Seat No.:	Enrolment No.

Subject Code:182102

## GUJARAT TECHNOLOGICAL UNIVERSITY

## **BE - SEMESTER-VIII EXAMINATION - WINTER 2015**

Date:04/12/2015

Ti	me: 2 truction 1.	Name: SELECTION OF MATERIALS & FAILURE ANALYSIS 2:30pm to 5:00pm Total Marks: ons: Attempt all questions. Make suitable assumptions wherever necessary.	70
		Figures to the right indicate full marks.	
Q.1	(a) (b)	List the criteria for selection of engineering materials and explain each.  With the help of case studies explain the material selection based on mechanical properties-fatigue and toughness.	07 07
Q.2	(a) (b)	Define creep. Draw creep curve and explain each stage. Which stage is preferred for longer service life? Why? List creep resistance materials. Discuss the relationship between material processing and selection.	07 07
	<b>(b)</b>	OR  How will you select the material for wear resistance application? List wear- resistance materials.	07
Q.3	(a)	What do you understand by surface durability? Explain the effect of corrosion in this context.	07
	<b>(b)</b>	What is stiffness? Discuss the criteria for selection of materials for stiffness.  OR	07
Q.3	(a)	Where materials with high strength-to-weight ratio are required? Discuss selection criteria and list the materials for the same.	07
	<b>(b)</b>	List the properties required for bearings. Discuss the bearing materials.	<b>07</b>
Q.4	(a)	What are the steps to be followed by materials engineer for failure analysis? Justify each step.	07
	<b>(b)</b>	With the help of neat sketch discuss types of failures and their characteristics.  OR	07
Q.4	(a) (b)	Discuss in detail micro and macro features of ductile fracture.  Define fatigue. Draw S-N curve. Discuss stages of fatigue failure. Differentiate between striations and beach marks.	07 07
Q.5	(a)	As a case study discuss failure modes of auto components (like crank pin, gear, crank bolt, etc.).	07
	<b>(b)</b>	Name the failure which takes place due to hydrogen induced cracking in steel. Explain the same.	07
Q.5	(a)	OR What is stress corrosion cracking (SCC)? Discuss mechanism of component-	07
	<b>(b)</b>	failure by SCC.  Discuss failure of the component due to wrong material selection.	07

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