂ , O ₂ ²⁺ and O ₂ ²⁻	Understand	CO-2,3
9.	Explain Bond Haber cycle with an application?	Apply	CO-4
10.	How many g/mL of NaCl are contained in 0.25 M solution? Given MW of NaCl =58.44	Apply	CO-5,6

Part C.
28 Marks. Time: 60 Minutes
Long Answer. 7 marks each.
Answer all 4 Questions, choosing among options within each question.
(Cognitive Level: Understand/Apply/Analyze)

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
11.	a. Discuss the rule for filling of electrons in atomic orbitals? OR b. i. How do the fundamental concepts of periodicity in the periodic table assist in predicting the chemical behavior and properties of elements? (3 marks) ii. Discuss these concepts with relevant examples to explain their significance? (4 marks)	Understand	CO-1
12.	a. Compare the molecular orbitals in HF and CO, focusing on the differences in their hybridization and bond characteristics. OR b. Apply the concept of hybridization in predicting geometries of molecules. Explain in detail the hybridization of sp^2, sp^3, dsp^2 with examples.	Apply	CO-2,3
13.	a. Derive an equation that relates enthalpy change of a reaction with temperature. (4 marks) The heat of reaction $N_2 + 3H_2 \rightarrow 2NH_3$ at $27^\circ C$ was found to be -21.976 kcal. What will be the heat of reaction at $50^\circ C$. the molar heat capacities at constant pressure and at $27^\circ C$ for nitrogen, hydrogen and ammonia are 6.8, 6.77 and $8.86 \text{ cal mol}^{-1} \text{ degree}^{-1}$. (3 marks) OR b. i. Analyse the thermodynamic conditions for the feasibility of a process. (4 marks) ii. Enthalpy and entropy changes of a reaction are $40.63 \text{ kJ mol}^{-1}$ and $108.8 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively. Predict the feasibility of the reaction at $27^\circ C$. (3 marks)	Apply	CO-4
14.	a. Analyze the role of common ion effect and solubility product in intergroup separation of cations. OR b. i. Comment on the safety measures that should be adopted in a chemistry lab. (3 marks) ii. How would you select indicator for $NaOH \times HCl$ and $H_2C_2O_4 \times NaOH$ titrations (4 marks)	Analyze	CO-5,6