Seat No.: _____ Enrolment No._____

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: 1.Pearlite 2.Ferrite 3.Austenite	**07**
	(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**

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