

Ref. No. : Ex/Met/PC/B/T/312/2025

**Name of the Examinations: B.E. METALLURGICAL AND MATERIAL ENGINEERING
THIRD YEAR FIRST SEMESTER - 2025**

Subject: ELECTRO-CHEMISTRY, CORROSION Time: 3hrs. Full Marks: 100

**Instructions: Attempt all the questions answer from each "CO" is mandatory following
given instruction**

CO I: (Answer any five questions from CO I)

1.

- a) Discuss the differences between EMF Series vs. Galvanic series.
- b) Discuss the differences between Exchange current Density and Limiting Current Density.
- c) Define Nerst's Equation and explain its importance in Corrosion.
- d) Explain the function of Saturated Calomel Electrode.
- e) Write short notes on E-PH Diagram of Steel.
- f) Discuss the effect of Oxidizers and Velocity.

CO 2: (Answer any five questions from CO 2)

2.

- a) Discuss the differences between Activation Polarization and Concentration Polarization.
- b) Write short note on Overvoltage.
- c) Discuss about Tafel's Plot and its application.
- d) Discuss about Passivity and Passivity breakdown.
- e) Discuss the mixed potential theory of Corrosion.
- f) Write about the thermodynamic and kinetic factors influencing the rate of Corrosion.

CO 3: (Answer any five questions from CO 3)

3. Distinguish the following:

- i) Crevice Corrosion and Pitting Corrosion
- ii) Hydrogen Embrittlement and Hydrogen Blistering

[Turn over

- iii) Cavitation Damage and Erosion Corrosion
- iv) SCC and Corrosion Fatigue
- v) Cathodic Protection and Anodic Protection
- vi) Vapor Phase Inhibitor and Pickling Inhibitor

CO 4: (Answer any five questions from CO 4)

- 4. a) Write about the basic kinetic laws used for Oxidation of pure metals.
- b) Explain the differences between Aqueous Oxidation and Dry Oxidation.
- c) Discuss the beneficial effects of Corrosion related to Batteries.
- d) Discuss about the Doping of p type and n type metallic Oxides.
- e) Discuss about the different factors affecting Atmospheric Corrosion?
- f) Write short note on Fuel cells.