

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**
