Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023

Subject Code:3132004 Date:01-08-2023

Subject Name:Principles of Materials Science and Metallurgy

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define: (1) Toughness (2) Hardness (3) Malleability	**03**
	(b)	Classify various types of engineering materials.	**04**
	(c)	Enlist and explain different point defects in metallic and ionic materials.	**07**
Q.2	**(a)**	Explain engineering requirements of materials.	**03**
	(b)	Define atomic packing factor (APF) and find APF for BCC material.	**04**
	(c)	Write a short note on Bragg's Law.	**07**
		OR	
	(c)	Differentiate between ductile fracture and brittle fracture.	**07**
Q.3	**(a)**	Explain interstitial solid solution.	**03**
	(b)	Explain eutectic and peritectic reaction.	**04**
	(c)	Draw and lable Iron – Iron Carbide diagram. Also explain the reactions taking place in it.	**07**
		OR	
Q.3	**(a)**	State and explain Gibb's Phase Rule.	**03**
	(b)	Explain jominy hardenability test.	**04**
	(c)	Explain with neat sketch TTT diagram for heat treatment of steel.	**07**
Q.4	**(a)**	Classify heat treatment processes.	**03**
	(b)	Differentiate between annealing and normalizing.	**04**
	(c)	Describe effect of quenching media on properties of steel during heat treatment.	**07**
		OR	
Q.4	**(a)**	Explain Austempering process.	**03**
	(b)	Explain any one method for production of metal powders.	**04**
	(c)	Name different types case hardening methods. Explain pack carburizing process with the help of a neat diagram.	**07**
Q.5	**(a)**	Enlist the steps involved in micro examination of specimen.	**03**
	(b)	Describe atomization process with help of neat sketch.	**04**
	(c)	Explain the advantages and disadvantages of powder metallurgy.	**07**
		OR	
Q.5	**(a)**	What is the main objectives of NDT method?	**03**
	(b)	What are the limitations and capabilities of LPT.	**04**
	(c)	Explain in detail Radiography testing method along with its advantages, disadvantages.	**07**