Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2152109 Date:30/11/2016

Subject Name:Advanced Materials

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Maximum carbon % in 304L is____	1
	2	Crystal structure of Hadfield manganese steel is_____	1
	3	Main alloying element in A4XXX series Al alloys is___	1
	4	Crystal structure of continuous matrix in Ni-base super alloys is__	1
	5	Feature sizes of nanomaterials are within____	1
	6	Define metallic glasses.	1
	7	What is Nicrosilal?	1
	8	What is Hastelloy?	1
	9	What is Electro-rheological fluid?	1
	10	What is Magneto- rheological fluid?	1
	11	Define superconducting materials.	1
	12	Define surface metal matrix composites.	1
	13	Define metal matrix composites.	1
	14	Define bio functionality.	1
Q.2	**(a)**	Give the composition and applications of High silicon cast iron.	**03**
	(b)	Describe properties and applications of Ni -hard**.**	**04**
	(c)	Discuss the characteristics of Titanium and Magnesium that makes them attractive for certain engineering applications.	**07**
		OR	
	(c)	Explain biocompatibility. Describe properties and application of Co-Cr-Mo alloys as a bio-material.	**07**
Q.3	**(a)**	List characteristics & applications of free cutting steel.	**03**
	(b)	Describe the properties of Austenitic stainless steel.	**04**
	(c)	TRIP steel satisfying the requirements of automotive industry for good formable high strength steel". Justify and comment on it.	**07**
		OR	
Q.3	**(a)**	Describe the properties of Stainless steel.	**03**
	(b)	Mention the properties and applications of duplex stainless steels.	**04**
	(c)	What do you mean by tool steel? Give its requirements, properties and applications.	**07**
Q.4	**(a)**	Mention the composition and applications of Waspaloy.	**03**
	(b)	Describe the properties and applications of Fe-based superalloys.	**04**
	(c)	Compare metallic glasses with their crystalline counterparts. Discuss the melt spinning technique to produce the metallic glasses.	**07**
		OR	
Q.4	**(a)**	Describe the properties of metallic glasses.	**03**
	(b)	Discuss the piston and anvil technique to produce the metallic glasses.	**04**
	(c)	Explain different mechanism by which high strength and creep resistance are achieved in super alloys.	**07**

Q.5	**(a)**	Describe the requirements of aero-space materials.	**03**
	(b)	Discuss the working of Piezoelectric materials in detail.	**04**
	(c)	Explain the mechanism of mechanical alloying technique for nano-material production. Give the factors affecting mechanical alloying.	**07**

OR

Q.5	**(a)**	Give some examples and applications of Nano materials.	**03**
	(b)	Discuss the properties and applications of cryogenic materials.	**04**
	(c)	What is Smart Material? Write a note on shape memory alloys.	**07**

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