

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- V (New) EXAMINATION – WINTER 2019****Subject Code: 2152106****Date: 25/11/2019****Subject Name: Physical Metallurgy****Time: 10:30 AM TO 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.

MARKS

- Q.1** (a) Define Crystal & Unit cell. **03**
 (b) How do you identify a crystal system using lattice parameter? **04**
 (c) What is packing factor? Determine the Atomic Packing factor of BCC. **07**
- Q.2** (a) Draw crystal planes and direction of followings: **03**
 a) $(1\ 1\ \bar{1})$ b) $(1\ 2\ 3)$ c) $[1\ \bar{1}\ \bar{1}]$
 (b) Explain constitutional supercooling. **04**
 (c) Write a short note on Solid solution. **07**
- OR**
- Q.3** (c) With the concept of free energy explain the homogeneous nucleation. **07**
 (a) Give classification of steel and cast Iron. **03**
 (b) Define the term component, phase, equilibrium & degree of freedom. **04**
 (c) Why concentration of carbon in α -Fe with BCC structure is less than γ -Fe with FCC structure? **07**
- OR**
- Q.3** (a) What do you mean by curie temperature? **03**
 (b) Describe the ferrite, pearlite and cementite. **04**
 (c) Give the Hume-Rothery's rules for substitutional solid solution. **07**
- Q.4** (a) Explain Allotropy of iron. **03**
 (b) Write a short note on ductile cast iron. **04**
 (c) Draw Fe-Fe₃C diagram and explain all invariant reaction in this diagram. **07**
- OR**
- Q.4** (a) Write effect of impurity elements on properties of steel. **03**
 (b) Where is the carbon atom located in iron lattice? **04**
 (c) Explain Gibbs' phase rule. **07**
- Q.5** (a) By Gibbs' phase rule, draw cooling curve for binary eutectic system. **03**
 (b) Explain coding of steel according to IS standard and American standard. **04**
 (c) What is Metallography? Explain specimen preparation techniques for metallography. **07**
- OR**
- Q.5** (a) Draw a cooling curve for pure metal. **03**
 (b) Draw a labeled sketch of metallurgical microscope. **04**
 (c) Explain the phase diagram for Isomorphous system with example. **07**
