Seat No.: _____  Enrolment No. 

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII (old) - EXAMINATION – SUMMER 2018**

**Subject Code: 182102 Date:30/04/2018**

**Subject Name: Selection of Materials and Failure Analysis**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Explain the role of material engineer for selection of materials in Design Synthesis. | **07** |
| | **(b)** | What is a failure analysis? What are the basic steps involved in performing a failure analysis? | **07** |
| **Q.2** | **(a)** | Explain how does availability of material& the cost of material affects the selection process ? Give suitable example. | **07** |
| | **(b)** | Define stiffness & explain the criteria for selecting material for stiffness. | **07** |
| | | **OR** | |
| | **(b)** | Discussed the case study of selecting the material based on the mechanical properties of strength, toughness & fatigue. | **07** |
| **Q.3** | **(a)** | Define hydrogen embrittlement of steel. Explain the mechanism of hydrogen induced cracking in the steels. | **07** |
| | **(b)** | Discuss the case study of failure of auto component ( like crank pin , gear, crank bolt, etc.) | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain macro & micro fracture features by drawing neat sketch in the following failures 1. Ductile fracture 2. Brittle fracture. | **07** |
| | **(b)** | Discuss about gear materials. | **07** |
| **Q.4** | **(a)** | Explain macro and micro features of Ductile fracture. | **07** |
| | **(b)** | Explain three stages of fatigue failure. Differentiate between striations and beach marks | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Discuss briefly on Material selection for wear resistance. | **07** |
| | **(b)** | Explain Creep mechanism. On which factors Creep resistance of material depends? Describe various materials used for Creep resistance. | **07** |
| **Q.5** | **(a)** | Define Toughness. How toughness plays important role in material selection | **07** |
| | **(b)** | Explain relationship between material selection and material processing. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Short note on corrosion fatigue and contact fatigue. | **07** |
| | **(b)** | Define the surface durability. What are the basic criteria for selection of material for corrosion & wear resistance applications? | **07** |

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