Bachelor of Science (B.Sc.-III) Fifth Semester

B.Sc. 3511 - CHEMISTRY PAPER-II (Physical Chemistry)

P. Pages : 2 **GUG/W/18/1331**

Time : Three Hours * 1 0 4 4 * 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 KCI.

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 $cd|CdCl_2||Agcl|Ag$ is 0 – 675V at 25ºC. 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 $R_H = 1.1x10^7 m^{-1}$). **2½**

d) State Heisenberg's uncertainty principle calculate minimum uncertainty in velocity of a particle of mass $1.1x10^{-27} kg$ if uncertainty in position is $3x10^{-12} m$. **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. $\left(\text{for water } k_f = 1.86 Kkg/mole\right)$ **2½**

d) How the osmatic 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.

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