

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

(ii) Questions : 9 Sub. Code : 

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Exam. Code : 

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B.A./B.Sc. (General) 4<sup>th</sup> Semester  
(2055)

**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, selecting *one* question each from Units I-IV. Question No. 9 (Unit-V) is compulsory.

**UNIT—I**

1. (a) Draw labelled phase diagram of Mg-Zn system. Indicate clearly the eutectic points and congruent melting point on the diagram. 2

(b) Define Distribution Law. Discuss its application to establish the formation of complex ion  $I_3^-$  according to the following equilibrium :



2. (a) Draw the lead-silver phase diagram and illustrate the principle of 'Pattinson's Process' for enrichment of silver. 2

(b) Explain Critical solution temperature and discuss a system with upper CST. 2

## UNIT—II

3. (a) A solution of  $\text{AgNO}_3$  was electrolysed with silver electrodes. Before electrolysis, 25 g of the solution contained 0.00265 g of Ag while after electrolysis 25 g of anodic solution contained 0.004294 g of silver. During the time of electrolysis 0.003210 g of silver were deposited in the silver voltameter. Calculate the transport number of  $\text{Ag}^+$  and  $\text{NO}_3^-$  ions. 3
- (b) Why Ostwald's dilution law is not applicable to strong electrolytes ? 1
4. (a) Briefly explain 'moving boundary method' for determination of transport numbers of  $\text{K}^+$  and  $\text{Cl}^-$  in KCl solution. 2
- (b) Write Debye-Huckel-Onsager equation in complete form. What do different symbols signify ? 1
- (c) Define Kohlrausch's law of independent migration of ions in terms of molar conductivity as well in terms of equivalent conductivity. 1

## UNIT—III

5. (a) Describe the use of calomel electrode as a reference electrode for determination of electrode potential of any electrode. 2

(b) The standard EMF of the cell  $\text{Ni}|\text{Ni}^{2+} \parallel \text{Cu}^{2+}|\text{C}$  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

6. (a) Explain how feasibility of a reaction can be predicted from the measurement of E.M.F. of the cell. 2

(b) What is Nernst equation ? Describe its utility. 2

#### UNIT—IV

7. (a) What is 'overvoltage' ? How is it different from concentration polarization ? Why is it reported at a definite current density ? 2

(b) Calculate the free energy change of the following cell at 25°C :



Standard EMF of the cell is 0.014 volt. 2

8. (a) Briefly explain the terms :

(i) Decomposition potential, and

(ii) Discharge potential. 2

(b) Derive the relationship between activity of the electrolyte with molality of the solution and mean activity coefficient of the ions. 2



## UNIT—V

9. (a) Why specific conductance decreases with dilution ?
- (b) Why transport number of  $\text{Cl}^-$  in an aqueous solution of  $\text{HCl}$  and  $\text{NaCl}$  is different ?
- (c) How can the liquid junction potential be eliminated ?
- (d) What is Quinhydrone ? What are the reactions occurring on the quinhydrone electrode ?
- (e) What are the advantages of potentiometric titrations ?
- (f) How many number of phases and components are present in the following systems ?
- (i) A mixture of molten Lead, Tin and Bismuth.
- (ii) Two ice cubes floating on water in a closed container in the presence of water vapour.  $6 \times 1 = 6$