

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII EXAMINATION – WINTER 2025****Subject Code: 3171931****Date:28-11-2025****Subject Name: Nanotechnology and surface Engineering****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
Q.1	(a) Write a short note on engineering scale of nanotechnology. (b) Prove mathematically: “Nanomaterials possess more surface area than normal materials.” (c) Write a detailed classification of nanomaterials based on different criteria.	03 04 07
Q.2	(a) List the challenges faced by nanotechnology (b) List different applications of nanotechnology. (c) Explain different physical and chemical properties of nanomaterials.	03 04 07
	OR	
	(c) Explain synthesis of nanomaterials by high energy ball milling along with its advantages and disadvantages.	07
Q.3	(a) Write the advantages and disadvantages of XRD. (b) Write a short note on magnetron sputtering. (c) Explain synthesis of nanomaterials by vapour condensation method along with its advantages and disadvantages.	03 04 07
	OR	
Q.3	(a) Explain the principle of hydrothermal method for synthesis of nanomaterials. (b) Differentiate between top down and bottom up approach. (c) Explain TEM with a neat sketch along with applications, advantages and disadvantages.	03 04 07
Q.4	(a) Explain the principle of UV/Visible spectroscopy. (b) Explain the need for cleaning and surface preparation of metal surfaces before coating. (c) Write a detailed classification of protective coatings. Explain metallic coatings in detail.	03 04 07
	OR	
Q.4	(a) Explain the principle of Bragg’s law with respect to XRD. (b) Differentiate between shot blasting and sand blasting. (c) List six methods used for cleaning and surface preparation of metal surfaces before coating. Explain any one in detail.	03 04 07
Q.5	(a) List the applications of friction stir welding in different fields. (b) Explain advantages and disadvantages of electroplating.	03 04

(c) List different surface modification techniques using laser. Explain any one in detail. **07**

OR

Q.5 (a) Explain the importance of surface modification. **03**
(b) Write the advantages, disadvantages and applications of powder coating. **04**
(c) Explain ion implantation method along with its advantages, disadvantages and applications. **07**
