

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III(New) • EXAMINATION – WINTER 2016****Subject Code:2133904****Date:09/01/2017****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.

		<b>MARKS</b>
<b>Q.1</b>	<b>Short Questions</b>	<b>14</b>
	1 Give Full Form of the TEM.	
	2 Write down Scherer formula.	
	3 What is interference?	
	4 Write down Bragg`s formula.	
	5 Magnetic Lenses is made of what?	
	6 What is sheet resistivity?	
	7 What is resolution?	
	8 Give full form of SEM.	
	9 What is Diffraction?	
	10 In which technique resolution is better, SEM or TEM.	
	11 What do mean by a detector in microscopy?	
	12 Can we find out particle size using TEM?	
	13 Can we find out particle size using SEM?	
	14 Which material is used as a filament in electron gun?	
<b>Q.2</b>	(a) Explain electron gun with schematic diagram.	<b>03</b>
	(b) Explain particle size determination using X-Ray diffraction pattern in material science and nanotechnology.	<b>04</b>
	(c) Describes Capacitance Measurements for advanced material.	<b>07</b>
<b>OR</b>		
	(c) Write down applications of X-Ray diffraction technique in the various fields of engineering.	<b>07</b>
<b>Q.3</b>	(a) Write a short note on Bragg`s law.	<b>03</b>
	(b) Explain resistivity and conductivity and give the name different techniques to measure it, in thin film and bulk material.	<b>04</b>
	(c) Write down application of TEM Characterization.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Write a short note on two probe measurement methods for resistivity measurements.	<b>03</b>
	(b) Draw schematic diagram of Scanning Electron Microscope.	<b>04</b>
	(c) Explain compound optical microscope with schematic diagram.	<b>07</b>
<b>Q.4</b>	(a) Draw schematic diagram of TEM for nanomaterial characterization.	<b>03</b>
	(b) Write down advantage and disadvantage of Four Probe Resistivity measurements.	<b>04</b>
	(c) Write down applications of Scanning electron microscopy.	<b>07</b>

**OR**

- Q.4** (a) Explain Junction testing. **03**  
(b) Give the difference between optical and electron microscopy. **04**  
(c) Explain X-Ray diffraction for material characterization. **07**

- Q.5** (a) Draw schematic diagram of optical microscopy with essential notations. **03**  
(b) Give the difference between TEM and SEM microscopy in the field of nanotechnology. **04**  
(c) Explain profilometry technique with its applications. **07**

**OR**

- Q.5** (a) Draw the schematic diagram of magnetic lenses in microscopy. **03**  
(b) Write advantages and disadvantages of profilometry technique. **04**  
(c) Explain Ellipsometry technique with its applications. **07**

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