LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FOURTH SEMESTER – **NOVEMBER 2016**

CH 4504/CH 4502 – ELECTROCHEMISTRY

Date: 04-11-2016   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART – A

Answer ALL questions.   (10 x 2 = 20 marks)

1. What is electromotive series?
2. What is standard hydrogen electrode?
3. What are chemical cells? Give an example.
4. What is liquid junction potential?
5. Calculate the ionic strength of 0.2M NaCl solution.
6. State Faraday's first law of electrolysis.
7. Define molar conductance of a solution.
8. Define activity and activity coefficient of a solution.
9. Define concentration polarisation.
10. What is corrosion?

PART – B

Answer any EIGHT questions.   (8 x 5 = 40 marks)

11. Describe the construction and working of Weston cell.
12. What is meant by standard electrode potential? How could you determine the standard electrode potential of copper electrode?
13. A zinc electrode is placed in 0.1 M solution of zinc sulphate at 25°C. If the degree of dissociation of salt at this concentration is found to be 0.95, calculate the electrode potential of the electrode at 25°C. Given that $E_{Zn,Zn^{2+}}^{0}$ = -0.76 volt.
14. Explain the principle involved in the redox titration by potentiometry.
15. Derive Nernst equation for electrochemical reactions.
16. Explain the principle of Lead storage battery.
17. Discuss the types of conductometric titrations.
18. The speed ratio of silver and nitrate ions in a solution of silver nitrate electrolysed between silver electrodes is 0.916. Find the transport number of the two ions.
19. State Kohlraush's law and give its applications.
20. How the Λ_c of an electrolyte solution can be determined?
21. Explain Debye-Huckel theory of activity coefficients.
22. Explain polarisation and overvoltage.

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PART – C

Answer any FOUR questions. (4 x 10 = 40 marks)

23. Explain the construction and working of
    i) Redox electrode   ii) Calomel electrode. (10)

24. i) Give the construction and working of Gas electrodes. (5)
    ii) Derive an expression for the EMF of a concentration cell with
        transference. (5)

25. Explain any four applications of EMF. (10)

26. i) Discuss the variation of specific conductance with concentrations of
        solution. (5)
    ii) How will you determine the transport number by moving boundary
        method? (5)

27. i) Discuss the Arrhenius theory of electrolytic dissociation. Give its (5)
        limitations.
    ii) Explain electrochemical theory of corrosion. (5)

28. i) Explain the effect of concentration, solvent, dielectric constant and
        temperature on conductance of a solution. (5)
    ii) Calculate the value of mean activity coefficient of 0.2 M $AlCl_3$ solution.
        Given that, A = 0.60. (5)

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