LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2025**

UCH 4501 – ELECTROCHEMISTRY

Date: 24-04-2025 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A

Answer ANY FOUR of the following **(4 x 10 = 40)**

1. (a) Describe the construction and working of Weston cell. (5)
   (b) How is the single electrode potential of copper electrode determined? (5)
2. How will you measure the EMF of an unknown cell potentiometrically?
3. Derive an expression for the EMF of a concentration cell without transference.
4. (a) State and explain the applications of Kohlrausch'slaw. (5)
   (b) Calculate the mean activity coefficient of 0.2 M $AlCl_3$ solution. (5)
5. Discuss the principle underlying the redox titration by potentiometric titrations.
6. Describe electrophoretic effect and asymmetric effect and explain Debye–Huckel-Onsager equation.
7. Explain the determination of transport number by Hittorff's method.
8. (a) Write down the Ilkovic equation and mention the terms in it. (5)
   (b) Explain concentration polarisation. (5)

SECTION B

Answer ANY THREE of the following **(3 x 20 = 60)**

9. (a) Explain the construction and working of primary and secondary reference electrodes. (10)
   (b) Define electrochemical series. Explain any five applications of it. (10)
10. (a) Describe the following electrodes with suitable example and apply Nernst equation. (10)
    (i) Metal-Metal ion electrode (ii) Redox electrode
    (b) Derive Nernst equations for electrochemical reactions. (10)
11. (a) How will you determine pH of a solution using glass and quinhydrone electrodes? (10)
    (b) Discuss the conductometric titrations of the following: (10)
    (i) Strong acid vs strong base (ii) Weak acid vs strong base
12. (a) Explain the determination of transference number by moving boundary method. (10)
    (b) Discuss Debye – Huckel theory of strong electrolytes. (10)
13. (a) Explain the variation of specific and equivalent conductance with concentration. (10)
    (b) Explain Ostwald's dilution law. Mention its demerits. (10)
14. (a) Describe the principle and applications of polarography. (10)
    (b) Explain the electrochemical theory of corrosion. (10)
