

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (New) EXAMINATION – WINTER 2018****Subject Code: 2133904****Date: 12/12/2018****Subject Name: Characterization of Nanomaterials-I****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.

| | | MARKS |
|-----|---|-------|
| Q.1 | (a) Explain Briefly Bragg's Law. | 03 |
| | (b) Describe different modes of AFM with Diagram. | 04 |
| | (c) Write short note on Scanning Electron Microscope SEM. (With Diagram) | 07 |
| Q.2 | (a) Write down Components of AFM. | 03 |
| | (b) Write down Advantages and Disadvantages of SEM. | 04 |
| | (c) Explain Transmission Electron Microscope TEM. (With Diagram) | 07 |
| | OR | |
| | (c) Describe Advanced Optical Microscopy AOM. | 07 |
| Q.3 | (a) Define Profilometry briefly. | 03 |
| | (b) Describe Two Probe Method For Electrical Measurement. | 04 |
| | (c) Explain Working of Scanning Tunneling Microscope STM. | 07 |
| | OR | |
| Q.3 | (a) What Happens when a Non-Conducting Sample is placed in the SEM and Which technique is used for the measurement of data? | 03 |
| | (b) Derive Bragg's Law for XRD. | 04 |
| | (c) Explain Working and Construction of X-Ray Diffraction XRD with Diagram and how it is used to measure Particle size. | 07 |
| Q.4 | (a) Explain the Concept of Tunneling. | 03 |
| | (b) Explain Drawbacks of Two Probe Method over Four Probe Method. | 04 |
| | (c) Describe Working and Principle of Atomic Force Microscope AFM. | 07 |
| | OR | |
| Q.4 | (a) Which Mode of AFM operation is responsible for destruction of sample? | 03 |
| | (b) What is Cantilever? In which Microscopy it is used? | 04 |
| | (c) List out Application of SEM and TEM. | 07 |
| Q.5 | (a) List out the components used in Four Probe Method with Diagram. | 03 |
| | (b) Define Conductivity, Resistivity, and Ohm's Law with Units. | 04 |

- (c) Explain Resistivity Measurement through Four Probe Method with Setup. **07**

OR

- Q.5** (a) Define Elliptical Polarized Light. **03**
(b) Describe Advantages and Disadvantages of TEM. **04**
(c) Write short note on Ellipsometry. (Construction and Working with Diagram) **07**

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