

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III EXAMINATION – SUMMER 2016**

**Subject Code:133403****Date:02/06/2016****Subject Name:Engineering Materials and Metallurgy****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.

- Q.1** (a) Draw iron-iron carbide diagram with necessary details. What are the different phases that appear on this diagram? **07**
- (b) Draw TTT-diagram for a steel with 0.8% carbon and show following phase transformations on it: (i) Austenite to Bainite (ii) Austenite to Martensite (iii) Austenite to coarse Pearlite (iv) Austenite to fine Pearlite. **07**
- Q.2** (a) What is Gibb's phase rule? Define system, phase and degree of freedom. Show that the degree of freedom at eutectic point in a binary phase diagram is zero. **07**
- (b) What are difference between annealing and normalizing in terms of range of temperatures in which they are performed and objectives. **07**
- OR**
- (b) What is heat treatment of steel? What is its objectives and advantage? **07**
- Q.3** (a) Briefly explain the effect of Carbon, Manganese, Sulphur, Nickel, Chromium, Silicon and Tungsten on the properties of steels. **07**
- (b) Write properties and applications of aluminum alloys. **07**
- OR**
- Q.3** (a) How does the addition of alloying elements improve the properties of steel? **07**
- (b) Write some typical compositions, properties and applications of bronze. **07**
- Q.4** (a) Explain in brief about nano materials and its properties. **07**
- (b) Define plastic with properties. Classify plastic. Explain any two types of plastics. **07**
- OR**
- Q.4** (a) Differentiate between Engineering plastics and Commodity plastics. **07**
- (b) Differentiate between thermosetting and thermoplastics resin with suitable example. Explain any one type of thermosetting and thermoplastic resin. **07**
- Q.5** (a) Write the procedure to measure hardness by using Rockwell test with diagram. **07**
- (b) Explain with neat sketch procedure of fatigue testing. **07**
- OR**
- Q.5** (a) Explain the working of charpy and izod impact testing machine with example. **07**
- (b) Explain the procedure with diagram to determine creep limit by using creep testing. **07**

\*\*\*\*\*