Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3162115 Date:28-11-2024

Subject Name:Advanced Materials

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.**

			Marks
Q.1	**(a)**	Why Stainless steels shows good corrosion resistance? Explain.	**03**
	(b)	Discuss the properties and applications of Austenitic Stainless Steel.	**04**
	(c)	Write the important characteristics of High-speed steels. Explain the phenomenon of secondary hardening in H.S.S.	**07**
Q.2	**(a)**	What is cast iron? Give the detailed classification of Cast Iron.	**03**
	(b)	What are Ni -hard and Heat resistance cast irons?	**04**
	(c)	Compare grey cast iron and nodular cast iron with reference to structure, applications and properties.	**07**
		OR	
	(c)	Write a short note on plain carbon steel.	**07**
Q.3	**(a)**	Discuss about the characteristic of High strength low alloy steel (HSLA).	**03**
	(b)	Discuss the factors for selection of alloys for high temperature applications.	**04**
	(c)	What are the important Titanium alloys? Give their chemical composition, properties and applications.	**07**
		OR	
Q.3	**(a)**	State the characteristic of free cutting steel.	**03**
	(b)	Explain the composition, properties and applications of Maraging steels.	**04**
	(c)	What are the important mechanical properties of pure Aluminium? Name a few important Aluminium alloys. Give the properties and applications of any three of them.	**07**
Q.4	**(a)**	Define glass materials. How does it different from other ceramic materials.	**03**
	(b)	Write a short note on Cryogenic materials.	**04**
	(c)	Define composite materials? What are the various types of composite materials? Write the important properties and applications of composite materials?	**07**
		OR	
Q.4	**(a)**	Write a short note on Bio-Materials.	**03**
	(b)	What do you mean by nano-materials? Why nano materials have superior properties than bulk materials?	**04**
	(c)	Give typical composition and applications of following super alloys like INCONEL, DS-NICKE, STELLITE-6B.	**07**
Q.5	**(a)**	What is Smart Material? Why does piezoelectric is called a smart Material?	**03**

	(b)	Why are nickel base single crystal super alloys the most preferred material for gas turbine blades?	**04**
	(c)	What are super alloys? Discuss various advantages, disadvantages and applications of the superalloys.	**07**

OR

Q.5	**(a)**	Write the properties and applications of Mg alloys used for light weight applications in Automobile sectors.	**03**
	(b)	What are surface composites? Give basic properties and applications of Surface composites.	**04**
	(c)	Describe the manufacturing of Nano Carbon Tube.	**07**

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