

No.:



W6790

Name:

University of Kerala

Third Semester FYUGP Degree Examination, November 2025

Discipline Specific Core Course

CHEMISTRY

UK3DSCCHE201 - ESSENTIALS OF PHYSICAL CHEMISTRY

Academic Level: 200-299

2024 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	Define molarity.	RE	4
2	Give one example of an acidic buffer	RE	1
3	Give two examples for secondary reference electrodes.	UN	2
4	Write Henderson-Hasselbalch equation.	UN	1
5	Give an account of autocatalysis and give examples.	UN	3
6	Write the equation for Osmotic Pressure	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	Explain azeotropes with one example	UN	4
8	Describe why hard-hard interactions are generally ionic and soft-soft interactions are covalent?	UN	1
9	A galvanic cell is constructed using Zn/Zn^{2+} and Cu/Cu^{2+} electrodes. Predict the direction of electron flow and write the cell reaction.	AP	2
10	A certain dye solution appears blue under white light. Interpret using the Grotthuss-Draper law, whether red light or blue light would be more effective in initiating a photochemical reaction in the solution.	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	
11	A) Discuss the applications in controlling pH in real-life systems with examples of acetic acid – sodium acetate and ammonium hydroxide – ammonium chloride OR B) Illustrate the relation between K_p, K_x and K_c.	AP	1, 1
12	A) Compare and analyse the conductance vs volume curves for (a) strong acid-strong base (b) weak acid -strong base, (c) weak acid-strong base. Explain the role of ionic mobility and concentration in shaping the curves OR B) a) With the help of a neat, labelled diagram, analyse the working principle of the H_2-O_2 fuel cell. b) Compare the advantages and limitations of Hydrocarbon-O_2 fuel cells over H_2-O_2 fuel cells in terms of fuel availability, environmental impact, and efficiency	AN	2, 2
13	A) Evaluate the effectiveness of the Michaelis–Menten model in describing enzyme-catalyzed reactions. Under what conditions might this model fail to accurately predict reaction rates? OR B) Photochemical reaction between H_2 and Cl_2 is an example of high quantum yield. Justify	EV	3, 3
14	A) Develop a laboratory procedure to determine the molecular mass of an unknown solute using the colligative property of freezing point depression. OR B) Predict how different types of impurities influence the critical solution temperature (CST) of phenol-water system.	CR	4, 4