

M. Tech. (Nano Technology) Sem-II (CBCS – 2015 Course) :
SUMMER - 2019
SUBJECT: NANO CHARACTERIZATION

Day: Saturday
Date: 08/06/2019

S-2019-3349

Time: 11.00 AM TO 02.00 PM
Max. Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SAME** Answer book.
- 4) Draw a neat and labeled diagram **WHEREVER** necessary.
- 5) Assume suitable data, if necessary.

SECTION –I

- Q.1** Explain how De Broglie concept is used for building powerful microscope with respect to resolution and magnification. Compare them with conventional optical microscope. (10)

OR

What is tunneling of electrons? Explain with neat sketch, the basic working principle, advantages, limitations and applications of Scanning Tunneling Microscope (STM) (10)

- Q.2** Explain with neat sketch the basic working principle, advantages, limitations and applications of Differential Thermal Analysis (DTA) comment why it is called differential. (10)

OR

Explain with suitable example need of thermal analysis for nanostructures. List the characterization techniques for thermal analysis. (10)

- Q.3** Differentiate between Confocal Optical Microscope and a usual Optical Microscope. (10)

OR

Explain with neat sketch the basic working principle, advantages, limitations and applications of Atomic Force Microscope (AFM). (10)

SECTION –II

- Q.4** List the spectroscopy techniques required to characterization of semiconductors. Explain any one with neat sketch. (10)

OR

Explain with neat sketch Electron Spin Resonance Spectroscopy with advantages, disadvantages and applications. (10)

- Q.5** Explain the characterization tools used for measuring modulus, load carrying capability, compression, fatigue, hardness and abrasion of nanomaterials with suitable examples. (10)

OR

Explain a method for testing the hardness of thin films and coatings. Can the same method be applicable to soft materials like polymers. (10)

- Q.6** Explain the difference between Interference and diffraction. Explain any two applications of diffraction phenomena for characterization of nanomaterials. (10)

OR

Explain what you understand by luminescence. Explain how luminescence of material changes when the size is reduced from bulk to nanometer. (10)