

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 162101**Date: 02/01/2013****Subject Name: Physical Metallurgy-I****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** What do you mean by phase? Explain in brief: **07**
1.Pearlite 2.Ferrite 3.Austenite
- (b)** Draw and explain Iron–Iron Carbide equilibrium diagram. Label it properly and give isothermal reactions. **07**
- Q.2 (a)** Define miller indices. Explain the procedure for finding miller indices. Draw planes: (1 2 3) and directions: [110]. **07**
- (b)** With neat sketch explain briefly the BCC, FCC and HCP structures using suitable examples. Calculate the atomic packing factor for BCC structure. **07**
- OR**
- (b)** Define equilibrium diagram. What information may be obtained from an equilibrium diagram? Explain its role in the development of alloys. **07**
- Q.3 (a)** Write and explain the Hume-Rothery Rules of solid solution formation giving suitable examples. **07**
- (b)** Draw and briefly explain the Copper-Nickel binary phase diagram. **07**
- OR**
- Q.3 (a)** Differentiate between primary & intermediate phases. Discuss about their formation. **07**
- (b)** Define cooling curve. Draw the cooling curves for Pure metal, binary solid solution alloy and binary eutectic alloy. **07**
- Q.4 (a)** Define grain size. Explain the effect of grain size on properties of 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)** Give classification of steel. Mention the effect of Mo, Ti, and Mn on the properties of steel. **07**
- Q.4 (b)** What do you mean by Coding of steel? Discuss about American Standard for steel (AISI). **07**
- Q.5 (a)** Draw the microstructure of Grey cast iron. Mention properties and applications of Grey cast iron. Compare it with white cast iron. **07**
- (b)** What are the different steps of specimen preparation for microscopic examination? Explain in brief about etching. Give the requirements of etching in microscopic observation. **07**
- OR**
- Q.5 (a)** Give the classification of Cast iron. Draw the microstructure of ductile cast iron and list its properties and applications. **07**
- (b)** Draw neat sketch of metallurgical microscope and label it. Explain the function of its components. Give its working principle. **07**
