Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2152109 **Date: 10/05/2017**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is Stainless steels?	
	2	What is Alloy cast iron?	
	3	What are Super alloys?	
	4	Define Glass transition temperature.	
	5	Define Glass forming ability.	
	6	Define Nano technology.	
	7	What is Carbon nano tubes?	
	8	What is Magneto- rheological fluid?	
	9	What is ceramic?	
	10	Define bio-functionality.	
	11	Define bio-inertness.	
	12	Define biocompatibility.	
	13	Define superconductivity.	
	14	What is composite?	
Q.2	**(a)**	Give limitations of magnesium to be used for engineering applications	**03**
	(b)	Discuss the applicability of titanium as aerospace material.	**04**
	(c)	Explain different mechanism by which high strength and creep resistance are achieved in super alloys. Enlist the properties of Co-based super alloys.	**07**
		OR	
	(c)	Give the composition, properties, applications and heat treatment cycle for Type-1 Ni-hard cast Iron.	**07**
Q.3	**(a)**	Why free cutting steel contain high sulphur content? Explain.	**03**
	(b)	Differentiate between M-type and T-type high speed tool steel.	**04**
	(c)	Mention the properties and applications of Ferritic stainless steel. Give the composition of 409 and 405 stainless steel.	**07**
		OR	
Q.3	**(a)**	Mention the properties of duplex stainless steels.	**03**
	(b)	Explain the Heat treatment cycle for Maraging steel.	**04**
	(c)	What is a TRIP steel? Explain the structure, properties and applications of these steels.	**07**
Q.4	**(a)**	Enlist the properties of metallic glasses.	**03**
	(b)	Give the properties of Fe-based super alloys.	**04**
	(c)	Explain the mechanism of mechanical alloying technique for nano-material production. Give the factors affecting mechanical alloying.	**07**
		OR	
Q.4	**(a)**	Give applications of Nano materials.	**03**
	(b)	Discuss the melt spinning technique to produce the metallic glasses.	**04**
	(c)	Write a note on shape memory alloys.	**07**

Q.5	**(a)**	Nacl or any gas does not show Piezo character. Explain why?	**03**
	(b)	Give the Properties required by biomaterials.	**04**
	(c)	Discuss the properties and applications of cryogenic materials.	**07**

OR

Q.5	**(a)**	Classify the composites.	**03**
	(b)	Describe the requirements of aero-space materials	**04**
	(c)	Describe properties and application of Ni-Ti alloy as a useful bio-material.	**07**

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