

# C.U.SHAH UNIVERSITY

## Summer Examination-2016

Subject Name : Material Characterization

Subject Code : 5SC04MCE1

Branch : M. Sc.(Physics)

Semester : 4

Date : 07/05/2016

Time : 02:30 To 05:30

Marks :70

### Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

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### SECTION – I

- Q-1**      **Attempt the Following questions**      **(07)**
- a. Which type of methods are used to measure resistivity perpendicular to C-axis.      **01**
  - b. What is dielectric relaxation?      **01**
  - c. Give the life time of the excited species.      **01**
  - d. Define: Chromophores.      **01**
  - e. Why X-rays are used for crystal diffraction?      **01**
  - f. Give equation to measure particle size from X-ray data.      **01**
  - g. Why powder diffraction pattern are also called a finger print of a crystal?      **01**
- Q-2**      **Attempt all questions**      **(14)**
- a. Describe in detail construction and working of X-ray diffractometer.      **07**
  - b. Discuss the effect of the crystal size and stress on XRD plot and also explain indexing of XRD peaks.      **07**
- OR**
- Q-2**      **Attempt all questions**      **(14)**
- a. Discuss refinement of unit cell parameters in XRD plots.      **05**
  - b. Explain in detail working of TEM.      **05**
- Q-3**      **Attempt all questions**      **(14)**
- a. Explain in detail working of SEM.      **07**
  - b. Describe in detail working of STM.      **07**
- OR**
- Q-3**      a. Describe working of SFM in detail.      **07**
- b. Explain briefly:Ferroelectric materials.      **07**



## SECTION – II

<b>Q-4</b>	<b>Attempt the Following questions</b>	<b>(07)</b>
	a. Write full name of SFM.	<b>01</b>
	b. Define: dielectric materials.	<b>01</b>
	c. On which Optical device does the FTIR depend?	<b>01</b>
	d. What is an interferometer?	<b>01</b>
	e. Write full name of FTIR.	<b>01</b>
	f. Which type of information can be obtained using IR spectroscopy?	<b>01</b>
	g. Which type of information can be obtained using UV-VIS spectroscopy?	<b>01</b>
<b>Q-5</b>	<b>Attempt all questions</b>	<b>(14)</b>
	a. Explain Four Probe technique.	<b>05</b>
	b. Explain Cole-Cole plot using Cole-Cole equation.	<b>05</b>
	c. Explain P-E loop.	<b>04</b>
	<b>OR</b>	
<b>Q-5</b>	<b>Attempt all questions</b>	<b>(14)</b>
	a. Explain Van der Pauw technique.	<b>05</b>
	b. Explain absorption containing organic compounds.	<b>05</b>
	c. Write a note on: Charge transfer absorption.	<b>04</b>
<b>Q-6</b>	<b>Attempt all questions</b>	<b>(14)</b>
	a. Explain construction of UV-VIS spectrophotometer.	<b>07</b>
	b. Discuss various polarizabilities in a dielectric material.	<b>07</b>
	<b>OR</b>	
<b>Q-6</b>	<b>Attempt all Questions</b>	<b>(14)</b>
	a. Explain about the instrumentation and working of FTIR.	<b>07</b>
	b. Describe the factors affecting the resistivity measurements in a sample.	<b>07</b>

