

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3150508****Date:22/01/2021****Subject Name:Material Science and Engineering****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

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| Q.1 | (a) Define ionization potential and electron affinity. | 03 |
| | (b) State and explain the classification of engineering materials. | 04 |
| | (c) Discuss about the various methods of protection against corrosion in detail. | 07 |
| Q.2 | (a) Differentiate between edge dislocation and screw dislocation. | 03 |
| | (b) Briefly discuss about the classification of polymers. | 04 |
| | (c) Mention the classification of the structure of materials depending on the level and briefly discuss about each. | 07 |
| Q.3 | (a) Explain secondary bonding and its significance. | 03 |
| | (b) Define Pilling – Bedworth ratio and explain its significance. | 04 |
| | (c) Discuss about the structure and crystallinity of long chain polymers with suitable illustrations. | 07 |
| Q.4 | (a) Explain Frenkel defect and Schottky defect. | 03 |
| | (b) State the types of surface imperfections and explain each. | 04 |
| | (c) With suitable illustrations, discuss about the structure-property relationship in materials. | 07 |
| Q.5 | (a) Briefly discuss about the applications of phase diagrams. | 03 |
| | (b) Explain the lever rule used for calculating the fractions of two coexisting phases. | 04 |
| | (c) Draw the Iron – Iron carbide (Fe – Fe ₃ C) phase diagram and briefly discuss about the phase transformations in steel. | 07 |
| Q.6 | (a) Explain glass transition. | 03 |
| | (b) Describe the precipitation process with a suitable example. | 04 |
| | (c) Stating the condition for the spontaneous occurrence of a phase transformation, discuss about the progressive transformation of a liquid to solid crystals by nucleation and growth with an illustration. | 07 |
| Q.7 | (a) Explain plastic deformation by slip. | 03 |
| | (b) Draw the tensile stress – strain curve for ductile material and discuss the significance of various regions. | 04 |
| | (c) Explain the mechanism of creep. Also discuss about the importance of creep resistant materials. | 07 |
| Q.8 | (a) Explain intrinsic semiconductor and extrinsic semiconductor | 03 |
| | (b) Briefly discuss about soft and hard magnetic materials. | 04 |
| | (c) Write a short note on super conducting phenomenon. | 07 |
