Reg. No ..... Name **26U663**

B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2026

SEMESTER 6 : CHEMISTRY

COURSE : **19U6CRCHE12 - PHYSICAL CHEMISTRY - IV**

(For Regular 2023 Admission and Supplementary 2022/ 2021/2020/2019 Admissions)

Time : Three Hours Max. Marks: 60

PART A

Answer All (1 mark each)

1. Define liquid junction potential of a cell.
2. The H_3O^+ concentration of pure water at 90°C is 10^{-6} mol/ L. What is the ionic product of water at this temperature?
3. What is the advantage of measuring pH of the solution using glass electrode?
4. Calculate the degree of ionization of NH_4 OH in 0.02 M solution. Given: the ionization constant of NH_4OH is 1.8 x 10^{-5} mol L^{-1} at 25°C.
5. What do you mean by osmotic pressure?
6. Calculate the ionic strength of 0.01 M sulphuric acid solution.
7. What is ionic mobility and its SI unit?
8. The vapour pressure of a dilute aqueous solution of glucose is 740 mm of mercury at 373 K. The mole fraction of the solute is

(1 x 8 = 8)

PART B

Answer any 6 (2 marks each)

9. What are the types of electrolyte concentration cells?
10. Explain Debye-Falkenhagen effect.
11. The solubility product of AgBr is 3.3 x 10^{-13} at 298 K. What is its solubility?
12. What is meant by degree of dissociation of an electrolyte? If the molar conductance at infinite dilution for an electrolyte is 400 S cm^2 mol^{-1} and the molar conductance of a 0.01 M solution of it at the same temperature is 102 S cm^2 mol^{-1}, calculate its degree of dissociation in 0.01 M solution.
13. Calculate the osmotic pressure of a solution containing 6 g of urea and 9 g of glucose in one litre solution at 27^0C.
14. At 298 K, the conductivity of pure water is 5.51 x 10^{-8} ohm^{-1} cm^{-1}. The ionic conductance of H^+ and OH^- ions at the same temperature are 349.8 S cm^2 $mol^{-1}$and 198.5 S cm^2 mol^{-1} respectively. Calculate the ionic product of water.
15. State the difference between a gas electrode and a redox electrode.
16. What is meant by buffer action? Give the Henderson's equation for an acidic buffer.

(2 x 6 = 12)

PART C

Answer any 4 (5 marks each)

17. Elaborate on the principle and procedure behind desalination of sea water.
18. How do you determine solubility product of sparingly soluble salt using emf measurements.

19. At 25°C, the resistance of 0.01 M KCI solution taken in conductivity cell is 525 ohms and its conductivity is 1.401 $x10^{-3}$ ohm^{-1} cm^{-1}. The resistance of 0.1 M NH_4OH, when taken in the same cell, was found to be 2030 ohms at 25°C. Calculate the degree of dissociation of NH_4OH in this dilution. $\lambda_m{}^0(NH_4OH)$ 384 ohm^{-1} cm^2 mol^{-1}

20. Discuss the application of the principles of common ion effect and solubility product in inorganic qualitative analysis.

21. How pH of solution can be determined using hydrogen electrode?

22. With the help of Temperature-Composition Diagram explain the separation of hexane and pentane from its liquid mixture.

(5 x 4 = 20)

PART D

Answer any 2 (10 marks each)

23. What is a reference electrode? Explain the various types of reference electrodes?

24. Describe the fractional distillation of any two types of completely miscible liquid mixtures.

25. What are acid-base indicators? Explain the action of phenolphthalein as an acid base indicator on the basis of Ostwald's theory.

26. Explain the application of conductance measurements based on conductometric titrations.

(10 x 2 = 20)