Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.VOC- SEMESTER–II EXAMINATION – WINTER 2025

Subject Code:21120304 Date:03-12-2025

Subject Name: Material Science and Metallurgy

Time:02:30 PM to 04:30 PM Total Marks:50

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)**	Explain the following material properties: Ductility, Creep, Fatigue, Resilience, Hardness.	**05**
	(b)	Discuss selection criteria for materials used in engineering applications.	**05**
Q.2	**(a)**	Explain the different methods for Grain size measurement.	**05**
	(b)	Write a Hume-Rothery rules for Substitutional Solid solution formation.	**05**
		OR	
	(b)	Calculate the APF for BCC structures.	**05**
Q.3	**(a)**	Draw iron- carbon diagram and mention all major elements.	**05**
	(b)	Outline major mechanical property requirements of bicycle wheel axle	**05**
		OR	
Q.3	**(a)**	Write short note on Ni- Cr alloy Steels.	**05**
	(b)	Write short note on Nodular Cast Iron.	**05**
Q.4	**(a)**	Explain the NDT method widely used for inspection of castings.	**05**
	(b)	Explain in detail Radiography testing method along with its advantages, disadvantages.	**05**
		OR	
Q.4	**(a)**	Describe Magnetic Particle Test principle and advantages.	**05**
	(b)	Describe Ultrasonic Testing Method and also mention its advantages and Limitations.	**05**
Q.5	**(a)**	Define Heat Treatment and classify heat treatment processes.	**05**
	(b)	Explain with a neat sketch Time-Temperature-Transformation (TTT) diagram for a eutectoid composition steel.	**05**
		OR	
Q.5	**(a)**	With proper justification choose appropriate heat treatment process for gear used in gearbox of car and explain the selected heat treatment process in detail.	**05**
	(b)	Discuss mechanisms of quenching of steel. State the advantages and drawbacks of water & oil as quenching media.	**05**

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