Seat No.: _____ Enrolment No._____

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-H_2O 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 H_2 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/m^3. What is its weight loss per hour? Given, atomic weight of Zn = 65.4, Faraday's constant = 9.65 * 10^4	**04**
	(b)	Discuss inter-granular corrosion of austenitic stainless steel.	**07**

****