Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3171931 Date:16-12-2023

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.**

Q.1	**(a)**	Explain the importance of surface engineering.	**03**
	(b)	Explain shot blasting process for surface preparation.	**04**
	(c)	What is shot peening? Describe working of shot peening to impart compressive residual stresses on to the surface of a given component.	**07**
Q.2	**(a)**	Give a classification of coatings with applications of each.	**03**
	(b)	Explain vapour phase degreasing for surface preparation.	**04**
	(c)	Compare the ‘Top down’ and ‘Bottom-up’ approach of nanomaterial synthesis.	**07**
		OR	
	(c)	List different techniques of nanomaterial synthesis. Explain any one.	**07**
Q.3	**(a)**	Describe why materials behave so differently at nanoscale?	**03**
	(b)	Give a detailed classification of nano materials with examples of each.	**04**
	(c)	Define Nano technology. Write a note on nano sensors. Give applications.	**07**
		OR	
Q.3	**(a)**	What is atomic force microscopy (AFM). Write its applications.	**03**
	(b)	Explain briefly sample preparation techniques for AFM.	**04**
	(c)	Describe applications of nano materials in food and agriculture industries.	**07**
Q.4	**(a)**	What is TEM? Differentiate SEM and TEM.	**03**
	(b)	Write a note on Sputtering. Give its uses in nanotechnology.	**04**
	(c)	Describe the Vapor Condensation Technique. Give its uses in nanotechnology.	**07**
		OR	
Q.4	**(a)**	Discuss advantages and limitations of SEM to characterize nano materials.	**03**
	(b)	Write a note on Spray Pyrolysis.	**04**
	(c)	What is X-ray diffraction (XRD)? How it is useful in nano material characterization? Explain any one method of XRD.	**07**
Q.5	**(a)**	What is sample requirement in TEM?	**03**
	(b)	What are surface composites? Explain how they differ from normal composites. Enlist their advantages.	**04**
	(c)	Describe Friction stir processing. Explain the use of Friction stir processing in surface modification.	**07**
		OR	
Q.5	**(a)**	Give advantages and applications of plasma spray coating method.	**03**
	(b)	Explain plasma spray coating method.	**04**
	(c)	What is ion implantation? Describe the use of ion implantation in surface modification.	**07**

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