

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

- 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 **07**  
as a useful bio-material.

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