

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

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

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE SEM-VI Examination-Nov/Dec-2011**

**Subject code: 162101**

**Date: 21/11/2011**

**Subject Name: Physical Metallurgy-I**

**Time: 10.30 am -1.00 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 equilibrium diagram. What information may be obtained from an equilibrium diagram? Explain its role in the development of new alloys. **07**  
(b) Define austenitic grain size? Explain the method of grain size measurement. **07**

- Q.2** (a) Draw and explain the Iron–Iron Carbide phase diagram. **07**  
(b) Explain briefly the BCC and FCC structure and calculate the atomic packing factor for both structures. **07**

**OR**

- (b) Explain the mean of crystal planes and crystal directions. With neat diagram indicate close packed directions of BCC and FCC materials. **07**

- Q.3** (a) Define Phase and differentiate between primary & intermediate phases. Discuss about their formation. **07**  
(b) Define cooling curve. Briefly explain the peritectic, monotectic and eutectoid reactions with proper examples of each. **07**

**OR**

- Q.3** (a) Write and explain the Hume-Rothery Rules of solid solution formation with suitable examples. **07**  
(b) Draw and briefly explain the Aluminium-Silicon binary phase diagram. **07**

- Q.4** (a) Mention the detailed classification of steel. Discuss about advantages and limitations of plain carbon steel. **07**  
(b) Discuss the effect of impurities on the properties of steels. Enumerate the properties and applications of stainless steels. **07**

**OR**

- Q.4** (a) Briefly explain the effect of various alloying elements on the properties of steel. **07**  
(b) What is coding of steel? Discuss about American Standard code for steel. **07**

- Q.5** (a) Mention the properties and applications of Malleable cast iron. Also compare it with compacted graphite cast iron. **07**  
(b) What is Metallography? Discuss about polishing techniques for metals and alloys. Give the requirements of etching in microscopic observation. **07**

**OR**

- Q.5** (a) Give the classification of Cast iron. Discuss about Indian Standards applicable to cast irons. **07**  
(b) Draw neat sketch of metallurgical microscope and label it. Explain the function of its components. **07**

\*\*\*\*\*