

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III • EXAMINATION – WINTER • 2014

Subject Code: 131904

Date: 01-01-2015

Subject Name: Materials Science and Metallurgy

Time: 02.30 pm - 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.

- Q.1** (a) State the importance of study of “Material Science” and briefly explain “Engineering Requirements” of materials. **05**
- (b) Define the following properties : (1) Toughness (2) Creep (3) Fatigue (4) Ductility **04**
- (c) What is Gibb’s phase rule ? Explain its importance. **05**
- Q.2** (a) With Neat Sketch Draw Iron-Carbon(Fe-C) Equilibrium Diagram & Explain briefly various microconstituents of the Diagram. **07**
- (b) State different types of corrosion and explain their probable causes of Occurance. Enlist common methods to protect corrosion. **07**
- OR**
- (b) What is metallography ? What useful information can be obtained from it ? **07**
- Q.3** (a) What is powder metallurgy ? Describe steps involved in powder metallurgy with each steps controlling properties of final sintered component. **07**
- (b) Describe with neat sketch how would you carry out a Jominy hardenability test on a steel sample. **07**
- OR**
- Q.3** (a) Draw TTT diagram for eutectoid steel. Explain briefly by cooling few cooling rates. **05**
- (b) Differentiate between White cast iron and grey cast iron ? **04**
- (c) Explain properties and application Wrought iron ? **05**
- Q.4** (a) What is the purpose of heat treatment ? Differentiate Annealing and Normalizing on the basis of : (I) Rate of cooling (II) Microstructure after cooling (III) Grain size distribution (IV) Internal Stresses (V) Mechanical properties (VI) Application **07**
- (b) Which are the Surface Hardening processes? With neat sketch Explain any one of them in detail. **07**
- OR**
- Q.4** (a) What is non destructive test? List various non destructive tests. Explain X-Ray Radiography. **07**
- (b) State the advantages and limitations of Powder Metallurgy. **04**
- (c) Differentiate between Edge dislocation and screw dislocation. **03**
- Q.5** (a) Enlist the properties of pure Aluminum and mention the composition, specific properties and application of any one aluminum alloys **07**
- (b) Explain Various Ultrasonic Testing Methods of inspection with reference to its working Principle, Advantages, Limitations & Application. **07**
- OR**
- Q.5** (a) Classify Brasses based on the composition of zinc ? Explain properties & Application of the main type of Brasses. **07**
- (b) (1) Differentiate between Austempering & Martempering. **04**
- (2) Write following alloys giving their important constituents & Application : (I) Monel (II) Invar (III) Nichrome **03**

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