

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) - EXAMINATION – SUMMER 2017****Subject Code: 2131904****Date: 02/06/2017****Subject Name: Material Science and 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 | Short Questions | 14 |
| | 1 Give any three names of composite material. | |
| | 2 Draw a BCC crystal structure. | |
| | 3 Define coordination no. and state Coordination no. for BCC, FCC, and HCP. | |
| | 4 Which is the hardest structure in Fe-C Diagram? | |
| | 5 In Microstructure which is weakest portion? Grain or Grainboundary? | |
| | 6 For any material Freezing Temperature and Melting temperature Both are Same. True or False? | |
| | 7 State Eutectic reaction of Fe-C Diagram. | |
| | 8 What elements are added to pig iron for good fluidity? | |
| | 9 State Any 4 name of Case hardening Processes. | |
| | 10 What are the Major alloying elements added to make stainless steel? | |
| | 11 Inconel and monel is an alloy of which basic element? | |
| | 12 State any four names of NDT Techniques. | |
| | 13 Define Metallography. | |
| | 14 State any two product name made by Powder metallurgy. | |
| Q.2 | (a) Differentiate a following Term: | 03 |
| | (1) Impact and Toughness | |
| | (2) Ductility and Malleability | |
| | (b) Write a material selection process for a crankshaft of Engine. | 04 |
| | (c) Explain a Nucleation and growth in Solidification of metals | 07 |
| OR | | |
| | (c) Explain Point defect, Line defect and Plane defect. | 07 |
| Q.3 | (a) Define Unit cell and draw (111) and [101] | 03 |
| | (b) Briefly explain Gibb's Phase rule. | 04 |
| | (c) Explain Iron –Carbon diagram with neat sketch. | 07 |
| OR | | |
| Q.3 | (a) Explain Binary equilibrium Phase Diagram. | 03 |
| | (b) State Hume -Rothery rules for solid solution. | 04 |
| | (c) Write a short note on Solidification Defects with its causes and remedies. | 07 |
| Q.4 | (a) Compare nodular cast iron and malleable cast iron. | 03 |
| | (b) What are the effect of following elements in steel: | 04 |

- (1) Carbon (2) Chromium (3) Silicon (4) Nickel
(c) Write a full name of TTT diagram and explain how it is constructed. **07**

OR

- Q.4** (a) State the composition, Characteristics, and Applications of Malleable iron and **03**

(b) Explain Macro examination and Micro examination **04**

(c) For stainless steel we cannot use MPT. Why? State reason and explain MPT method in detail **07**

- Q.5** (a) Briefly explain an allotropy of iron. **03**

(b) Explain Flame hardening. **04**

(c) Explain the principle of Radiography testing. With its use in metal testing. **07**

OR

- Q.5** (a) Explain the methods to control grain size. **03**

(b) Explain any one method of powder production in powder metallurgy.(with neat sketch) **04**

(c) Explain Austempering and Martempering **07**
