

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III (New) EXAMINATION – WINTER 2019****Subject Code: 3131904****Date: 28/11/2019****Subject Name: Material Science and Metallurgy****Time: 02:30 PM TO 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.

| | | Marks |
|------------|--|-----------|
| Q.1 | (a) What is unit cell. | 03 |
| | (b) Explain any two mechanical properties. | 04 |
| | (c) Do the detailed classification of engineering material. | 07 |
| Q.2 | (a) Grain boundary is a defect. Evaluate. | 03 |
| | (b) Explain the importance of undercooling in nucleation. | 04 |
| | (c) Explain the final solidification structure of a pure metal ingot. | 07 |
| OR | | |
| | (c) Explain homogeneous and heterogeneous nucleation process with neat sketch. | 07 |
| Q.3 | (a) Describe applications of phase diagram. | 03 |
| | (b) Eutectic alloys solidify at fixed temperature. Justify with the help of Gibbs Phase rule. | 04 |
| | (c) What is the purpose of hardening? Explain induction hardening in detail. | 07 |
| OR | | |
| Q.3 | (a) Explain interstitial solid solution. | 03 |
| | (b) Explain Hume Rothery rule for substitutional solid solution | 04 |
| | (c) Explain the detail procedure of polishing the specimen for microexamination. | 07 |
| Q.4 | (a) What is the role of etchant in microexamination? | 03 |
| | (b) Explain the principle of magnetic particle test with neat sketch. | 04 |
| | (c) Draw and label Iron – Iron Carbide diagram. Also explain the reactions taking place in it. | 07 |
| OR | | |
| Q.4 | (a) Differentiate between Eutectic and Eutectoid reaction. | 03 |
| | (b) What are the limitations and capabilities of LPT. | 04 |
| | (c) Explain the advantages and disadvantages of powder metallurgy. | 07 |
| Q.5 | (a) What is martensite? | 03 |
| | (b) Differentiate between annealing and normalizing | 04 |
| | (c) Explain Jominy Hardenability test with neat sketch. | 07 |
| OR | | |
| Q.5 | (a) Why cast iron has a limited engineering applications? | 03 |
| | (b) Explain macro and micro examination. | 04 |
| | (c) Explain the mechanism of corrosion. Also explain any one corrosion prevention technique in detail. | 07 |
