

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

(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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