

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII EXAMINATION – WINTER 2025

Subject Code:3170509

Date:20-11-2025

Subject Name:Nanoscience and Technology

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) Define nanotechnology. What is the relationship between nanometer and micrometer? **03**

(b) Discuss the historical events in the field of nanotechnology. **04**

(c) Discuss effects of nanoscience and technology in different fields. **07**

Q.2 (a) Define zero, one and two dimensional nanomaterials with suitable examples. **03**

(b) Compare and contrast the features of top-down and bottom up approaches of synthesis of nanomaterials. **04**

(c) Discuss colour generation from nanoparticles and nanostructures due to interaction with light or other reasons with examples. **07**

OR

(c) Explain the effect of nanometer length scale on diffusivity, melting point and solubility of materials. **07**

Q.3 (a) What are the precautions required while operating Atomic force microscopy? **03**

(b) Explain the principle and working of dynamic light scattering method. **04**

(c) With neat diagram explain the working principle of high energy ball milling. **07**

OR

Q.3 (a) What is EDS analysis? State its application. **03**

(b) Explain the principle of FTIR analysis. Which type of spectral information can be obtained from FTIR analysis? **04**

(c) Define Emulsion. Write a note on stability problem in Emulsion. **07**

Q.4 (a) Explain Beer-Lambert law in context with UV-VIS spectroscopy. **03**

(b) Discuss briefly the principle of Sol-gel method of synthesis of nanomaterials. **04**

(c) Compare and contrast the salient features of scanning electron microscopy and transmission electron microscopy. **07**

OR

Q.4 **(a)** Discuss steps of Nano-lithography **03**

(b) What are the advantages and limitations of physical vapor deposition process? **04**

(c) With a neat diagram explain chemical vapor deposition process. **07**

Q.5 **(a)** What are nanocomposites? State its applications. **03**

(b) Discuss application of Nano oxide as protective coatings. **04**

(c) Discuss the application of nanomaterials in drug delivery and diagnostics. **07**

OR

Q.5 **(a)** Discuss the role of nanomaterials in advances on catalysis. **03**

(b) What is meant by single walled and multi walled carbon nanotubes. Write down the applications of carbon nanotubes. **04**

(c) Compare the photolithography and electron beam lithography techniques. **07**
