Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VI Regular Examination May 2011

Subject code: 162101

Subject Name: Physical Metallurgy – I

Date:16/05/2011 **Time: 10.30 am – 01.00 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 the Copper-Nickel binary phase diagram and explain in brief. **07**

(b) Draw Iron–Iron Carbide equilibrium diagram and label all components properly. **07**

Q.2 **(a)** Give the detailed classification of steel. Mention the significance of plain carbon steel. **07**

(b) Discuss Briefly the following: **07**

1. Hexagonal close packed structure for metallic elements
2. Monotectic and peritectoid reactions

OR

(b) Define miller indices. Explain with example, the procedure for finding miller indices. **07**

Q.3 **(a)** Define solid solution. Discuss Hume-Rothery Rules of solid solution formation. **07**

(b) State the Gibb's phase rule and its importance. **03**

(c) The binary alloy of A-B has complete solubility. For an overall composition containing 75%B, the liquid composition containing 55%B and solid composition having 83%B are in thermal equilibrium. Melting point of A and B are 900^0C and 1050^0C. Draw the phase diagram and determine the relative amount of solid and liquid phases. **04**

OR

Q.3 **(a)** Explain the nucleation and growth mechanism for the solidification of metals/alloys. **07**

(b) What do you mean by cooling curve? Draw the cooling curves for binary solid solution alloy and binary eutectic alloy. **07**

Q.4 **(a)** What do you mean by allotropy of metals? Explain with example of pure iron. **03**

(b) A slowly cooled plain carbon steel show proeutectoid cementite to be 14% by weight of microstructure. Calculate the Carbon % of steel. **04**

(c) State the purpose of alloying of steel. Mention the effect of Ni, Cr, Mo, Ti and Mn on the properties of steel. **07**

OR

Q.4 **(a)** Define austentic grain size? Explain the effect of grain size on properties of steel. **07**

(b) What do you mean by Coding of steel? Discuss about Indian Standard for steel. **07**

Q.5	**(a)**	Give the classification of Cast iron. Mention the properties and applications of ductile cast iron.	**07**
	(b)	Draw neat sketch of metallurgical microscope and label it. Give the function of course and fine adjustment and eye piece.	**07**

OR

Q.5	**(a)**	Mention the properties and applications of Grey cast iron. Also compare it with white cast iron.	**07**
	(b)	Define mounting and explain its objective. List different mounting methods and explain any one.	**07**

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