

Roll No.

Exam Code : D-24

Subject Code—62384

B. Sc. EXAMINATION

(Main/Re-appear)

(Batch 2020 Onwards)

(Third Semester)

CHEMISTRY-PHYSICAL CHEMISTRY-II

CCL-304

(Solutions, Phase Equilibrium, Conductance
and Electrochemistry)

(Course-V)

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) The vapour pressure of ethyl alcohol at 298 K is 40 mm of Hg. Its mole fraction in a solution with methyl alcohol is 0.80. What is its vapour pressure in solution if the mixture obeys Raoult's law ?
- (b) What are Azeotropes ?
- (c) Calculate the number of components and degree of freedom for an aqueous solution of NaCl.
- (d) What is the difference between thaw point and melting point ?
- (e) What are buffer solutions ? How their pH is calculated ?
- (f) Write a short note on Conductivity Water.
- (g) Define Electrode potential.
- (h) Explain why an electrochemical cell stops working after sometime. $2 \times 8 = 16$

Unit I

2. (a) Explain Raoult's law of solutions for ideal and non-ideal solutions. Draw vapour pressure composition diagrams and corresponding boiling point-composition diagrams for different types of non-ideal solutions. 12
- (b) Calculate the boiling point of an aqueous solution containing 18 g glucose in 100 g of water. Molal elevation constant of water is $0.52 \text{ K kg mol}^{-1}$. The boiling point of pure water is 373 K. 4
3. (a) Derive thermodynamically an expression relating the freezing point depression of a solution with the molality of the dissolved solute. 8

(b) Explain the principle underlying the process of steam distillation. 4

(c) Write a short note on Critical Solution Temperature. 4

Unit II

4. (a) Draw and Explain the phase diagram of Sulphur System. 8

(b) Explain the following : 2,2,2,2

(i) Congruent melting point

(ii) Reduced phase rule

(iii) Component

(iv) Transition point

5. (a) Derive and give importance of Clausius-Clapeyron equation. 8

(b) Draw lead silver phase diagram and explain Pattisons process for desilverisation of lead. 8

Unit III

6. (a) Explain Specific Conductivity and Molar Conductivity and also explain their variation with dilution. 8

(b) The specific conductance of a saturated solution of silver bromide is $2.44 \times 10^{-7} \text{ S cm}^{-1}$. The equivalent conductance at infinite dilution of silver bromide is $140.3 \times 10^{-7} \text{ S cm}^{-1}$. calculate the solubility of silver bromide. The conductivity of water used for solution is $1.21 \times 10^{-7} \text{ S cm}^{-1}$. 8

7. (a) State and explain Kohlrauschs law. How it can be applied to determine : 8

(i) Ionic product of water

(ii) Solubility of sparingly soluble salt ?

(b) Explain of the following : 8

(i) Principle of conductometric titration

(ii) Transport number

(iii) Hydolysis constant

(iv) Ionic product of water.

Unit IV

8. (a) Derive Nernst equation for measuring the EMF of a cell and its application in calculation of equilibrium constant. 12

(b) Define potentiometric titration. Explain the principle of potentiometric titrations. 4

9. (a) Derive an expression for Emf of electrode concentration cells without transference. 8

(b) How Quinhydrone electrode is used to determine the pH of solution ?

Explain

8