

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3172114

Date: 03/06/2026

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.**

- Q.1**
- (a) Define failure analysis and state its aims. **03**
 - (b) List important factors causing premature failure of metals. **04**
 - (c) Explain use of optical microscopy and SEM in failure analysis. **07**
- Q.2**
- (a) Differentiate between ductile and brittle fracture **03**
 - (b) Write note on fractographic features of fatigue failure. **04**
 - (c) Explain creep failure with example. **07**
- OR
- Q.2**
- (c) Discuss abrasive wear in gears. **07**
- Q.3**
- (a) Define pitting and crevice corrosion. **03**
 - (b) What is stress corrosion cracking? Give its example. **04**
 - (c) Explain hydrogen embrittlement with preventive measures. **07**
- OR
- Q.3**
- (a) What is intergranular corrosion? **03**
 - (b) Explain crevice corrosion with sketch. **04**
 - (c) Write a note on preventive methods of stress corrosion cracking. **07**
- Q.4**
- (a) List common failures due to faulty heat treatment. **03**
 - (b) Explain failure in metal forming processes. **04**
 - (c) Analyze causes of weld joint failures & prevention. **07**
- OR
- Q.4**
- (a) Give reasons of shaft failure after improper heat treatment. **03**
 - (b) Explain fracture due to improper quenching. **04**
 - (c) Write a case study on welding defect leading to structural failure. **07**
- Q.5**
- (a) Write procedural steps of failure investigation of a component. **03**
 - (b) Explain failure analysis of bearings. **04**
 - (c) Write a case study on pressure vessel failure due to corrosion. **07**
- OR
- Q.5**
- (a) Procedure for analyzing failed welded joint. **03**

(b) Give common possible causes for failure of heat exchanger tube. **04**

(c) Write a case study on failure of cast automotive component. **07**
