15·12·18 (M)

[This question paper contains 7 printed pages]

Your Roll No. : ....

Sl. No. of Q. Paper : 216   I

Unique Paper Code : 42174304

Name of the Course : **B.Sc.(Prog.)**

Name of the Paper : Chemistry-2 (Solution, conductance, Electrochemistry and Functional Group)

Semester : III

Time : 3 Hours   *Maximum Marks : 75*

Instructions for Candidates :

  (a) Write your Roll No. on the top immediately on receipt of this question paper.

  (b) Use separate answer sheets for **Section - A** and **Section - B**.

  (c) Both sections carry equal marks.

  (d) Attempt **six** questions in **all, three** questions from each Section.

 (e) Log tables can be used for calculations.

P.T.O.

Section – A

Note : Attempt **THREE** questions in all. Question No. **1** is compulsory.

1. (a) The resistance of 0.01N NaCl solution at 25°C is 200 Ω. Cell constant of conductivity cell is unity. Calculate the equivalent conductivity. 2.5

   (b) Plot the graph for conductometric titration between strong acid and strong base. Explain it also. 2.5

   (c) Give Nernst equation for Calomel electrode. 2.5

   (d) Define components and phase of system. 2

   (e) What is minimum boiling azeotrope ? 2

   (f) Define ionic mobility and transport number. 2

2. (a) Calculate the E_{red} of the following electrode. 4

   Pt/Cl_2 (1.5 atm)/ $2Cl^-$ (0.01M)
   $E°Cl_2 /2 Cl^- = 1.36$ V

   (b) How will you calculate the pH of unknown solution using Hydrogen electrode ? 4

   (c) Calculate the equilibrium constant for a reaction. 4

   Ni (s) + Cu^{2+} (aq) $\rightarrow$ Cu(s) + Ni^{2+} (aq)
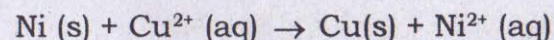
   Given, $E°Ni^{2+}/Ni = -0.25$ V

   $E°Cu^{2+}/Cu = +0.34$ V

3. (a) Determine the solubility product of sparingly soluble salt using conductometric measurements. 4

   (b) Explain Hittorf method to calculate transport number. 4

   (c) Given the following molar conductivities at 25°C 4

   HCl=426 Ω^{-1} cm^2 mol^{-1}

   NaCl=126 Ω^{-1} cm^2 mol^{-1}

   NaC(Sodium Crotonate)=83 Ω^{-1} cm^2 mol^{-1}

   Calculate the degree of dissociation and dissociation constant of crotonic acid.

   The conductivity of 0.001 mol dm^{-3} acid solution in 3.83×10^{-5} Ω^{-1} cm^{-1}.

4. Write short note on any **three** :

4, 4, 4

   (a) Gibb's Phase Rule

   (b) Ideal and Non-Ideal solution

   (c) Steam distillation

   (d) Critical Solution Temperature (CST) and effect of impurity on CST.

Section - B

Note : Attempt **THREE** questions in **all**. Question No. **1** is compulsory.

5. (i) Give the preparation of glycine using Streckers synthesis. 2

   (ii) Giving suitable explanation, arrange the following in increasing order of their reactivity with phenol :

   acetyl chloride, acetamide, methyl acetate

   2

   (iii) What is meant by isoelectric point with reference to amino acids ? 2

   (iv) How will you distinguish between ethyl amine and aniline using HNO_2? Give the chemistry involved. 2.5

   (v) What are polysaccharides ? What is the structural difference between starch and cellulose ? 2.5

   (vi) A tetrapeptide on partial hydrolysis gave following dipeptides. Determine the structure and name of the tetrapeptide by overlapping method. 2.5

   Ala–Gly + Gly–Val + Leu–Ala

6. (i) What happens when methyl α -D- glycoside is oxidized with periodic acid and the resultant compound is treated with bromine water, followed by hydrolysis with dilute acids ? What conclusion is drawn from these reactions regarding structure of D-(+) glucose. 4

   (ii) What is mutarotation ? Explain taking the example of D-(+)glucose. 4

   (iii) How can D-aldopentose be converted into D-aldohexose ? Give name of reaction involved. 4

7. (i) Explain the method used for determining the N & C-terminal amino acid present in a peptide.   4

(ii) Synthesize dipeptide ala-val by using t-BOC & DCC. Give the name and structure of protecting & activating groups.   4

(iii) Explain the formation of violet colour when amino acid reacts with ninhydrin.

    4

8. (i) Convert :   2.5, 1.5

  (a) Phenylacetic acid to benzylamine

  (b) Aniline into p-bromoanilne

(ii) An aliphatic amine with molecular formula C_2H_5N exists in 2 isomeric forms 'A' and 'B'. When warmed with chloroform and KOH only 'A' reacts producing a foul smell. What are the structure and name of 'A' and 'B' ? Write name of reaction and chemical equation involved in it. Also predict which would behave as stronger base- 'A' or 'B' ?   4

(iii) Give a brief description, reaction and example of any **one** of the following :   4

  (a) Perkin condensation

  (b) Claisen condensation