

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 182102****Subject Name: Selection of Materials & Failure Analysis****Date: 12/05/2012****Time: 10.30 am – 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.

- Q.1** (a) What are the basic criteria for selection of engineering materials ? define & Explain each. **07**
- (b) Explain how does availability of material & the cost of material affects the selection process ? Give suitable example. **07**
- Q.2** (a) Describe various materials used for high strength & Ultra high strength. **07**
- (b) Discussed the case study of selecting the material based on the mechanical properties of strength, toughness & fatigue. **07**
- OR**
- (b) Define stiffness & explain the criteria for selecting material for stiffness. **07**
- Q.3** (a) Define creep mechanism. What are the basic requirements for creep resistance? List various materials used for creep resistance. **07**
- (b) Define the surface durability . What are the basic criteria for selection of material for corrosion & wear resistance applications ? **07**
- OR**
- Q.3** (a) What are the basic requirements for selecting material for high temperature process.? justify giving example. **07**
- (b) Explain how material selection & material processing are related ? Give suitable example. **07**
- Q.4** (a) What is a failure analysis? What are the basic steps involved in performing a failure analysis? **07**
- (b) What are the types of failures & its characteristics ? explain with neat sketch. **07**
- OR**
- Q.4** (a) Explain macro & micro fracture features by drawing neat sketch in the following failures 1. Ductile fracture 2. Brittle fracture. **07**
- (b) Explain in detail the mechanism of stress corrosion cracking failure. **07**
- Q.5** (a) Define hydrogen embrittlement of steel. Explain the mechanism of hydrogen induced cracking in the steels. **07**
- (b) Define wear & explain the mechanism of grinding wear, abrasive wear, gouging wear, and fretting wear. **07**
- OR**
- Q.5** (a) Discuss the case study of failure of auto component (like crank pin , gear, crank bolt, etc.) **07**
- (b) Discuss the case study of failure due to wrong material selection. **07**
