Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3170509 Date:22-05-2024

Subject Name: Nanoscience and Technology

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

			MARKS
Q.1	**(a)**	Define Nanotechnology. List out the challenges faced by Nanotechnology.	**03**
	(b)	Define top down and bottom up approach. How does nano size influence the electron band gap?	**04**
	(c)	Explain in detail magnetic, optical, thermal, and catalytic properties of nanomaterials.	**07**
		What are the challenges involved in	
Q.2	**(a)**	What is meant by nucleation? What are zero, one and two dimensional nano structures?	**03**
	(b)	List out the advantages of bottom up approach over top down approach.	**04**
	(c)	With neat diagram explain the working principle of high energy ball milling.	**07**
		OR	
	(c)	Define Emulsion. Write a note on stability problem in Emulsion.	**07**
Q.3	**(a)**	What are the precautions required while operating Atomic force microscopy?	**03**
	(b)	Compare the working of Scanning electron microscopy and Transmission electron microscopy.	**04**
	(c)	Explain in detail the principle, working and application of UV-Vis spectrophotometer.	**07**
		OR	
Q.3	**(a)**	What is dynamic light scattering analysis? State its applications.	**03**
	(b)	What is the principal of Fourier transform infrared spectroscopy? What are the most common applications of Fourier transform infrared spectroscopy?	**04**
	(c)	Explain in detail the principle, working and application of X-ray diffraction.	**07**
Q.4	**(a)**	What is meant by crystal growth? What factors affect the crystal growth?	**03**
	(b)	What are the advantages and limitations of physical vapor deposition process?	**04**
	(c)	With a neat diagram explain the sol gel method.	**07**

OR

Q.4	**(a)**	Compare the photolithography and electron beam lithography techniques.	**03**
	(b)	Write briefly on molecular self-assembly.	**04**
	(c)	With a neat diagram explain chemical vapor deposition process.	**07**
Q.5	**(a)**	What are natural nanomaterials? State the name of natural nanomaterials.	**03**
	(b)	What is meant by single walled and multi walled carbon nanotubes. Write down the applications of carbon nanotubes.	**04**
	(c)	Discuss in detail the application of nanomaterials in drug delivery and diagnostics.	**07**

OR

Q.5	**(a)**	What are nanocomposites? State its applications.	**03**
	(b)	Discuss the historical events in the field of nanotechnology.	**04**
	(c)	Discuss in detail the application of nanomaterials in photocatalysis.	**07**

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