

B.Sc.- III (CBCS Pattern) Semester-V
USCCHT10 - Chemistry Paper-II - Physical Chemistry

P. Pages : 2

Time : Three Hours



GUG/W/24/13090

Max. Marks : 50

1. a) What is mean by Conductometric Titrations? How it can be used in 5
i) Strong acid and strong base
ii) Weak acid and strong base.

- b) State and explain Kohlrausch's Law. Discuss application of Kohlrausch's law in 5
determining.
i) Solubility of sparingly soluble salt
ii) λ_{∞} of weak electrolyte

OR

- c) Discuss asymmetric effect of strong electrolyte. 2½
d) Equivalent conductance of CH_3COONa , HCl and NaCl are 91×10^{-4} , 426.16×10^{-4} and 2½
 125.45×10^{-4} , $5\text{m}^2 \text{equi}^{-1}$. respectively. Calculate equivalent conductance of CH_3COOH
at infinite dilution.
e) Discuss the precipitation titration conductometrically with suitable example. 2½
f) What are postulates of Arrhenius theory of electrolyte dissociation? Give any two 2½
limitations of it.

2. a) What is electrochemical cell? Give the construction and working of Galvanic cell. 5
b) What is transport number? Discuss moving boundary method for the determination of 5
transport number of ions.

OR

- c) What are the factors affecting transport number? Obtain the relation between transport 2½
number and ionic conductance.
d) Derive the relation between equilibrium constant and emf of cell. 2½
e) Write a note on migration of ions. 2½
f) Explain Faraday's II law of electrolysis. 2½

3. a) Obtain the expression for EMF of concentration cell with transference. 5
b) What are the types of reversible electrodes? Derive Nernst's equation for the EMF of the 5
cell.

OR

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| c) | Discuss the application of EMF measurement in determination of pH of solution by using Hydrogen electrode. | 2½ |
| d) | What are the potentiometric titrations? Explain the acid base titration carried out potentiometrically. | 2½ |
| e) | Define 'Liquid junction potential'. How it can be eliminated? | 2½ |
| f) | Discuss the application of EMF measurement in determination of solubility product of sparingly soluble salt. | 2½ |
| 4. | a) Explain the phenomenon of Black body radiation. Why classical mechanics could not explain this phenomenon? | 5 |
| | b) Derive the expression for energy and normalized wave function for a particle in one dimensional box. | 5 |

OR

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| c) | State the postulates of quantum mechanics. | 2½ |
| d) | Explain Photoelectric effect. | 2½ |
| e) | State Heisenberg's uncertainty principle. Give its physical interpretation. | 2½ |
| f) | Define normalized and orthogonal wave function. What are the properties of well behaved wave function? | 2½ |
| 5. | Solve any ten questions. | |
| a) | What is electrophoretic effect? | 1 |
| b) | Write SI unit of molar conductance and equivalent conductance. | 1 |
| c) | Give the relationship between E.M.F. of cell and ΔH . | 1 |
| d) | What is Galvanic cell? | 1 |
| e) | Write down the cell reaction of the reversible cell $\text{Cd} \text{Cd}^{2+} \text{H}^+ \text{H}_2(\text{g}) \text{Pt}$. | 1 |
| f) | Give electrode reaction of metal insoluble salt anion electrode. | 1 |
| g) | What do you mean by reference electrode? | 1 |
| h) | Give two functions of salt bridge. | 1 |
| i) | Give any two advantages of potentiometric titrations. | 1 |
| j) | What is de-Broglie hypothesis? | 1 |
| k) | Define operator. Write Hamiltonian (Time independent) Operator. | 1 |
| l) | Define heat capacity of solid. | 1 |
