

Bachelor of Science (B.Sc.-III) Fifth Semester
B.Sc. 3511 - CHEMISTRY PAPER-II (Physical Chemistry)

P. Pages : 2

Time : Three Hours



GUG/W/18/1331

Max. Marks : 50

Notes :

1. a) State and explain Kohlrausch's law. 5
Discuss application of Kohlrausch's law in determining
i) Solubility of sparingly soluble salt. ii) λ_{∞} of weak electrolyte.
- b) What is transport number? Describe moving boundary method of determination of transport number of ions. 5
- OR**
- c) Discuss asymmetry effect of strong electrolytes. 2½
- d) What are postulates of Arrhenius theory of electrolyte dissociation? Give any two limitation of it? 2½
- e) Derive relationship between ionic conductance and transport number of ions. 2½
- f) Explain variation of conductance in titration of 2½
i) Strong acid & strong base ii) AgNO_3 and KCl .
2. a) What is electrochemical cell? Give the construction and working of Galvanic cell. 5
- b) What are the concentration cell? Derive an expression for emf of electrolyte concentration cell without transference? 5
- OR**
- c) The emf of cell $\text{Cd}|\text{CdCl}_2||\text{AgCl}|\text{Ag}$ is 0 – 675V at 25°C. Calculate free energy change of cell. 2½
- d) Derive relation between equilibrium constant and emf of cell. 2½
- e) Explain the construction and working of hydrogen gas electrode. 2½
- f) What is liquid function potential? How it is eliminated? 2½
3. a) What are the limitation of classical mechanics? 5
Explain
i) Black body radiation ii) Photoelectric effect.
- b) Derive Schrodinger wave equation from the postulate of quantum mechanics. 5
- OR**
- c) What are the postulates of Bohr theory of atom? Calculate wavelength of first Balmer line in hydrogen spectrum (Rydberg constant $R_H = 1.1 \times 10^7 \text{ m}^{-1}$). 2½
- d) State Heisenberg's uncertainty principle calculate minimum uncertainty in velocity of a particle of mass $1.1 \times 10^{-27} \text{ kg}$ if uncertainty in position is $3 \times 10^{-12} \text{ m}$. 2½

- e) Calculate normalization constant of Schrodinger wave equation for particle in one dimensional box. 2½
- f) What do you understand by orthogonal and normalized wave function? 2½
4. a) What is colligative property? What is mean by elevation in boiling point? Derive the relation between molecular weight of the solute and elevation in boiling point of solution. 5
- b) What are the different types of magnetic behaviours shown by substance and explain each briefly. 5
- OR**
- c) Calculate freezing point of a solution containing 0.52gm of glucose is 80.2gm of water. (for water $k_f = 1.86Kkg / mole$) 2½
- d) How the osmotic pressure measure by Berkeley and Hartley method? 2½
- e) How the magnetic susceptibility of a substance can be used to decide the structure of coordination compound and structure confirmation? 2½
- f) Describe Gouy method for determination of magnetic susceptibility? 2½
5. Attempt **any ten**. **1x10**
=10
- i) Define
- a) Equivalent conductance. b) Molar conductance.
- ii) What is electrophoretic effect?
- iii) Write different factor's affecting on transport number of ion?
- iv) What is electrolytic cell?
- v) What is Potentiometric titration?
- vi) What is reference electrode?
- vii) What are the condition of well behaved wave function?
- viii) What is zero point energy?
- ix) Give any two limitation of Bohr's theory?
- x) Define
- a) Mole fraction. b) Molality.
- ix) State Raoult's law for lowering of vapour pressure.
- xiii) Calculate magnetic moment of a molecule having four unpaired electron.
