

International Islamic University Chittagong
Department of Electrical and Electronic Engineering
B. Sc. Engineering in EEE
Semester End Examination, Spring 2023

Course Code: CHEM 2301

Time: 2 hours 30 minutes

Course Title: Chemistry

Full Marks: 50

- (i) The figures in the right-hand margin indicate full marks
(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs), Program Outcomes (POs) and Bloom's Levels (BL) of the Questions			
CO	CO Statements	PO	BL
CO1	Developing the basic knowledge of different chemicals.	POa	C1
CO2	Understanding of the chemical behavior, physical properties of the common substances.	POa	C2
CO3	Demonstrate the basic proficiency to solve the chemical problems and discussing the interactions between matter and energy at the atomic and molecular levels.	POb	C3

Bloom's Levels (BL) of the Questions						
Letter Symbols	C1	C2	C3	C4	C5	C6
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

- 1) a) What is transport number? In 0.1M HCl(aq) and 0.1M NH₄OH(aq) solution, explain the effect of equivalent conductance with the change of concentration or dilution. CO1, CO2 C1, C6 1+4 =5
- 1) b) In a solution of 15g H₂SO₄ in 500 ml, two electrodes are placed between 1.X cm apart and having an area of each X.0 sq cm offered a resistance of 2X ohms. Calculate the equivalent conductance. [Given, X = Summation of last two digits of your metric id] CO3 C5 5
- OR**
- 1) a) Explain the following terms with example : CO1, CO2 C1, C6 5
i) Transport Number, ii) Molar Conductance and iii) Ionic Mobility
- 1) b) If 1 ampere current passing for 1 second, how many amount of substance is deposited in Electrolytic dissociation process? CO3 C5 5
- 2) a) Define the following terms: mole fraction, molality, normality, ppm and ppt. CO1 C2 5
- 2) b) Exhibit the electrolysis process in a cell with example. CO2 C4 5

Part B

- 3) a) What is free energy change? Derive a thermodynamic relation between standard free energy change and equilibrium constant of a reaction at a given temperature. CO1 C2 5
- 3) b) What is Le-Chatelier principle? Using Law of mass action develop an expression for the equilibrium constant K_c and K_p of the following reaction and also finds the relationship between K_p & K_c. N₂(g) + 3 H₂(g) ⇌ 2 NH₃(g); ΔH = - 92 KJ CO2 C1, C4 5

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|-----------|---|-------------|--------|-----------|
| 4) a) | What do you mean by 'Reaction rate', 'Rate law' and Order of reaction? Calculate the first order reaction. | CO1 | C2,C3 | 5 |
| 4) b) | For the first order reaction the half-life period is 30 minutes. What is the time taken for 75% completion of the reaction? | CO3 | C5 | 5 |
| 5) a) | Write the lyophilic, lyophobic and emulsion solution and explain it with your opinion. | CO1,
CO2 | C1, C4 | 5 |
| 5) b) | How do you remove ions from solution using dialysis and electro-dialysis? | CO2 | C3 | 5 |
| OR | | | | |
| 5) a) | What is sorption? Deduce Freundlich adsorption isotherm. | CO1,
CO2 | C1, C4 | 1+4
=5 |
| 5) b) | Give the significance of Langmuir's adsorption isotherm. | CO2 | C3 | 5 |