

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2020****Subject Code:2131904****Date:04/03/2021****Subject Name:Material Science and Metallurgy****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.

		MARKS
Q.1	(a) Define following terms: (1) Ductility (2) Malleability (3) Toughness	03
	(b) What is the purpose of alloying in steels?	04
	(c) What is twinning deformation? Explain the difference between slip and twinning mechanisms using sketch.	07
Q.2	(a) Explain engineering requirements of material in brief.	03
	(b) Explain following alloys giving their important constituents & Applications: (I) Monel (II) Invar (III) Nichrome	04
	(c) Differentiate between Edge and Screw dislocation with sketch.	07
Q.3	(a) Explain Nitriding Process in brief.	03
	(b) Difference between Annealing Process and Normalizing Process.	04
	(c) Draw a neat sketch of Iron-Iron Carbide Equilibrium Diagram and explain phase transformation at following compositions: (1) 0.83% Carbon (2) 4.0% Carbon	07
Q.4	(a) What is allotropy? Explain with example of Iron.	03
	(b) Explain with neat sketch the microstructure of any one Micro-constituent of Iron and Steel.	04
	(c) Explain Austempering and Martempering.	07
Q.5	(a) Discuss the effect of adding nickel and chromium to steels.	03
	(b) Explain the “Hume-Rothery Rules” for solid solution.	04
	(c) Draw and label TTT diagram for eutectoid steel and explain critical cooling rate with help of TTT diagram.	07
Q.6	(a) Compare Nodular Cast Iron and Malleable Cast Iron.	03
	(b) Explain chemical composition, Properties and Applications of Wrought Iron.	04
	(c) Draw and explain the phase diagram for components which are completely soluble in liquid state but partially soluble in solid state with suitable example.	07
Q.7	(a) Differentiate between micro and macro examination of materials.	03
	(b) Explain Dye Penetrant Inspection technique with neat sketch.	04
	(c) Discuss: Advantages, Limitations and Applications of Powder Metallurgy.	07

- Q.8** (a) Explain the property requirement of bearing materials. **03**
(b) Explain steps to prepare specimen for microscopic examination in brief. **04**
(c) Explain: Principle, Operation and Application of Eddy current technique of Testing with neat sketch. **07**
