

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020

Subject Code:3152112

Date:03/02/2021

Subject Name:Nano Materials

Time:10:30 AM TO 12:30 PM

Total Marks: 56

Instructions:

1. Attempt any **FOUR** questions out of **EIGHT** questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

| | | Marks |
|------------|--|--------------|
| Q.1 | (a) Differentiate between Conventional material and Nanomaterials. | 03 |
| | (b) Give classification of Nanomaterials based on its Structures. | 04 |
| | (c) “There is plenty of room at the Bottom” –discuss this statement with suitable example. | 07 |
| Q.2 | (a) Define- Nanotechnology and give example of any company using Nanotechnology for its product. | 03 |
| | (b) Discuss how nanomaterials are foreseen as promising materials for future technology. | 04 |
| | (c) What is nanostructured bulk material ? Draw and explain with suitable schematics. | 07 |
| Q.3 | (a) List out various Synthesis routes for fabrication of nanomaterials. | 03 |
| | (b) Why fabrication of Nanomaterials is different from that conventional materials fabrication methods? | 04 |
| | (c) Differentiate between “Bottom-Up” and “Top- Down” approach of fabrication of nano materials with suitable schematic and examples. | 07 |
| Q.4 | (a) Draw schematic of 1D Structure-2D Structure and 3D structure. | 03 |
| | (b) Explain the –“Inverse Hall petch relationship” with respect to Nanomaterials with graph. | 04 |
| | (c) What is “Nano-size induced effect” on Melting point, Surface area to Bulk volume ratio and on optical properties? | 07 |
| Q.5 | (a) Briefly explain-How Properties of Nanomaterials are different than their properties at bulk state ? | 03 |
| | (b) Write short note on “Sol-gel” synthesis route for creation of nanomaterials. | 04 |
| | (c) Explain High energy Ball Milling Process for production of Nanopowders. What are the use and application of Nano powders? Discuss with suitable example. | 07 |
| Q.6 | (a) List out various Carbon Nanostructures and draw schematics of each. | 03 |
| | (b) What is Super-plasticity phenomena? Discuss. | 04 |
| | (c) What is “Quantum confinement”? Differentiate between Quantum wells, quantum wires and quantum dots. | 07 |
| Q.7 | (a) What are the potential application of Carbon nanotube (CNT) for Nuclear energy process. ? | 03 |
| | (b) Write Short note on Nanocomposite materials. | 04 |
| | (c) Discuss –Ferro-magnetism, para-magnetism and Di-magnetism. What is the use of magnetic materials in electronics Industries? | 07 |

- Q.8 (a) Give definitions of Cluster, Colloids, Nano-particles and nano-crystal. 03
- (b) List out the sophisticated equipment to characterize Nanostructures. 04
- (c) List out few applications of Nanotechnology in 1. Sports goods and equipments 2. Health care and medicine 3. Consumer products 4. Automobiles and Aerospace 5. Electronics 6. Textiles. 7. Nuclear power Industries. 07

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