

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2132004****Date: 11/06/2019****Subject Name: Principles Of Materials Science And Physical Metallurgy****Time: 02:30 PM TO 05:30 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) State the importance of study of “Material Science” and briefly explain engineering requirement of materials. **03**
(b) Explain types of crystal structures. **04**
(c) Draw iron-iron carbide equilibrium diagram with all necessary details. **07**
- Q.2** (a) State critical reactions of iron carbon phase diagram. **03**
(b) What is powder metallurgy? State applications of the powder metallurgy. **04**
(c) What is micro examination? What are the various steps required for specimen preparation for micro examination. **07**

OR

- (c) Explain TTT diagram with fully labeling. **07**
- Q.3** (a) Difference between Annealing and Tempering. **03**
(b) What are the advantages of Austempering and Martempering? **04**
(c) Explain eddy current testing method with neat sketch. Also explain limitations and applications. **07**

OR

- Q.3** (a) Define :- (a) creep (b) fatigue (c) ductility **03**
(b) Explain in brief induction hardening. **04**
(c) Differentiate between Edge and Screw dislocations with neat sketch. **07**
- Q.4** (a) Explain x-ray fluoroscopy. **03**
(b) Derive Bragg's law. **04**
(c) Describe jominy hardenability test with neat sketch. **07**

OR

- Q.4** (a) Comparison of NDT with destructive testing. **03**
(b) Give the overview on hardening, tempering and normalizing process. **04**
(c) List the most common methods for non destructive testing. Explain LPT method in detail and by giving its working principal, applications, advantages and limitations. **07**
- Q.5** (a) Explain the allotropic behavior of iron with sketch. **03**
(b) Enlist methods of manufacturing metal powder. Discuss any one in detail. **04**
(c) Explain classification of engineering materials. **07**

- Q.5**
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|-----|---|-----------|
| (a) | List various heat treatment processes which applied to steel. | 03 |
| (b) | Write a short note on ductile and brittle failure. | 04 |
| (c) | Explain Gibb's phase rule. | 07 |

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