



**Daffodil International University**  
**Department of Electrical and Electronic Engineering**  
**Faculty of Engineering**  
**Final Examination, Spring – 2025**

Course Code: 0531-111  
Section: A, B, C, D, E  
Full Marks: 40

Course Title: Chemistry  
Level-Term: L1-T1  
Exam Date: June 26, 2025

Teacher's Initial: AAA  
Time: 2 Hours

**[Answer All the Questions, you must maintain the order while answering]**

- Q1.** (a) Define Exothermic & Endothermic reactions with example. CO-1 [2+2+4=8]  
(b) Describe Chemical Equilibrium with graphical presentation. (C1)  
(c)  $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3 + 45.2\text{Kcal}$   
Highlight the effect of changing temperature and pressure of the above reaction at equilibrium.
- Q2.** (a) What is the difference between Molarity & Molality? CO-2 [2+4+2=8]  
(b) Determine the pH and pOH for the following entities. (C1)  
0.5%  $\text{Na}_2\text{CO}_3$ , 0.2%  $\text{CH}_3\text{COOH}$ .  
(c) What is the molarity of a solution prepared by dissolving 75.5 g of pure KOH in 660ml of solution?
- Q3.** (a) Differentiate between Homogeneous Mixture & Heterogeneous Mixture. CO-2 [2]  
(b) Calculate the mole fraction of HCl in a solution of Hydrochloric acid in water containing 23.5% HCl by weight. CO-2 [3+3=6]  
(c) Calculate the molality of a solution prepared by dissolving 10g of Toluene ( $\text{C}_6\text{H}_5\text{CH}_3$ ) in 250g of Benzene ( $\text{C}_6\text{H}_6$ ). (C3)
- Q4.** (a) What are Acids and Bases according to Bronsted-Lowry theory? Write down its limitations. CO-2 [2+3+3=8]  
(b) What is a buffer solution? Write down the process of calculating pH of a basic buffer with Henderson's Hasselbalch Equation. (C1)  
(c) What is the pH of a buffer 0.35 moles ethanoic acid and 0.400 moles acetate ion and the total volume is 3.5L when you add 0.125 moles HCl? [K<sub>a</sub> =  $1.75 \times 10^{-5}$ ]



Q5. (a) What are alcohols? Categorize about the classification of alcohols?

CO-3  
(C4)

[2]

(b) How would you prepare toluene and phenol? Illustrate the reactions.

[3+3=6]

(c) Illustrate the mechanisms of  $S_N1$  and  $S_N2$  reactions.

Or

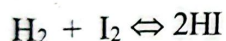
(a) Outline the Common Ion effect.

CO-3  
(C4)

[2+3+3=8]

(b) Establish the relation between  $K_p$  &  $K_c$  with the help of the law of mass action.

(c) At a certain temperature 0.1 mole of  $H_2$  and 0.1 mole of  $I_2$  were placed in a one litre flask. The purple color of Iodine vapour was used to monitor the reaction. After a time, the equilibrium,



Was established and it was found that the concentration of  $I_2$  decreased to

0.025 mole/L. Estimate the value of  $K_c$  for the reaction.