

- (c) What are the applications of water splitting? (4)
- (d) What is the importance of the Einstein equation of diffusion? (3)
6. (a) What is galvanic corrosion? (2)
- (b) Explain the mechanism of galvanic corrosion. (2)
- (c) How can galvanic corrosion can be prevented? (2)
- (d) How does hydrogen overvoltage affect the corrosion of metals? (3)
- (e) What do you mean by water splitting? (3)
- (f) What is the role of diffusion in ionic conductivity? (3)

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[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9908 K

Unique Paper Code : 2173540010

Name of the Paper : DSE: Introductory Interfacial
ElectrochemistryName of the Course : B.Sc. (Prog.) Physical
Sciences/Analytical
Chemistry

Semester : VII

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any 4 question.

1. (a) Why is a Calomel electrode considered a secondary reference electrode? (4)
- (b) How does temperature affect the potential of reference electrodes? (4)

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- (c) What is a counter electrode (also called auxiliary electrode) in an electrochemical cell? Explain its function during electrochemical measurements. (2+2)
- (d) Discuss how overpotentials affect the efficiency of electrolytic cells? (3)
2. (a) Explain how electrode current is related to oxidation and reduction rates at the electrode surface? (4)
- (b) Write down the Tafel equation and explain every term. (4)
- (c) Obtain the mathematical expression for the Butler-Volmer equation and explain its significance. (4)
- (d) Describe the method of determining exchange current density using Tafel analysis. (3)
3. (a) What are the limitations of the equilibrium potential? (4)
- (b) What are the advantages of using formal potential over equilibrium potential? (4)

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- (c) Discuss the role of catalysis in the electrode reaction. (4)
- (d) What is exchange current density? (3)
4. (a) What do you mean by the Pilling-Bedworth ratio? (2)
- (b) How do pH and temperature affect the corrosion of metals? (2)
- (c) What is the role of humidity in corrosion? (3)
- (d) What are the hydrogen evolution reaction (HER) and oxygen evolution reaction (HER) in water splitting? (2)
- (e) What is Fick's second law of diffusion? (3)
- (f) What are electric double-layer supercapacitors and pseudocapacitors? (3)
5. (a) What is wet or electrochemical corrosion? Explain the mechanism of wet or electrochemical corrosion. (4)
- (b) What are the factors that affect corrosion? Briefly describe any one factor. (2+2)

P.T.O.