

B.Sc. - III (New CBCS Pattern) Sem-V
USCCHT10 - Chemistry Paper-II : Physical Chemistry

P. Pages : 2

Time : Three Hours



GUG/W/22/13090

Max. Marks : 50

- Notes :
1. All the **five** questions are compulsory and carry equal marks.
 2. Draw diagram and give chemical reaction whenever required.
 3. Use of calculator is permitted.

1. a) Explain the nature of curves obtained in conductometric titration of 5
i) Strong acid-Strong Base ii) Precipitation titration

b) Discuss the electrophoretic effect of strong electrolytes. 5
The resistance of 0.5N solution of an electrolyte is 45Ω . Calculate equivalent conductance if the electrode of the cell are 2.5cm apart and have cross section area 3.8cm^2 .

OR

c) What are the effect of dilution on equivalent conductance and specific conduction of solution? 2½

d) What are the postulate of Arrhenius theory of electrolytic dissociation? Give any two limitation. 2½

e) Write a note on relaxation effect. 2½

f) The specific conduction of saturated solution of AgCl is $1.64 \times 10^{-4} \text{ s/m}$ after subtraction of water. The ionic conduction of Ag^+ and Cl^- are 64.5×10^{-4} and $85.3 \times 10^{-4} \text{ s/m}^2$ respectively. Calculate solubility of AgCl at this temperature. 2½

2. a) What do you mean by Galvanic cell? Explain construction and working of Daniell cell. 5

b) What is transport number? Explain moving boundary method for the determination of transport number. 5

OR

c) What is emf of cell? How it is measure? 2½

d) State and explain Faraday's first law of electrolysis. 2½

e) Derive the relationship between ionic conduction and transport number of ions. 2½

f) Describe an experiment to demonstrate the migration of ions towards the electrode on passing electricity. 2½

3. a) What is the reference electrode? Give the construction and working of calomel electrode. 5

b) What are concentration cell? Derive an expression for the emf of a concentration cell without transference. 5

OR

- c) Explain how the pH of a solution is measured with the help of glass electrode. 2½
- d) Write a short note on liquid junction potential, how it is eliminated? 2½
- e) Explain the construction and working of hydrogen gas electrode. 2½
- f) Derive the Nernst equation for EMF of cell. 2½
4. a) Derive the expression for energy and normalized wave function for a particle in one dimensional box. 5
- b) What is de-Broglie hypothesis? Calculate the wavelength with an electron moving with a velocity 10^{-9} . What are the properties of well behaved function? 5

OR

- c) Explain photoelectric effect. 2½
- d) State the postulate of quantum mechanics. 2½
- e) State Heisenberg's uncertainty principle. Give its physical interpretation. 2½
- f) Write Schrodinger wave equation and explain term involved in it. 2½
5. Attempt **any ten**. 10
- 1) Define Molar conductance.
 - 2) State Kohlrausch's law.
 - 3) What are advantage of conductometric titration?
 - 4) The speed ratio of Ag^+ and NO_3^- ion is 0.95. Calculate the transport number of these ions.
 - 5) What is reversible cell?
 - 6) State any two factors affecting transport number of ions?
 - 7) What is amalgam electrode?
 - 8) What is salt bridge?
 - 9) What is potentiometric titration?
 - 10) State Heisenberg's uncertainty principle.
 - 11) What are the four phenomena which could not be explain on the basis classical mechanic?
 - 12) Define normalized and orthogonal wave function.
