

Overlap

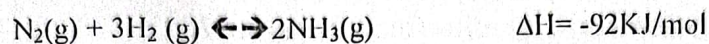
University of Information Technology & Sciences (UITS)
Faculty of Science and Engineering
Department of CSE
Term Final Examination, Autumn-2023
Course Title: Chemistry
Course Code: CHEM- 175
Set: B

Marks: 50

Time: 3 Hours

Answer any five (05) out of the following six (06) questions. Assume necessary data/values if missing

1. (a) "Bronsted-Lowry concept is superior to Arrhenius concept" explain this statement with proper example. 5
(b) If a solution has a pH of 5.50 at 25°C, calculate its $[\text{OH}^-]$. 5
2. (a) Derived Henderson-Hasselbalch equation for an acidic buffer system. 5
(b) A chemist needs a buffered solution of propanoic acid, $\text{CH}_3\text{CH}_2\text{COOH}$, and its salt, $\text{CH}_3\text{CH}_2\text{COONa}$. Calculate the ratio $[\text{CH}_3\text{CH}_2\text{COOH}]/[\text{CH}_3\text{CH}_2\text{COONa}]$ required to yield a pH of 4.30. K_a for propanoic acid is 1.3×10^{-5} . 5
3. (a) Derive the rate equation for the second order rate equation. Show that: Half-life is independent of initial concentration for first order reaction. 5
(b) A certain first order chemical reaction required 120 seconds for the concentration of the reactant to drop from 2.00 M to 1.00 M. Find the rate constant and the concentration of reactant after 80 seconds. 5
4. (a) Discuss the effect of temperature and pressure on various gaseous equilibrium according to Le-Chatelier's principle, 5



4.00 mol HI was placed in a 5.00 L vessel at 458°C, the equilibrium mixture was found to contain 0.442 mol I_2 . What is the value of K_c ?

Calculate the molar concentrations, and put them into the equilibrium expression to find its value.

5. (a) Why does sodium chloride solution conduct electricity not sugar solution? 5

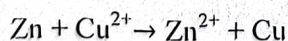
An Olympic sized swimming pool contains 2,500,000 L of water. If 1 tsp of salt (NaCl) is dissolved in the pool, what is the concentration in ppm?

- (b) Balance the reaction in acidic medium: $\text{FeSO}_4 + \text{KMnO}_4 + \text{H}_2\text{SO}_4 \longrightarrow ?$ 5

6. (a) A voltaic cell is formed from a piece of iron in a solution of $\text{Fe}(\text{NO}_3)_2$ and silver in a solution of AgNO_3 . Which is the cathode, and which is the anode? Why? 5

- (b) When a copper strip is dipped into a solution of zinc sulfate solution what would be happened? 5

Calculate the standard cell potential for the following reaction:



Given: $E^\circ(\text{Zn}^{2+}/\text{Zn}) = -0.76 \text{ V}$ and $E^\circ(\text{Cu}/\text{Cu}^{2+}) = -0.34 \text{ V}$