Seat No.: _____ Enrolment No.

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.**

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_3C) 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**

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