Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER 2013

Subject Code: 162101 **Date: 27-11-2013**

Subject Name: Physical Metallurgy-I

Time: 02:30 pm to 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)**	Draw iron-iron carbide equilibrium diagram indicating all important temperatures, phases and compositions.	**07**
	(b)	Explain invariant reactions with reference to iron-iron carbide diagram and explain critical temperatures for iron-iron carbide systems.	**07**
Q.2	**(a)**	Define unit cell. What are lattice parameters? Draw FCC and BCC crystal structures.	**07**
	(b)	Define Miller indices. Draw following planes and directions in cubic crystal: (i) (100) (010) (001) (ii) [100] [010] [001]	
		OR	
	(b)	How Miller indices can be found? Explain with proper examples.	**07**
Q.3	**(a)**	Draw completely labeled copper-nickel equilibrium diagram.	**07**
	(b)	Discuss types of solid solutions. How Hume-Rothery rules govern formation of solid solution?	**07**
		OR	
Q.3	**(a)**	Explain the effects of alloying elements on properties of plain carbon steel.	**07**
	(b)	What do you understand by austenite grain size? How it affects the properties of steel?	**07**
Q.4	**(a)**	Classify alloy steels. Discuss stainless steel in detail.	**07**
	(b)	Write a note on coding of steel as per Indian and American standards.	**07**
		OR	
Q.4	**(a)**	Define steel and cast iron. How many types of cast irons are there? Explain any one.	**07**
	(b)	Explain allotropy of iron with neat sketch.	**07**
Q.5	**(a)**	Draw labeled diagram of Metallurgical microscope. Explain functions of important parts.	**07**
	(b)	Differentiate between white and gray cast irons in terms of composition, microstructure, properties and applications.	**07**
		OR	
Q.5	**(a)**	Compare critically cooling curves for pure metal, binary solid solution and eutectic alloy with examples of each.	**07**
	(b)	Write a note on solidification of metals and alloys.	**07**

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