UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2020

GE3-CHEMISTRY

Full Marks: 40

ASSIGNMENT

The figures in the margin indicate full marks.

Take *two* Questions From Each Section

SECTION-A

PHYSICAL CHEMISTRY

Answer any *two* questions from the following 10×2=20

1. (a) What are the number of components, phases and degrees of freedom in the following equilibrium system? 3

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$$

(b) Give the labelled phase diagram of Water System and discuss the importance of various points and lines. 4

(c) Define congruent and incongruent melting points and give examples. 3

2. (a) What are Ideal and Non-Ideal solutions? 2

(b) Draw Vapour-Pressure composition diagram for Ideal solution and explain it. 2

(c) Mention two Azeotropic solutions having maximum and minimum boiling points with diagram. 3

(d) What is Nernst Distribution Law? Give its applications. 1+2

3. (a) Define Equivalent Conductance and Molar Conductance. 2+2

(b) How does the Equivalent Conductance of a strong electrolyte and weak electrolyte vary with dilution? 3

(c) The specific conductance of a weak acid of 0.02(N) is $3.13\times10^{-4}\Omega^{-1}cm^{-1}$. What will be its equivalent conductance at infinite dilution if its degree of dissociation is 0.045? 3

4. (a) Derive Nernst Equation for measuring EMF of a cell. 4

(b) The standard reduction potentials of $Ag^+ | Ag$ and $Fe^{3+} | Fe^{2+}$ are 0.799 and 0.771 V respectively. Calculate the equilibrium constant of the reaction: 3

$$Ag + Fe^{3+} \rightarrow Fe^{2+} + Ag^+$$

(c) Describe the Standard Hydrogen Electrode. 3

SECTION-B

ORGANIC

Answer any *two* questions from the following 10×2 =20

1. (a) Discuss the mechanism of acidic hydrolysis of esters. $2\frac{1}{2}$

   (b) Why is acetyl chloride more reactive than acetamide? 2

   (c) How can you differentiate primary, secondary and tertiary amines by the Hinsberg Test. 3

   (d) Write a short note on the Reformatsky reaction. $2\frac{1}{2}$

2. (a) Carry out the following conversions: 2+2 = 4

   (i) Aniline → Azobenzene

   (ii) Nitrobenzene → m-Bromophenol

   (b) Give the mechanism of Hoffmann's Bromamide reaction. 2

   (c) Complete the following reactions. 4

   (i) $CH_3CH_2COOH \xrightarrow{Br_2/P}$

   (ii) $2CH_3COOC_2H_5 \xrightarrow[H^{\oplus}]{C_2H_5ONa}$

   (iii)  $+ H_3CCOCl \xrightarrow{\text{Anhy. } AlCl_3}$

   (iv)  $CH_2CHO + NH_3 \rightarrow$

3. (a) Why is sucrose known as Invert Sugar? 2

   (b) Draw the chair conformation of α-D(+)-glucose and β-D(+)-glucose. Which is more stable and why? 1+2=3

   (c) Complete the reaction: 2

   $$\text{Glucose} \xrightarrow{5HIO_4} A + B$$

   (d) Establish the open chain structure of fructose. 3

4. (a) Describe the Gabriel Phthalimide synthesis of amino acids. $2\frac{1}{2}$

   (b) Write short notes on— 2+2 = 4

   (i) Primary structure of protein

   (ii) Ninhydrin test.

   (c) Describe Edman's degradation method for identification of N-terminal amino acid. $2\frac{1}{2}$

   (d) What are peptides? 1

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