



‘সমানো মন্ত্র: সমিতি: সমানী’

UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 3rd Semester Examination, 2022

GE2-P1-CHEMISTRY

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

Use separate answer scripts for SECTION-A and SECTION-B

SECTION-A

PHYSICAL CHEMISTRY [Marks-22]

GROUP-A

1. Answer any *two* questions from the following: 1×2 = 2
- (a) Molar ionic conductivities of a bivalent electrolyte are 57 and 73. The molar conductivity of the solution will be:
- (i) $130 \text{ S cm}^2 \text{ mol}^{-1}$ (ii) $65 \text{ S cm}^2 \text{ mol}^{-1}$
(iii) $1875 \text{ S cm}^2 \text{ mol}^{-1}$ (iv) $10 \text{ S cm}^2 \text{ mol}^{-1}$
- (b) What is the critical temperature of CO_2 ?
- (c) The emf measurement can be used to determine:
- (i) Solubilities of Sparingly soluble salts
(ii) Ionic product of water
(iii) End point in the potentiometric titrations
(iv) All the above

GROUP-B

2. Answer any *two* questions from the following: 5×2 = 10
- (a) Derive the relation between ionic conductance and transport number. 5
- (b) (i) What do you mean by congruent and incongruent melting point? 2+3
(ii) Vapour pressure of water at 90°C is 530 mm. What will be the vapour pressure of water at 100°C if the average Latent heat is 540 cal/g in between temperature range of 90°C to 100°C .
- (c) Explain the terms with suitable examples: 2½+2½
- (i) Degree of Freedom
(ii) Number of Phases.

GROUP-C

3. Answer any **one** question from the following: 10×1 = 10
- (a) (i) State and explain Raoult's Law. 3+4+3
- (ii) State Kohlrausch's Law of Independent Migration of ions.
- (iii) If $\Lambda_m^0(\text{NaCl}) - \Lambda_m^0(\text{NaNO}_3) = 3.7$ what will be the value of $\Lambda_m^0(\text{LiCl}) - \Lambda_m^0(\text{LiNO}_3)$?
- (b) (i) Derive Clausius-Clapeyron Equation, and write its importance in phase change. 5+5
- (ii) Write a note on Potentiometric Titration with example and graphical representation of Acid-Base Neutralization.

SECTION-B

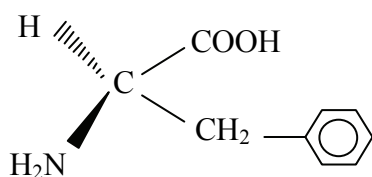
ORGANIC CHEMISTRY [Marks-18]

GROUP-A

4. Answer any **three** questions from the following: 1×3 = 3
- (a) Why are aryl diazonium ions more stable than alkyl diazonium ions?
- (b) How is isoelectric point calculated from pKa values of an amino acid?
- (c) Draw the structure of sucrose.
- (d) Why 4-Nitrobenzoic acid has a lower pKa value than benzoic acid?
- (e) What is the simplest α -amino acid? Is it optically active?

GROUP-B

5. Answer any **one** from the following: 5×1 = 5
- (a) (i) O-hydroxybenzoic acid is a stronger acid than O-methoxybenzoic acid — Explain. 2
- (ii) The rates of base catalyzed hydrolysis of acylchlorides are usually higher than those of alkylchlorides — Justify. 2
- (iii) Assign D or L: 1



- (b) (i) How can $\text{CH}_3\ddot{\text{N}}\text{H}_2$, $(\text{CH}_3)_2\ddot{\text{N}}\text{H}$ and $(\text{CH}_3)_3\ddot{\text{N}}$ be distinguished by a chemical test? 2

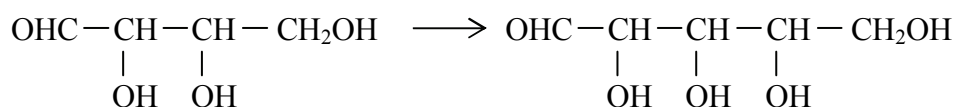
- (ii) What is the full form of 'B_{AC}2'? Show the steps involved in B_{AC}2 mechanism during the base catalyzed hydrolysis of ethylacetate. 1+2

GROUP-C

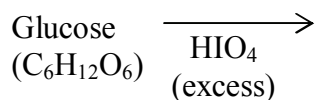
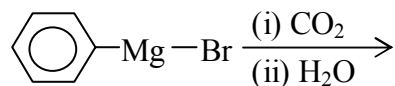
6. Answer any **one** from the following: 10×1 = 10

- (a) (i) How phenylalanine can be synthesized using Strecker's process? 2

- (ii) Convert: 2+2



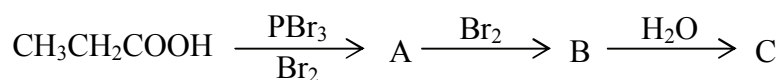
- (iii) Predict the products: 2+2



- (b) (i) How Edman's degradation is used to find out the N-terminal amino acid residue in a peptide? Explain. 3

- (ii) How would be the order of basicity of $\text{CH}_3\ddot{\text{N}}\text{H}_2$ $(\text{H}_3\text{C})_2\ddot{\text{N}}\text{H}$ $(\text{H}_3\text{C})_3\ddot{\text{N}}$ in gaseous phase and in aqueous solution? Why? 1+2

- (iii) Identify the products formed (A → C): 3



- (iv) What happens when sucrose is treated with Tollen's reagent? 1

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