

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014

Subject Code: 162105**Date: 26-05-2014****Subject Name: Electrometallurgy and Corrosion****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)** Define corrosion. Write the various losses due to corrosion? List the various methods to calculate corrosion rate. **02+04**
+01
- (b)** Explain oxidation and reduction reactions with the help of an example. **07**
- Q.2 (a)** Draw POURBAIX diagram for Fe-H₂O system. Write the objectives of Pourbaix diagram. What are its limitations? **03+02**
+02
- (b)** What is polarization? Explain any one type of polarization. **07**
- OR**
- (b)** i. Describe standard hydrogen cell and the reaction involved. **04**
 ii. What is the electrode potential of H₂ electrode at 1 atmospheric pressure and pH = 4? Given R = 8.314 J/mole K°, F = 96500 C, T = 298.13 °K. **03**
- Q.3 (a)** Explain galvanic corrosion. Write its preventions. **04+03**
(b) Explain pitting corrosion with its mechanism. **07**
- OR**
- Q.3 (a)** (i) How crevice corrosion can be minimized? **04**
 (ii) Explain hydrogen blistering. **03**
- (b)** Describe S.C.C? Briefly discuss any two factors affecting S.C.C? **07**
- Q.4 (a)** Illustrate the electro-chemical reactions occurring at high temperature corrosion. **07**
(b) Describe Pilling Bedworth ratio. **07**
- OR**
- Q.4 (a)** Differentiate and compare anodic protection and cathodic protection. **07**
(b) Briefly explain stray currents resulting from cathodic protection of a buried steel tank. **07**
- Q.5 (a)** Briefly explain the effect of various parameters on corrosion rate (ANY TWO) **07**
 i. Temperature ii. Velocity iii. Oxygen and oxidizers
- (b)** i. List the various methods of applying coatings. **02**
 ii. Explain plating of a Cu or Ni by any one electrolytic process. **05**
- OR**
- Q.5 (a)** i. What is the purpose of corrosion testing? **03**
 ii. If the corrosion current for zinc metal dipped in dilute HCl is 10⁻³ A/m³. What is its weight loss per hour? Given, atomic weight of Zn = 65.4, Faraday's constant = 9.65 * 10⁴ **04**
- (b)** Discuss inter-granular corrosion of austenitic stainless steel. **07**
