

SUBJECT: NANO CHARACTERIZATION

Day: Thursday  
Date: 22/11/2018

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

W-2018-3084

N.B.:

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

SECTION –I

**Q.1** Explain in detail why electron microscope has better magnification, resolution, accuracy than optical microscope using visible light. (10)

OR

Explain in detail Environmental Transmission Electron Microscopy, Give its applications. (10)

**Q.2** Explain with neat sketch working principle, advantages, applications and limitations of Differential Scanning Calorimetry (DSC) (10)

OR

Explain with neat sketch working principle, advantages, applications and limitations of Thermogravimetry. (10)

**Q.3** Explain with neat sketch working principle, advantages, applications and limitations of Secondary Ion Mass Spectrometry (SIMS) (10)

OR

Why the resolution and magnification of a confocal optical microscope is better than a usual optical microscope even if both are using same wavelength of light. Justify. (10)

SECTION –II

**Q.4** Discuss advantages and disadvantages of Fourier Transform Infra Red Spectroscopy (FTIR) and Raman Spectroscopy over each other. (10)

OR

Explain with neat sketch working principle of Nuclear Magnetic Resonance (NMR) with its application and limitations. (10)

**Q.5** Describe nanotribometer and its applications for nanomaterials and nanotechnology. (10)

OR

Explain the characterization techniques used for nano composites to measure the mechanical properties. The application of this nano composites is in aerospace. Justify with suitable examples. (10)

**Q.6** Discuss what information X-ray diffraction (XRD) gives about materials and nanomaterials. Explain X-ray power diffraction method. (10)

OR

List the techniques used for structural characterization for nanomaterials. Explain any one with its working principle, advantages, applications and limitations. (10)