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Daffodil International University

Department of Nutrition and Food Engineering
Faculty of Health and Life Sciences
B.Sc. in Nutrition and Food Engineering
Final Examination Fall 2025

Course Code: 0531-1103
Level and Term: L-1, T-1
Time: 2 hours
Section: 253 All
Course Title: Physical, Inorganic and Analytical Chemistry
Course Teacher Initials: DNU, DAMR, DZI
Total Marks: 40

Splitting any answer is strictly prohibited

				Marks
1	(a)	What are the Lewis acid and Bases? Give example for each of them.	[CLO3,PLO1,C1]	2
	(b)	What is pH of a solution? Determine the relationship between pH and pOH.	[CLO3,PLO1,C2]	3
	(c)	What is pH scale? If a solution has a pH of 5.50 at 25°C, calculate its $[OH^-]$?	[CLO3,PLO1,C3]	3
2	(a)	What is buffer solution? Explain the mechanism of an acid buffer with an example.	[CLO3,PLO1,C2]	2
	(b)	The K_a of propionic acid is 1.34×10^{-5}. What is the pH of a solution containing 0.5 M propionic acid, C_2H_5COOH, and 0.5 sodium propionate, C_2H_5COONa. What happens to the pH of this solution when volume is doubled by the addition of water?	[CLO3,PLO1,C3]	3
	(c)	The value of K_p at 25°C for the reaction $2NO(g) + Cl_2(g) \rightleftharpoons 2NOCl(g)$ is 1.9×10^3 atm^{-1}. Calculate the value of K_c at the same temperature.	[CLO3,PLO1,C3]	3
3	(a)	Briefly explain the Equilibrium constant expression or Equilibrium law.	[CLO3,PLO1,C1]	2
	(b)	At equilibrium for the reaction, $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ the concentrations of reactants and products at 727°C were found to be : $SO_2 = 0.27$ mol L^{-1}; $O_2 = 0.40$ mol L^{-1}; and $SO_3 = 0.33$ mol L^{-1}. What is the value of the equilibrium constant, K_c, at this temperature?	[CLO3,PLO1,C3]	3
	(c)	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + 22.4$ Kcal/mol Write down the effect of the following stresses of the above reaction: for (i) Concentration, (ii) Pressure, and (iii)Temperature.	[CLO3,PLO1,C4]	3
4	(a)	What is reaction rate? Express the rate of reaction giving an example.	[CLO4,PLO1,C2]	2
	(b)	Prove that, $x = k_0 t$ for zero order reaction.	[CLO4,PLO1,C4]	3
	(c)	The half-life of a substance in a first order reaction is 15 minutes. Calculate the rate constant.	[CLO4,PLO1,C3]	3
5	(a)	Write down the comparison of Lyophilic sols and Lyophobic sols?	[CLO4,PLO1,C1]	2
	(b)	What are gels? Classify it with examples. Mention the properties of the gels.	[CLO4,PLO1,C2]	3
	(c)	Name the types of colloids with examples for each of them.	[CLO4,PLO1,C1]	3