

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019****Subject Code: 2162107****Date: 09/12/2019****Subject Name: Heat Treatment****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Define Heat treatment. List out Heat treatment processes.	03
	(b) Differentiate between Annealing and Normalizing.	04
	(c) Explain time temperature transformation (TTT) diagram for Eutectoid steel.	07
Q.2	(a) "Hardening by quenching is followed by tempering" Justify	03
	(b) If the ASTM grain size number is 8, calculate the average grain diameter in microns assuming the grains to be spherical.	04
	(c) How formation of austenite on heating is done for eutectoid steel? Explain it.	07
	OR	
	(c) Discuss Bain distortion model for martensitic formation.	07
Q.3	(a) Differentiate between upper and lower Bainite.	03
	(b) For improve machinability of Bearing steel which heat treatment is suggested? Justify and explain.	04
	(c) Explain Hull – Mehl model for pearlitic transformation.	07
	OR	
Q.3	(a) Explain effect of Cr and C on hardenability of steel.	03
	(b) Differentiate between full annealing and partial annealing	04
	(c) Short note on Austempering	07
Q.4	(a) Write note on Retained Austenite.	03
	(b) Discuss different Characteristics of Quenchants.	04
	(c) What are different methods of case carburizing and give its need? Explain pack carburizing by coal.	07
	OR	
Q.4	(a) Differentiate between hardness and Hardenability.	03
	(b) Discuss effect of inter lamellar spacing of pearlite on the kinetics of formation of austenite on heating.	04
	(c) Explain hardenability measurement by Jominy End Quench test.	07
Q.5	(a) Short note on Patenting.	03
	(b) Compare induction hardening and flame hardening.	04
	(c) Explain heat treatment of EN: 8 steel with composition, properties, application and microstructure.	07
	OR	
Q.5	(a) Compare cyaniding and carbonitriding case Hardening process.	03
	(b) Write brief on CCT diagram.	04
	(c) List out defects in heat treated parts. Explain any one with causes and remedies.	07
