

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – SEM-VI EXAMINATION – SUMMER 2015**

**Subject Code: 162101****Date: 01/05/2015****Subject Name: Physical Metallurgy-I****Time: 10.30am-01.00pm****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 neat sketch of phase diagram for two metals completely soluble in liquid and solid state with suitable example. **07**
- (b) With neat sketch draw Fe-Fe<sub>3</sub>C diagram and label it properly. Give all isothermal reactions. **07**
- Q.2** (a) What is miller indices? Draw (2 3 4), (1 0 0), (-1 -1 1), [001], [101] and [111] planes and directions. **07**
- (b) State Gibb's phase rule, define its each term and calculate degree of freedom at melting point of pure metal and eutectic point. **07**
- OR**
- (b) What is super cooling? Draw cooling curves for pure metal, compound and alloy. **07**
- Q.3** (a) List the steps of metallography and explain them. **07**
- (b) Explain working principle of metallurgical microscope and draw its neat sketch, label its parts. **07**
- OR**
- Q.3** (a) Explain Hume Rutherly Rules for formation of solid solution. **07**
- (b) Explain tie line and Lever rule. For Fe-Fe<sub>3</sub>C diagram apply lever rule at eutectic temperature for 2.5% carbon alloy. **07**
- Q.4** (a) Write note on plain carbon steel. **07**
- (b) What is cast iron? Write short note on gray cast iron. **07**
- OR**
- Q.4** (a) What is purpose of alloying of steel? Explain effect of major alloying elements. **07**
- (b) Draw microstructure of S.G. Iron. Give its properties and applications. **07**
- Q.5** (a) Write short note on grain size measurement. Draw microstructure of 0.4% and 0.8% carbon steel. **07**
- (b) Briefly write on Ferrite, Pearlite and Cementite. **07**
- OR**
- Q.5** (a) What is crystal? Explain different types of crystal system in term of lattice parameter with suitable example. **07**
- (b) Define A.P.F. and calculate A.P.F. for BCC and FCC crystal structure. **07**

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