

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE SEM-III Examination-Dec.-2011**

**Subject code: 131904****Date: 24/12/2011****Subject Name: Material Science & Metallurgy****Time: 2.30 pm -5.00 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) Define 1) Toughness 2) Hardness 3) Hardenability 07  
4) Malleability 5) Creep 6) Elasticity 7) Ductility .  
(b) Discuss selection criteria for materials used in engineering applications. 07
- Q.2** (a) Draw Iron-Carbon Diagram and explain eutectic reaction in it. 07  
(b) Explain the effects on steel by alloying elements Silicon, Sulphur, 07  
Magnesium and Phosphorous.
- OR**
- (b) Explain properties and application of Wrought iron. 07
- Q.3** (a) Explain the Spark Test and Magnetic test for metallic materials. 07  
(b) Write the procedure for Jominy end quench practical and discuss its 07  
conclusion.
- OR**
- Q.3** (a) Explain the difference between Annealing and Normalizing. 07  
(b) What is phase diagram? Explain Lever rule. 07
- Q.4** (a) Differentiate between white cast iron and grey cast iron. 07  
(b) Give composition and use of White metal and Monel metal. 07
- OR**
- Q.4** (a) Enlist the products made from powder metallurgy. Explain all four steps 07  
of powder metallurgy.  
(b) Explain structure and properties of Malleable cast iron. 07
- Q.5** (a) Which non-destructive test is used for finding defects on welded joints? 07  
Explain it.  
(b) Explain cathodic protection against corrosion. 07
- OR**
- Q.5** (a) Explain principle and procedure of Ultrasonic test. 07  
(b) Explain metal and organic coatings. 07

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