

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III EXAMINATION – SUMMER 2020****Subject Code: 3131904****Date: 28/10/2020****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) Draw miller indices of [111] and (110).	03
	(b) Define atomic packing factor (APF) and find APF for FCC material.	04
	(c) Do the detailed classification of Engineering Material.	07
Q.2	(a) Grain boundary is a defect. Evaluate.	03
	(b) Explain Lever rule with example.	04
	(c) Explain homogeneous and heterogeneous nucleation process with neat sketch.	07
OR		
	(c) Explain a Nucleation and growth in Solidification of metals.	07
Q.3	(a) What is solid solution? Discuss in brief types of solid solution with neat sketch.	03
	(b) Write the difference between impurities and alloying elements. Write importance of alloying.	04
	(c) Explain cooling curve of binary alloy forming solid solution.	07
OR		
Q.3	(a) Explain Point defect & Line defect.	03
	(b) Explain Hume Rothay rule for substitutional solid solution.	04
	(c) Explain the detail procedure of polishing the specimen for micro-examination.	07
Q.4	(a) Differentiate between Austenite and Ferrite.	03
	(b) What are the limitations and capabilities of LPT	04
	(c) Draw and label Iron – Iron Carbide diagram. Also explain the reactions taking place in it.	07
OR		
Q.4	(a) Differentiate between LPT and MPT.	03
	(b) Explain the Ultrasonic Testing.	04
	(c) List the common methods of powder production in powder metallurgy & discuss their influences on the properties of final product.	07
Q.5	(a) Explain macro examination.	03
	(b) Differentiate between annealing and normalizing.	04
	(c) Draw TTT-diagram for a steel with 0.8% carbon and show austenite to martensite transformations on it.	07

OR

- Q.5** (a) Which are surface heat treatment processes? What are the applications of such processes? **03**
- (b) Define hardenability of steel. State the factor that affect the hardenability. **04**
- (c) Explain the mechanism of corrosion. Also explain any one corrosion prevention technique in detail. **07**
