

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VI Regular Examination May 2011****Subject code: 162105****Subject Name: Electro- metallurgy & corrosion****Date: 23/05/2011****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is an electro-chemical reaction? Explain with example. **07**
 (b) What do you understand by polarization? Explain activation polarization and concentration polarization. **07**

- Q.2** (a) Explain fretting corrosion. Also give its preventive measures. **07**
 (b) Explain the mechanism of crevice corrosion. Also give preventions. **07**

OR

- (b) Explain pitting corrosion with its mechanism. Also give its prevention. **07**

- Q.3** (a) Describe the nature of aluminium oxide film formed on aluminium if the density of aluminium is 2.7 mg/m^3 , and that of Al_2O_3 is around 4 mg/m^3 . Given the molecular weight of $\text{Al}_2\text{O}_3 = 101.96$ and atomic weight of aluminium is 26.981. **07**

- (b) Explain Potential-pH or POURBAIX diagram with the example of iron(Fe) in water. **07**

OR

- Q.3** (a) Explain cathodic protection. What do you understand by stray current effects. **07**

- (b) Zinc corrodes in HCl solution with the evolution of H_2 gas under activation polarization with following polarization data: **07**

	Standard potential	Exchange current density, i_0	Tafel constant
Zinc	-0.763 V	10^{-7} A/cm^2	+0.09
H_2	0.000 V	10^{-7} A/cm^2	-0.08

Calculate the mixed current and corrosion potential.

- Q.4** (a) How can you prevent corrosion considering below terms. **07**

- (i) Design.
- (ii) Alteration in environment.

- (b) Explain electroplating with a suitable example. What do you understand by **07**

- (i) Throwing power of an electrolyte.
- (ii) Current efficiency.

OR

- Q.4** (a) What is coating. Describe its classification. **07**

- (b) What do you understand by dry corrosion. Explain the mechanism of oxidation at high temperature. **07**

- Q.5 (a)** Discuss the various steps involved during any corrosion test. **07**
(b) Discuss the Tafel extrapolation method used to measure corrosion rate. **07**
- OR**
- Q.5 (a)** Discuss linear polarization method to measure corrosion rates. Also its advantages. **07**
(b) What is passivity. Discuss the effect of temperature and acid concentration on active-passive metal dissolution behavior. **07**
