

Reg. No.:



Name:

University of Kerala

U9128

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

POLYMER CHEMISTRY**UK2DSCPOC103 - BASICS OF PHYSICAL CHEMISTRY-II**

Academic Level: 100-199

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	State the Clausius statement of the Second Law of Thermodynamics.	RE	3
2	_____ is used to visualize the colloidal particle.	RE	4
3	What do you mean by first order reaction?	UN	1
4	State Hardy-Schulz rule.	UN	4
5	How does Helmholtz free energy relate to work done in a system?	UN	3
6	What is the effect of adding a non-volatile solute to a solvent on its boiling point?	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	Distiguish between hypertonic and hypotonic solutions.	UN	2
8	How will you determine order of a reaction using graphical method?	UN	1
9	A gas expands reversibly and isothermally at 300 K, absorbing 500 J of heat. Calculate the entropy change of the system.	AP	3
10	How is coagulation applied in water treatment processes to purify colloidal impurities?	AP	4

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) (a) Derive van't hoff equation for osmotic pressure of dilute solutions. (b) Calculate the osmotic pressure of 0.001 M solution of sucrose at 25°C. OR B) A pharmaceutical company wants to determine the molar mass of a new drug using the Beckmann method.(a) Explain the principle behind the Beckmann method and why it is suitable for molar mass determination.(b) Explain the experimental procedure for measuring the freezing point depression using this method.	AP	2, 2
12	A) Describe how a colloidal solution can be purified. Explain how this method works. OR B)	AN	4, 4

Qn No.	Question	CL	CO
	Describe the differences between a true solution, a colloid, and a suspension. Include particle size, visibility, and separation methods.		
13	A) Evaluate the significance of Carnot cycle and Carnot theorem in determining the maximum efficiency of heat engines. OR B) Evaluate the significance of Gibbs and Helmholtz free energies in determining thermodynamic equilibrium and spontaneity. Derive the Gibbs-Helmholtz equation and discuss how Gibbs free energy changes depend on temperature, and pressure	EV	3, 3
14	A) Explain the concept of activation energy and its role in chemical reactions. Using Arrhenius equation describe how a small increase in temperature can lead to a significant increase in the rate of reaction. OR B) A reaction $A+B \rightarrow C$ follows the rate law: $\text{Rate}=k [A]^2[B]^1$ (a) Determine the overall order of the reaction. (b) If the concentration of A is doubled while B remains constant, by what factor will the reaction rate change? (c) If the concentration of B is tripled while A remains constant, by what factor will the reaction rate change?	CR	1, 1