

University of Barishal

Department of Computer Science and Engineering

1st Year 1st Semester B.Sc. (Hons) Final Examination, Admission Session: 2021-2022

Course Code: CHEM-1107, Course Title: Chemistry

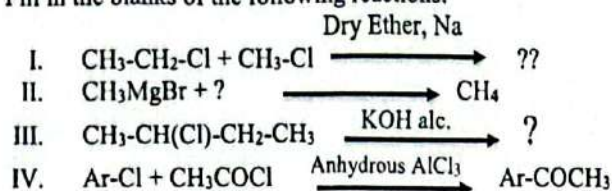
Time: 3 Hours

Full Marks: 60

Answer any five (05) Questions from the followings, parts of the same question should be answered consecutively.

1. (a) State and explain Hund's Multiplicity Principle of electron configuration. 3
(b) Write down the four quantum number values (n, l, m, s) for the 25th electron of Cu. 2
(c) What is dual behavior of Electron. Demonstrate the drawbacks of Rutherford's Atomic Model. 3
(d) Calculate the shortest and longest wavelengths in the hydrogen spectrum of the Lyman series. 4
2. (a) Why group 18 Elements are inert in nature? Write down the application of He, Ar and Ne. 4
(b) State modern periodic law. Write down the electronic configuration and predict the position (group no. and period no.) for the following elements: Ca (20), Fe (26) and S (16) 4
(c) Define Electron affinity and Electronegativity of Elements. Why Electron affinity of Chlorine (Cl) is greater than fluorine (F). 4
3. (a) Explain Coordination bond with suitable example. 2
(b) Draw the structure and mention the hybridization of central atom of the following compound. PCl_5 , $\text{CH}_2=\text{CH}_2$, XeF_4 and NH_4^+ 4
(c) What is Covalent character of ionic compound. Explain with suitable example. 3
(d) Predict the shape of Silane (SiH_4) Phosphine (PH_3) and Hydrogen Sulfide (H_2S) according to VSEPR theory. 3
4. (a) Define Buffer capacity and buffer solution. 2
(b) Explain intermolecular hydrogen bonding and intramolecular hydrogen bonding with appropriate example. 4
(c) " NH_3 is Lewis as well as Bronsted Lowrey's base but not Arrhenius base", explain it. 3
(d) Calculate the concentration of H^+ ions in a solution having pOH value 9. 3

- 5 (a) Define attacking reagents in organic reactions and classify attacking reagents according to mode of action with proper example. 4
- (b) Illustrate the mechanism of Friedel Craft Alkylation reaction. 4
- (c) Fill in the blanks of the following reactions: 4



6. (a) State law of mass action. Establish a relationship between K_p and K_c . 4
- (b) Derive the equation of K_p for the following reaction: 4



- (c) What is critical temperature? At 27°C and 1 atm pressure N_2O_4 is 20% dissociated in the NO_2 . Calculate the value of K_p under this condition. 4

7. (a) What is Rate of reaction? Differentiate between order and molecularity of a reaction. 4
- (b) What is rate law? Show that for first order reactions the half-life period is independent of the initial concentration. 4
- (c) Define pseudo-order reaction. From the following data for the decomposition of N_2O_5 in CCl_4 solution at 48°C , show that the reaction is of the first order 4

$t(\text{mts})$	10	15	20	∞
Vol. of O_2 evolved	6.30	8.95	11.40	34.75

8. Write shorts notes: Any four 4X3=12

- Nitration of benzene
- Chlorination of methane
- SN_1 reaction
- Aldol reactions
- Reimer-Tiemann reaction