(i) Printed Pages: 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0352

Exam. Code : 0004

B.A./B.Sc. (General) 4th Semester

1048

CHEMISTRY (Same for B.Sc. Microbial & Food Technology)

Paper : XV Physical Chemistry-B

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :— Attempt **five** questions in all, **one** question from each unit and the compulsory question. Compulsory question carries **6** marks and other **four** questions carry **4** marks each.

UNIT—I

1. (a) Discuss the salient features of the phase diagram of lead-silver system and explain desilverization of lead on the basis of this phase diagram.

   (b) Compare the melting point curve of Ice and solid CO_2. 2,2

2. (a) What do you mean by critical solution temperature ? Explain a system which has both upper CST as well as lower CST.

   (b) Apply Nernst Law to the association of solute in immiscible liquids. 2,2

UNIT—II

3. (a) State Kohlrausch's law. How can it be used to calculate (i) Ionic Product of Water, (ii) Solubility of a sparingly soluble salt.

   (b) The equivalent conductance of NH_4Cl at a certain dilution is 149.7 $ohm^{-1}cm^2$ and the ionic conductance of OH^- and Cl^- ions are 198 and 76.3 $ohm^{-1}cm^2$ respectively. Calculate the equivalent conductance of NH_4OH at this dilution. 2,2

4. (a) Briefly describe Hittorf's method for the determination of transport number of Ag^+ and NO_3^- in $AgNO_3$ solution when (a) electrodes of Platinum are used

   (b) electrodes of silver are used.

   (b) The equivalent conductance of 0.01 N solution of acetic acid at 298 K is 5.32 mhos cm^2 $equiv^{-1}$. The ionic conductances of H^+ and CH_3COO^- ions are 349.8 and 40.9 mhos cm^2 $equiv^{-1}$ respectively. Calculate the dissociation constant of acetic acid at 298 K. 2,2

UNIT—III

5. (a) Describe the construction and working of (i) Hydrogen electrode, (ii) Calomel electrode.

(b) The standard EMF of the cell Ni | Ni^{2+} || Cu^{2+} | Cu is 0.59 volt. The standard electrode potential (reduction potential) of copper electrode is 0.34 volt. Calculate the standard electrode potential of nickel electrode. 2,2

6. (a) What do you understand by Reversible Electrodes ? Briefly explain the different types giving at least one example each.

(b) Calculate the equilibrium constant at 25°C for the reaction $Zn(s) + Cu^{2+}(1M) \rightleftharpoons Cu(s) + Zn^{2+}(1M)$. E° for the cell is 1.10 V. 2,2

UNIT—IV

7. (a) Derive expression for the liquid-junction potential. How can it be minimized or eliminated ?

(b) Discuss the application of hydrogen overvoltage in the dissolution and corrosion of metals. 2,2

8. (a) Derive an expression for the EMF of a cell with transference taking the example as :

$$H_2\ (1\ atm)\ |\ HCl\ (a_1)\ \vdots\ HCl(a_2)\ |\ H_2\ (1\ atm).$$

(b) Draw a labelled titration curve for the potentiometric titration of an aqueous solution of HCl with an aqueous solution of NaOH. 2,2

UNIT—V

(Compulsory Question)

9. (a) What is the difference between eutectic point and cryohydric point ?

(b) Why Ostwald's dilution law is not applicable to strong electrolytes ?

(c) How the transport number of ions changes when the temperature is increased ?

(d) What is quinhydrone ?

(e) Give the differences between a galvanic cell and an electrolytic cell.

(f) Give the basic difference between (i) concentration polarization and (ii) overvoltage. 1×6