

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2152109****Date: 19/06/2019****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	(a) Give advantages of sol-gel technique for nano-material production.	03
	(b) Describe the Gas Condensation Technique for Ultrafine Nano Particle production.	04
	(c) Define metallic glasses. Compare properties of metallic glasses with their crystalline counter parts. Mention advantages, limitations and applications of metallic glasses.	07
Q.2	(a) Give the classification and applications of Fe-based superalloys.	03
	(b) Explain mechanism by which high strength and creep resistance are achieved in super alloys.	04
	(c) Give the composition, properties, applications and heat treatment cycle for Type-1 Ni-hard cast Iron.	07
<b>OR</b>		
	(c) Describe the metallurgical aspects of Titanium and its alloys including their properties and applications.	07
Q.3	(a) Why free cutting steel contain high sulphur content? Give typical composition of a free cutting steel.	03
	(b) Why Austenitic Stainless Steel become slightly magnetic after welding? How to restore non magnetic state in welded structure?	04
	(c) What is sensitization? Discuss how Inter Granular corrosion is harmful for stainless steel. Suggest the methods to minimize it.	07
<b>OR</b>		
Q.3	(a) Differentiate between M-type and T-type high speed tool steel.	03
	(b) Mention the properties and applications of Martensitic stainless steel.	04
	(c) TRIP steel satisfying the requirements of automotive industry for good formable high strength steel". Justify and comment on it.	07
Q.4	(a) What are Smart Materials? Give advantages.	03
	(b) Mention the properties, and applications of Hastelloy.	04
	(c) Explain the chemical vapour deposition technique for nano-material production. Draw the necessary diagram. Give its advantages.	07
<b>OR</b>		
Q.4	(a) Define and Classify the composites.	03
	(b) Mention the properties and applications of Inconel.	04
	(c) Define Piezoelectricity and write a note on Piezoelectric materials. Nacl or any gas does not show Piezo character. Why?	07
Q.5	(a) Give the Properties required by biomaterials.	03
	(b) Discuss the piston and anvil technique to produce the metallic glasses.	04
	(c) Describe the requirements of aero-space materials. Suggest some candidate materials.	07

- Q.5** (a) Define and explain biocompatibility. **03**  
(b) Discuss the melt spinning technique to produce the metallic glasses. **04**  
(c) Define bio-materials. Describe properties and application of Ni-Ti alloy as a useful bio-material. **07**

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