

Enrollment No:-\_\_\_\_\_

Exam Seat No:-\_\_\_\_\_

# C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 5SC04MCE1

Subject Name: Material Characterization

Course Name: M.Sc. (Physics)

Date: 21/5/2015

Semester: IV

Marks: 70

Time: 10:30 TO 01:30

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**Instructions:**

- 1) Attempt all Questions in same answer book/Supplementary.
  - 2) Use of Programmable calculator & any other electronic instrument prohibited.
  - 3) Instructions written on main answer book are strictly to be obeyed.
  - 4) Draw neat diagrams & figures (if necessary) at right places.
  - 5) Assume suitable & perfect data if needed.
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**SECTION - I**

- Q.1 Answer in short: 7
- (a) Write full form of GIXRD.
  - (b) Write mathematical equation for Bragg's law of diffraction.
  - (c) Why X-Rays are used for crystal diffraction?
  - (d) Write full form of TEM.
  - (e) Write full form of LEED & RHEED.
  - (f) Write equation to obtain particle size from XRD data.
  - (g) Give reason why powder diffraction plot are also called finger print of a crystal.

- Q.2 Answer in detail 14
- (a) Describe construction of X-Ray Diffractometer in detail.
  - (b) Explain the effect of crystal size and stress on XRD plot and explain indexing of XRD peaks.

OR

- Q.2 Answer in detail 14
- (a) Explain refinement of unit cell parameters in XRD plots.
  - (b) Explain LEED and RHEED in detail.

- Q.3 Answer in detail 14
- (a) Describe working of SEM in detail.
  - (b) Describe working of TEM in detail.

OR

- Q.3 Answer in detail 14
- (a) Describe working of STM in detail.
  - (b) Describe working of AFM in detail.

**SECTION II**

- Q.4 Answer in detail 7
- (a) What are dielectric materials?



- (b) Write full form of AFM?
- (c) Which principle is responsible for working of AFM?
- (d) What is an interferometer?
- (e) What information can be obtained using IR spectroscopy?
- (f) What information can be obtained using UV-VIS spectroscopy?
- (g) Write full form of FTIR?

Q.5 Answer in detail 14

- (a) Describe in detail: Two, Four Probe, Van der Pauw method to calculate resistivity.
- (b) Explain the factors affecting the resistivity measurements in a sample.

OR

Q.5 Answer in detail 14

- (a) Write a short note on Ferroelectric material.
- (b) Explain various polarizabilities in a dielectric material.

Q.6 Answer in detail 14

- (a) Explain in detail: UV-Vis spectroscopy.
- (b) Explain in detail: Construction of FTIR spectrophotometer.

OR

Q.6 Answer in detail 14

- (a) Explain construction of UV-VIS spectrophotometer.
- (b) Explain the theory of IR absorption and typical spectral analysis.

