



Date: 03-04-2019  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**PART – A**

Answer **ALL** questions

(10 X 2= 20marks)

1. What is meant by standard electrode potential?
2. Zinc reacts with dil.  $H_2SO_4$  while silver does not. Why?
3. What is Redox titration? Give example.
4. Give any two limitations of  $H_2-O_2$  fuel cells.
5. Define Molar Conductance. Give its unit.
6. Write the mathematical representation of Ostwald's dilution law. State the demerit.
7. Define Transport number.
8. Calculate the ionic strength of 0.25 molal  $K_2SO_4$ .
9. Write any two applications of overvoltage.
10. Define the term concentration polarization.

**PART – B**

Answer any **EIGHT** questions

(8 X 5= 40marks)

11. With a neat diagram, explain the working of Calomel electrode.
12. Enumerate the applications of EMF measurements.
13. The EMF of the concentration cell with transference, viz.,  
 $Pt ; H_2 (1 \text{ atm}), HCl (a_{\pm} = 0.009048) : HCl (a_{\pm} = 0.01751), H_2(1 \text{ atm}) ; Pt$ , is 0.02802 V at  $25^{\circ}C$ . The EMF of the corresponding cell without transference is 0.01696 V. Calculate the liquid junction potential,  $E_l$ .
14. Explain the working of Lead acid Battery.
15. Discuss the Debye-Huckel theory of Mean ionic activity co-efficients.
16. How will you determine the transport number of an ion using Hittorf's method?
17. How will you apply conductance measurement in precipitation titration?
18. What are concentration cells? How do they differ from chemical cells?
19. State Kohlrausch's law. How is it used in calculating the molar ionic conductance at infinite dilution?
20. What is Half-wave potential? Enumerate its significance.
21. The EMF of the cell  $Cd, CdCl_2. 2.5H_2O (\text{saturated}) // AgCl(s), Ag$  is 0.6753 volt at  $25^{\circ}C$  and 0.6915 volt at  $0^{\circ}C$ . Calculate the free energy change (  $G$  ) and enthalpy change (  $H$  ).
22. Draw and explain the conductivity curves for the following (i)  $CH_3COOH$  Vs  $NH_4OH$   
(ii)  $AgNO_3$  Vs  $KCl$ .

**PART – C**

**Answer any FOUR questions:**

**(4 X 10= 40marks)**

23. (i) Explain the construction and working of Standard Hydrogen Electrode.  
(ii) State and explain Ilkovic equation. **(6+4)**
24. (i) How will you determine Liquid Junction Potential?  
(ii) Explain the phenomenon of overvoltage. Give any two factors which affect overvoltage.  
**(5+5)**
25. (i) Derive Nernst equation. Mention its significance.  
(ii) Calculate the molar conductance at infinite dilution of an aqueous solution of NaCl at room temperature. Given that the mobilities of  $\text{Na}^+$  and  $\text{Cl}^-$  ions at this temperature are  $4.26 \times 10^{-8}$  and  $6.80 \times 10^{-8} \text{ V}^{-1}\text{S}^{-1}$  respectively. **(6+4)**
26. (i) Calculate the transport number of  $\text{H}^+$  and  $\text{Cl}^-$  ions from the following data obtained by the moving boundary method using  $\text{CdCl}_2$  as the indicator electrolyte: Concentration of HCl solution = 0.1000N, Mass of Ag deposited = 0.1209 g, Movement of boundary = 7.50 cm, Cross-section of the tube =  $1.24 \text{ cm}^2$   
(ii) Explain the application of polarographic technique in the estimation of inorganic and organic substances. **(5+5)**
27. (i) Illustrate how the solubility of a sparingly soluble salt can be determined with the help of conductance measurements.  
(ii) Explain the principle of potentiometric redox titration. **(5+ 5)**
28. (i) Explain the principle and working of Dropping Mercury electrode.  
(ii) What is decomposition potential? Give its importance. **(6+4)**

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