

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:3152112****Date:20-05-2025****Subject Name:Nano 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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) How Nano materials are different from Conventional materials	03
	(b) Classify Nanomaterials according to their structures.	04
	(c) “There is plenty of room at the Bottom” –Discuss this historical statement given by Richard Feynman.	07
Q.2	(a) Explain relationship between Nano-Science & Nano-Technology	03
	(b) Why it is required to develop nano-technology ?	04
	(c) List our various commercial products / devices / apparatus available in global market, making use of nano-technology.	07
	OR	
	(c) List the several types of nanostructures, their sizes, and their applications.	07
Q.3	(a) What is the effect on Surface area to Bulk volume ratio in nano grain materials.	03
	(b) Why conventional methods of metal fabrication are not useful for nano-materials ?	04
	(c) Compare Bottom-Up approach and Top-down approach with suitable examples.	07
	OR	
Q.3	(a) Draw schematic of 1D Structure-2D Structure and 3D structure.	03
	(b) What will be the effect on melting point of materials due to reduction of grain size from microscopic to nano-scopic dimensions.	04
	(c) Explain –Inverse Hall patch relationship phenomena associated with nano-grains material? What is critical grain diameter (dc) ?	07
Q.4	(a) Write short note on “Sol-gel” synthesis route for creation of nanomaterials.	03
	(b) Explain the Chemical Vapour deposition technique of Nano synthesis.	04
	(c) Draw & explain High Energy Ball Milling Process for Nanopowder Production. State the applications and uses of Nano powders?	07
	OR	
Q.4	(a) Draw and compare Single Wall Nanotube (SWNT) and Multi Wall nanotube (MWNT) structures.	03
	(b) What is Super-plasticity effect with respect to nano materials?	04
	(c) Differentiate between Quantum wells, quantum wires and quantum dots.	07

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| Q.5 | (a) | List the properties of Carbon Nanotubes (CNTs) material. | 03 |
| | (b) | Write a brief note on Nano composites material. | 04 |
| | (c) | Draw schematic of ferro-magnetism, para-magnetism and di-magnetism effect and state the application of these materials in electronic industries. | 07 |

OR

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|------------|------------|---|-----------|
| Q.5 | (a) | Give definitions of Cluster, Colloids, Nano-particles and nano-crystal. | 03 |
| | (b) | How a nanostructure can be characterized? Discuss anyone characterization method with schematics. | 04 |
| | (c) | Give your views in one-two sentences only. | 07 |

1. Explain in a few sentences how the properties of nano materials differ from their bulk state properties ?
2. What is the energy solutions expected from nano-technology?
3. How Nano-technology is useful for medical science & application?
