

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII EXAMINATION – SUMMER 2025

Subject Code:3172114

Date:21-05-2025

Subject Name:Failure Analysis

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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Why Failure Analysis? What is the purpose of it?	03
	(b) Enlist the various tools and technique for systematic investigation of failure analysis.	04
	(c) Draw a Ductile and Brittle mode of fracture with its surface characteristics.	07
Q.2	(a) What is chevron marks and cleavage fracture?	03
	(b) Describe the common cause of failure of an engine valve? Discuss the probable mode of failure with neat schematic.	04
	(c) What are the engineering components subjected to creep damage? How grain size is important to this phenomena.	07
	OR	
	(c) Enlist the set of properties required by a gear material. Enlist the materials used for manufacturing of automobile gears.	07
Q.3	(a) Why Stainless Steel material cannot be used for chloride containing service application ?	03
	(b) What is Galvanic Series? How it can be helpful to decide materials for corrosion resistance application?	04
	(c) What is Stress Corrosion? What are the factors responsible for it? Name of the engineering components subjected to stress corrosion cracking phenomena?	07
	OR	
Q.3	(a) Name the type of corrosion that may take place at the interface of two metal flanges bolted together.	03
	(b) Which type of corrosion is expected with two dissimilar metals in contact with each other?	04
	(c) Discuss the Inter granular corrosion (IGC) phenomena with high carbon Stainless Steel welded joints. What are the suggested remedies to be done with the welded structure subjected to IGC?	07
Q.4	(a) What kind of defects can be produced in heat treated components due to faulty quenching practices ?	03
	(b) What is the purpose of Post weld heat treatment? How it can be done?	04
	(c) How hydrogen can cause brittle failure in welded steel structures? What is the mechanism of this type of failure?	07
	OR	

- Q.4** (a) Draw a Stress Versus Nos. of Cycle Curve for Ferrous and Non ferrous metals. **03**
- (b) Can Temperature and Corrosion have effects on fatigue properties of metals? Explain your views. **04**
- (c) What is ductile to brittle transition (DBTT) phenomena? How to assess this behavior? Name the applicable mechanical test. **07**
- Q.5** (a) What is equi-cohesive temperature in Creep Phenomena? **03**
- (b) State the difference between Endurance limit and Fatigue limit. **04**
- (c) What are the various methods to improve the fatigue life of a metallic structure. Discuss the factors affecting the fatigue life. **07**
- OR**
- Q.5** (a) Discuss the visual examination tools used for failure investigation work. **03**
- (b) Define Wear. How it can be minimized. List the suitable techniques to minimize wear of excavator bucket teeth. **04**
- (c) Predict the type of failure in engineering components : **07**
1. Steam pipelines.
 2. Marine Propeller.
 3. Brass material Stove
 4. Automobile Spring
 5. Excavator bucket teeth
 6. Bearing
 7. Airplane wing structures.
