

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V (New) EXAMINATION – WINTER 2019

Subject Code: 2152109

Date: 29/11/2019

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	(a) Enlist the properties of Stainless steel and classify it.	03
	(b) Discuss how Inter Granular corrosion is harmful for stainless steel. Suggest methods to minimize it.	04
	(c) Describe important characteristics & applications of free cutting steel. Give typical composition of a free cutting steel.	07
Q.2	(a) What are Ni -hard cast iron? Describe their properties.	03
	(b) Give the composition and properties of High silicon cast iron.	04
	(c) What is a TRIP steel? "TRIP steel satisfying the requirements of automotive industry for good formable high strength steel". Justify and comment.	07
	OR	
	(c) Mention the properties and applications of Ferritic stainless steel. Give the composition of 409 and 405 stainless steel.	07
Q.3	(a) Write the properties of Hastelloy	03
	(b) Give the properties and applications of Fe-based superalloys.	04
	(c) Describe the metallurgical aspects of Titanium and its alloys including their properties and applications.	07
	OR	
Q.3	(a) Define and explain biocompatibility.	03
	(b) Explain bio-inertness and bio-functionality.	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
Q.4	(a) What are metallic glasses? Write applications.	03
	(b) Describe the properties of metallic glasses.	04
	(c) Explain the sol-gel technique for nano-material production. Draw the necessary diagram. Give advantages of this method.	07
	OR	
Q.4	(a) Give some examples and applications of Nano materials.	03
	(b) Write a note on carbon nanotubes.	04
	(c) Discuss the piston and anvil technique to produce the metallic glasses. Compare the metallic glasses with their crystalline counter parts.	07
Q.5	(a) What is Smart Material? Give their advantages.	03
	(b) Discuss the working of Piezoelectric materials.	04
	(c) Classify composites. Discuss properties & applications of metal matrix composites.	07
	OR	
Q.5	(a) Describe properties of semi conducting materials.	03
	(b) Discuss the properties of cryogenic materials.	04
	(c) Write a note on shape memory alloys.	07
