

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 162101****Date: 26-11-2014****Subject Name: Physical Metallurgy-I****Time: 02:30 pm - 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 temps. , 07
phases, and composition.
- (b) What is phase diagram? How are they classified? Draw completely labeled Cu- 07
Ni equilibrium diagram.
- Q.2** (a) Give classifications of steel. Mention the effect of Cr, C, Mo, and W on the 07
properties of steel.
- (b) Classify alloy steels. Discuss duplex stainless steels in detail. 07
- OR**
- (b) Write advantages and limitations of plain carbon steels. Write applications of 07
plain carbon steel.
- Q.3** (a) What is metallography? Write in detail about basic steps required to prepare 07
metallographic specimen.
- (b) Explain electrolytic polishing. State the name and applications of different 07
etchant.
- OR**
- Q.3** (a) Differentiate between Macroscopic and Microscopic Examination. Define Non 07
metallic inclusion.
- (b) Write a short note on Metallurgical Microscope. 07
- Q.4** (a) Compare White and Gray cast irons. 07
- (b) State and explain the Hume Rothery rules of solid solution formation with 07
suitable example.
- OR**
- Q.4** (a) Explain the nucleation and growth mechanism for the solidification of metals. 07
- (b) Explain Malleable cast iron production method. 07
- Q.5** (a) Draw and explain the cooling curves for pure metal, binary solid solution alloy 07
and binary eutectic alloy.
- (b) Explain the meaning of crystal planes and crystal directions. With neat sketch 07
indicate directions of BCC and FCC material.
- OR**
- Q.5** (a) What do you mean by coding of steel? Discuss about American Standards for 07
Steel.
- (b) Define miller indices. Explain the procedure for finding miller indices. Draw 07
planes: (1 1 1) and direction: [1 1 1]
