

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021****Subject Code:3132004****Date:23-02-2022****Subject Name:Principles of Materials Science and Metallurgy****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What is the significance of study of Metallurgy?	03
	(b) Give difference between Metal and Non-metals.	04
	(c) Explain criteria for selection of engineering materials.	07
Q.2	(a) Write difference between Crystalline solid and non-crystalline solid. What is meant by 'Amorphous Material'?	03
	(b) Determine APF for FCC crystal structure.	04
	(c) Explain Edge dislocations with the help of neat sketches.	07
OR		
	(c) Explain various point defects found in ionic crystals. What is the effect of these defects on the properties of ionic materials?	07
Q.3	(a) Define metallography. Differentiate between micro and macro structure of materials.	03
	(b) What are the advantages of Austempering and mar tempering?	04
	(c) What is powder metallurgy? Describe methods of manufacturing metal powder briefly.	07
OR		
Q.3	(a) List various non-destructive tests. Explain general advantages and disadvantages of Non-destructive tests.	03
	(b) State advantages and disadvantages of powder metallurgy.	04
	(c) Suggest and explain a simple and economical NDT method to determine minute surface defects in large size component.	07
Q.4	(a) Differentiate between annealing and tempering.	03
	(b) Explain optical metallurgical microscope with neat sketch.	04
	(c) What is a critical nucleus? What is significance of critical radius of a solidifying particle?	07
OR		
Q.4	(a) What are the purposes of alloying?	03
	(b) Explain in brief Ductile failure of metal.	04
	(c) Draw iron carbon equilibrium diagram.	07
Q.5	(a) State critical reactions of iron carbon phase diagram.	03
	(b) Define allotropy. Explain allotropy of iron.	04
	(c) Draw TTT diagram for steel.	07

OR

- Q.5** (a) Differentiate between hardness and harden ability of steel. **03**
(b) What is heat treatment of steel? What is its objective? **04**
(c) Explain solid or pack carburizing process with its limitations. **07**
