

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI EXAMINATION – SUMMER 2025

Subject Code:3162115

Date:26-05-2025

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.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
<b>Q.1</b> (a) Describe important characteristics of free cutting steel.	<b>03</b>
(b) Discuss the properties and applications of Martensitic stainless steel.	<b>04</b>
(c) What is a TRIP steel? Explain the structure and properties of these steels. Enlist applications.	<b>07</b>
<b>Q.2</b> (a) Discuss the critical properties of spring steels.	<b>03</b>
(b) Discuss important characteristics and applications of High speed steel.	<b>04</b>
(c) Explain how Inter Granular corrosion is harmful for stainless steel. Suggest the methods to minimize it.	<b>07</b>
<b>OR</b>	
(c) Write a note on HSLA steels including properties and applications.	<b>07</b>
<b>Q.3</b> (a) Give the properties of Ni-hard cast Iron.	<b>03</b>
(b) Describe the properties and applications of High silicon cast iron.	<b>04</b>
(c) Explain Strengthening mechanism in super alloys.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Discuss the use of titanium and its alloys as aerospace material.	<b>03</b>
(b) Describe the applications of aluminum and its alloys.	<b>04</b>
(c) Describe the properties and applications of Inconel. Give the composition of Inconel 600 and 625.	<b>07</b>
<b>Q.4</b> (a) What are Nano materials? Describe applications of Nano materials.	<b>03</b>
(b) Define metallic glasses. Compare it with crystalline alloys.	<b>04</b>
(c) Discuss the piston and anvil technique to produce the metallic glasses. Describe applications of metallic glasses.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Describe advantages and limitations of metallic glasses.	<b>03</b>
(b) Write a note on carbon nanotubes.	<b>04</b>
(c) Explain the sol-gel technique for nano-material production. Draw the necessary diagram.	<b>07</b>
<b>Q.5</b> (a) Write the advantages and applications of shape memory alloys.	<b>03</b>
(b) Discuss the working of Piezoelectric materials.	<b>04</b>
(c) Write a note on Electro-rheological fluids.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Discuss the properties of cryogenic materials.	<b>03</b>
(b) Define bio-materials. Explain biocompatibility.	<b>04</b>
(c) Classify the composites. Discuss properties & applications of metal matrix composites.	<b>07</b>

\*\*\*\*\*