

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2024****Subject Code:3132004****Date:10-12-2024****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) Define:- (1) Material science (2) Metallurgy	03
	(b) Briefly explain Nano-materials with application.	04
	(c) Define: - (1) Ductility (2) Creep (3) Fatigue (4) Toughness (5) Dielectric strength (6) Superconductivity (7) strain.	07
Q.2	(a) Define unit cell and draw (1) (221) (2) (632)	03
	(b) Explain a Nucleation and growth in solidification of metals.	04
	(c) Explain microscopic examination of the material with its all steps.	07
OR		
	(c) Differentiate between edge dislocation and screw dislocation with sketch.	07
Q.3	(a) Define fracture and state the stages when fracture can take place.	03
	(b) State the difference between ductile and brittle failures.	04
	(c) State and derive an expression for Bragg's law used in x-rays diffraction.	07
OR		
Q.3	(a) What is heat treatment of steel? What is its purpose?	03
	(b) What is coring? Why it is observed?	04
	(c) With neat sketch draw iron-carbon equilibrium diagram and explain briefly various micro constituents of the diagram.	07
Q.4	(a) Explain the importance of TTT diagram in heat treatment.	03
	(b) Give the comparison between annealing and normalizing.	04
	(c) Differentiate flame hardening and induction hardening process on the basis of parametric control, process features, operational safety and productivity.	07
OR		
Q.4	(a) Completely describe the "sintering process".	03
	(b) Enlist methods of manufacturing metal powder. Discuss any one in detail.	04
	(c) State chief advantages, limitations and applications of powder metallurgy.	07
Q.5	(a) Write limitations of RT and UT.	03
	(b) Explain dye penetration testing.	04
	(c) What is nondestructive test? List various non destructive tests. Explain advantages and disadvantages of non-destructive tests.	07
OR		
Q.5	(a) Discuss applications of steels in engineering field.	03
	(b) Explain the mechanism of twinning with a neat sketch.	04
	(c) Explain jominy harden ability test with a neat sketch.	07
