Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER 2013

Subject Code: 162105 Date: 04-12-2013

Subject Name: Electrometallurgy and Corrosion

Time: 02:30 pm to 05:00 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)**	Write Piling-Bedworth ratio. Discuss its importance and applications in corrosion study.	**07**
	(b)	Compare Tafel extrapolation method with linear polarization method for the determination of corrosion rate. State their applications.	**07**
Q.2	**(a)**	Enlist factors affecting corrosion. Discuss the effect of anodic area, pH and velocity on corrosion rate.	**07**
	(b)	With proper examples explain how material selection is helpful to combat corrosion in automobile industries.	**07**
		OR	
	(b)	Discuss principle of Electroplating and explain setup used for it with a neat sketch.	**07**
Q.3	**(a)**	Discuss the Pourbaix diagram for Fe-H_2O system and show that how it is useful in corrosion study.	**07**
	(b)	What is galvanic series? Discuss it's applicability and limitations in corrosion studies. Compare it with e.m.f. series.	**07**
		OR	
Q.3	**(a)**	Discuss about concentration polarization. Differentiate between concentration polarization and activation polarization.	**07**
	(b)	Derive Nernst equation for electrode potential. Mention applications and limitations of Nernst's equation in corrosion study.	**07**
Q.4	**(a)**	Explain mechanism of inter granular corrosion. Describe methods to prevent it in stainless steel.	**07**
	(b)	Discuss causes and mechanism of stress corrosion cracking. Suggest and explain possible remedial measures against it.	**07**
		OR	
Q.4	**(a)**	Discuss causes, mechanism and way of prevention of galvanic corrosion.	**07**
Q.4	**(b)**	What do you understand by pitting corrosion? Explain factors which increase pitting. Describe methods to prevent it.	**07**
Q.5	**(a)**	Discuss the role of sacrificial anode in corrosion protection. Explain sacrificial anode cathodic protection method.	**07**
	(b)	Define Galvanizing. Explain Galvanizing Process. Give advantage and application of Galvanizing.	**07**
		OR	
Q.5	**(a)**	What are inhibitors? With the help of proper examples, differentiate between cathodic and anodic inhibitors.	**07**
	(b)	Calculate the amount of Zn required per square meter to protect underground pipeline in last 4 years for Cathodic protection, if the current density required is 25 mA/square meter. (One mole of Zn has a mass of 0.06537 kg.)	**04**
	(c)	Prior to coating, metal surface needs cleaning. Comment on it.	**03**

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