Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III EXAMINATION – WINTER 2025

Subject Code:3131904 Date:12-12-2025

Subject Name: Material 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)**	Give difference between Metals & Non-metals.	**03**
	(b)	What is Unit cell? Explain different types of unit cell with neat sketch.	**04**
	(c)	Draw and explain iron carbon diagram.	**07**
Q.2	**(a)**	Enlist and Explain important properties of materials.	**03**
	(b)	Explain Recovery, recrystallization, and grain growth.	**04**
	(c)	Explain and differentiate Edge dislocation and Screw dislocation with neat sketch.	**07**
		OR	
	(c)	Enlist and explain all point defects.	**07**
Q.3	**(a)**	Difference between micro and macro examination.	**03**
	(b)	Briefly explain Gibb's Phase rule.	**04**
	(c)	What is a substitutional solid solution? Explain the Hume Rothery rule for the formation of a substitutional solid solution.	**07**
		OR	
Q.3	**(a)**	Discuss merits and de-merit of powder metallurgy process.	**03**
	(b)	Explain Jominy end quench test.	**04**
	(c)	What is Powder Metallurgy? Explain the process steps of Powder Metallurgy.	**07**
Q.4	**(a)**	Draw and explain Pearlite.	**03**
	(b)	What is allotropic form ? explain different allotropic form of iron.	**04**
	(c)	Explain TTT diagram in detail with sketch.	**07**
		OR	
Q.4	**(a)**	What is eutectic point ? Explain in brief.	**03**
	(b)	Briefly explain Gibb's Phase rule.	**04**
	(c)	Draw and explain the phase diagram of binary system having complete soluble in liquid but total insoluble in solid phase with lever rule.	**07**
Q.5	**(a)**	Explain Optical Metallurgical Microscope with neat sketch.	**03**
	(b)	Explain the steps of Dye Penetration Testing with neat sketch.	**04**
	(c)	Explain the principle of Radiography testing. With its use in metal testing.	**07**
		OR	
Q.5	**(a)**	What is heat treatment ?	**03**
	(b)	Differentiate Annealing Vs Normalising.	**04**
	(c)	Explain Flame Hardening Process with neat sketch.	**07**

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