Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2015

Subject Code:2133904 **Date:18/12/2015**

Subject Name: Characterization of Nanomaterials-I

Time: 2:30pm to 5:00pm **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		**Short Questions**	**14**
	1	Give Full Form of SEM.	
	2	Write down Bragg`s formula.	
	3	What is sheet resistivity?	
	4	Write down Scherrer formula.	
	5	Magnetic Lenses is made of what?	
	6	What is interference?	
	7	What is Diffraction?	
	8	What do mean by detector.	
	9	What is resolution?	
	10	In which technique resolution is better, SEM or TEM.	
	11	Give Full Form of TEM.	
	12	Which material is used as a filament in electron gun?	
	13	Can we find out particle size using TEM?	
	14	Can we find out particle size using SEM?	
Q.2	**(a)**	Explain Bragg`s law.	**03**
	(b)	Explain how to find out particle size using X-Ray diffraction Pattern.	**04**
	(c)	Write down applications of X-Ray diffraction technique.	**07**
		OR	
	(c)	Write a short note on X-Ray diffraction for material characterization.	**07**
Q.3	**(a)**	Describe electron gun with schematic diagram.	**03**
	(b)	Draw schematic diagram of Transmission Electron Microscope.	**04**
	(c)	Write down applications of SEM microscopy.	**07**
		OR	
Q.3	**(a)**	Draw the schematic diagram of magnetic lenses.	**03**
	(b)	Write down advantage and disadvantage of Four Probe resistivity measurements.	**04**
	(c)	Write a short note on Capacitance Measurements.	**07**
Q.4	**(a)**	Draw schematic diagram of SEM microscopy for nanomaterial characterization.	**03**
	(b)	Give difference between SEM and TEM microscopy.	**04**
	(c)	Write down application of TEM Characterization.	**07**
		OR	
Q.4	**(a)**	Draw schematic diagram of optical microscopy with necessary notations.	**03**
	(b)	Give difference between optical and electron microscopy.	**04**
	(c)	Describe compound optical microscope with schematic diagram.	**07**

Q.5	**(a)**	Describe two probe measurement methods for resistivity measurements.	**03**
	(b)	Explain resistivity and conductivity and give the name different techniques to measure it.	**04**
	(c)	Describe Ellipsometry technique with its applications.	**07**

OR

Q.5	**(a)**	Describe Junction testing.	**03**
	(b)	Write advantages and disadvantages of four probe measurement method.	**04**
	(c)	Describe Profilometry technique with its applications.	**07**

****