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# Daffodil International University

## Department of Electrical and Electronic Engineering

## Faculty of Engineering

## Final Examination, Fall – 2025

Course Code: 0531-111 | Course Title: Chemistry
Section: A, B, C, D, E, F, G, H | Level-Term: L1-T1 | Teacher's Initial: AAA, SRA
Full Marks: 40 | Exam Date: December 22, 2025 | Time: 2 Hours

**[Answer Any 5 Questions, you must maintain the order while answering]**

**Q1.** **Define** Exothermic & Endothermic reactions with example. **CO-1 C(1)** **[2+6]**
**Describe** the effect of changing temperature and pressure at equilibrium for the following reaction.

$$N_2 + 3\,H_2 \Rightarrow 2\,NH_3 \quad \Delta H = -98\ KJ$$

**Q2.** **What** is the difference between Molarity & Molality? **CO-1 C(1)** **[2+2+4]**
**What** is the mole fraction of HCl in a solution of Hydrochloric acid in water containing 12% HCl by weight?
**Determine** the pH of a buffer composed of 0.1M acetic acid ($CH_3COOH$) and 0.6M acetate ($CH_3COO$-) knowing that the acid dissociation constant Ka is $1.8 \times 10^{-5}$.

**Q3.** **Differentiate** between Homogeneous Mixture & Heterogeneous Mixture. **CO-2 C(2)** **[3+3+2]**
**Calculate** the molality of a solution prepared by dissolving 10g of Toluene ($C_6H_5CH_3$) in 250g of Benzene ($C_6H_6$).
**Calculate** the mass percentage of glucose in a solution prepared by dissolving 10g of glucose into 100g of water.

**Q4.** **What** are Acids and Bases according to Arhenious theory? **Write** down its limitations. **CO-2 C(1)** **[3+3+2]**
**Determine** the pH and pOH for the following entities.
0.5% $H_2SO_4$, 0.2% $CH_3COOH$.
**Describe** why $Ca(OH)_2$ is weaker base than KOH.

**Q5.** **Establish** the relation between Kp & Kc with the help of the law of mass action. **CO-3 C(4)** **[4+4]**
Some nitrogen and hydrogen gases are pumped into an empty five-litre glass bulb at 500°C. When equilibrium is established, 3.00 moles of $N_2$, 2.10 moles of $H_2$ and 0.298 mole of $NH_3$ are found to be present.

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**Estimate** the value of Kc for the reaction.

**Q6.** **Explain** hydrocarbons with examples. **CO-3** **[1+3+4]**
**Illustrate** the preparation of toluene by Friedel- Craft alkylation. **C(4)**
**Illustrate** the mechanism of $S_N1$ reaction.

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