

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

**Subject Code:131904****Date:14/06/2016****Subject Name:Material Science 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) Explain the importance of material science and metallurgy? **07**  
 (b) Draw and explain upper, middle and lower portion of iron-iron carbide Diagram and give brief note on various changes in phases in different parts of diagram. **07**
- Q.2** (a) Draw and explain TTT diagram for eutectoid steel. **07**  
 (b) Enlist NDT test. Explain dye penetration test. **07**
- OR**
- (b) Describe Gibb's phase rule. How this rule is applied to pure metal and binary alloys. **07**
- Q.3** (a) Explain the difference in microstructure and properties of white and gray cast iron. **07**  
 (b) Discuss the advantages of nitriding over carburizing. Explain nitriding process and it's applications. **07**
- OR**
- Q.3** (a) Give composition, properties and use of malleable cast iron. **07**  
 (b) Explain special alloy steel and high speed steel. **07**
- Q.4** (a) Enlist the properties of copper. Explain why copper is suitable for automobile radiator. **07**  
 (b) Define corrosion. How does corrosion differ from erosion? Why does corrosion generally occur at the anode? **07**
- OR**
- Q.4** (a) Differentiate between the term brass and bronze. Why are tin bronze suitable for use as bearings? **07**  
 (b) Explain the mechanism of electrochemical corrosion. **07**
- Q.5** (a) Explain the advantages, limitations and applications of powder metallurgy. **07**  
 (b) What is NDT? Explain magnetic particle test. **07**
- OR**
- Q.5** (a) List the three common method of powder production and Discuss any one of them **07**  
 (b) Describe with neat sketch how would you carry out Jominy harden ability test on a steel sample. **07**

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