Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2162108 **Date: 05/05/2017**

Subject Name: Material Degradation and Prevention

Time: 10:30 AM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Give the effect of stray current on corrosion.	
	2	Why is moderate temperature used during electroplating?	
	3	Under what condition throwing power of an electrolyte will be maximum?	
	4	Give applications of anodizing.	
	5	List types of wear.	
	6	List beneficial effect of galvanic corrosion.	
	7	List factors affecting bond strength in thermal spray coating.	
	8	What do you understand by counter electrode?	
	9	Write formula for corrosion rate in mpy.	
	10	Give the formula of wear rate in pin on disc method.	
	11	In which form of corrosion, there is maximum loss of material.	
	12	What do you mean by surface composites?	
	13	Define wear.	
	14	Define vapor deposition.	
Q.2	**(a)**	How to protect soft bearing surfaces against wear?	**03**
	(b)	Discuss the mechanism of Sliding Wear.	**04**
	(c)	Discuss the Plasma spray coating Process. Compare it with thermal spray coating.	**07**
		OR	
	(c)	Define Physical vapor deposition and Explain evaporation technique.	**07**
Q.3	**(a)**	Small anodic area results in intense corrosion. Give reason.	**03**
	(b)	Explain the effect of moisture and atmospheric gases on corrosion rate.	**04**
	(c)	Derive Nernst equation for electrode potential. Mention applications and limitations of Nernst's equation in corrosion study.	**07**
		OR	
Q.3	**(a)**	"Activation polarization is reaction polarization". Justify.	**03**
	(b)	Show how the electrode potential of Hydrogen electrode will vary with pH at one atmospheric pressure.	**04**
	(c)	Discuss the Pourbaix diagram for Fe-H_2O system and show that how it is useful in corrosion study.	**07**

Q.4	**(a)**	List different methods to prevent high temperature corrosion.	**03**
	(b)	What are the effects when Zinc is preferentially removed from brass? How to prevent it.	**04**
	(c)	Why the stainless steel is not exposed in the temperature range of 550^0C to 950^0C. How to protect stainless steel when exposed to above mentioned range of temperature.	**07**

OR

Q.4	**(a)**	Write Piling-Bedworth ratio and its applications.	**03**
	(b)	Write a note on wear resistant materials.	**04**
	(c)	Discuss causes, mechanism and way of prevention of riveted boiler plates.	**07**
Q.5	**(a)**	Write a note on alteration of environment for corrosion prevention.	**03**
	(b)	Differentiate between cathodic and anodic inhibitors.	**04**
	(c)	Justify the role of proper material selection and design aspects in corrosion protection with suitable examples of each.	**07**

OR

Q.5	**(a)**	Explain the need of corrosion testing.	**03**
	(b)	“Prior to coating, metal surface needs cleaning”. Comment.	**04**
	(c)	Discuss the role of sacrificial anode in corrosion protection. Explain sacrificial anode cathodic protection method.	**07**

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