

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- VI EXAMINATION – SUMMER 2026

Subject Code:3162107

Date:08-06-2026

Subject Name: Heat treatment

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 heat treatment? Why it is carried out? Explain.	03
	(b) What is normalizing? Describe the normalizing temperature range for hypo- and hyper-eutectoid steels.	04
	(c) What is hardening? Discuss briefly. Describe the changes in material properties due to hardening.	07
Q.2	(a) Explain how properties get improved with carburizing.	03
	(b) What is annealing? Using suitable examples explain difference in full annealing and partial annealing.	04
	(c) Describe importance of austenitic grain size.	07
	OR	
	(c) What is austenitic grain size? Describe the method for determination of austenitic grain size.	07
Q.3	(a) Discuss factors to be considered before selecting a quenching medium.	03
	(b) Describe effect of critical cooling rate on properties of heat-treated parts.	04
	(c) Discuss the kinetics of austenitic formation.	07
	OR	
Q.3	(a) List the requirements of a good quenching medium.	03
	(b) Explain the mechanism of heat removal during quenching.	04
	(c) Draw and explain Time - Temperature -Transformation (TTT) diagram for hypereutectoid steel.	07
Q.4	(a) Describe how martensite differs from pearlite.	03
	(b) Write a short note on austempering.	04
	(c) Explain Hull-Mehl model of pearlitic transformation.	07
	OR	
Q.4	(a) Draw schematic transformation diagram for martempering.	03
	(b) Describe the structural changes taking place during tempering treatment.	04
	(c) What is carburizing? Describe the solid carburizing.	07
Q.5	(a) Describe the principle of laser hardening.	03
	(b) Explain the process of flame hardening.	04
	(c) Discuss the Bain distortion model of martensitic transformation.	07
	OR	
Q.5	(a) List advantages and limitation of tempering treatment.	03
	(b) Explain the process of induction hardening.	04
	(c) What is martensitic transformation? Explain effect of applied stress on martensitic transformation.	07
