

**M. TECH. (NANO TECHNOLOGY) SEM-II (CBCS – 2015
COURSE) : SUMMER - 2018**

SUBJECT: NANO CHARACTERIZATION

Day: **Friday**
Date: **15/06/2018**

S-2018-2946

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 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 with neat sketch the working principle of electron microscopes. Give advantages and applications of electron microscope. **(10)**

OR

Explain with neat sketch working principle of Scanning Electron Microscope (SEM) with its advantages, limitations and applications comment on what information's is gathered by using SEM. **(10)**

Q.2 Explain with neat sketch working principle of Thermo-gravimeter (TG) with its advantages, limitations and applications comment on what information's is gathered by using Thermo-gravimeter (TG) **(10)**

OR

What are the characterization tools used for thermal analysis of nanomaterials. Explain any one in detail. **(10)**

Q.3 Explain the principle of lithography and state its applications. What advantages Scanning Probe lithography has over conventional Photo- lithography and E-beam lithography. **(10)**

OR

Explain with neat sketch working principle of Confocal microscope (CM) with its advantages, limitations and applications. **(10)**

SECTION –II

Q.4 Explain what information you get about nanomaterials by using Raman and Infrared (IR) spectroscopy. What changes do you expect in IR/ Raman spectra, when you go from bulk material to nanomaterial. **(10)**

OR

Explain with neat sketch the working principle of Electron Spin Resonance Spectroscopy with its advantages, limitations and applications. **(10)**

Q.5 Explain what do you understand by elastic plastic deformation of material. What characterization tools used for checking above properties of nanomaterials. Justify with suitable example. **(10)**

OR

Describe the construction and working of Friction Force Microscope (FFM). State its applicability in nanotechnology. **(10)**

Q.6 Explain different methods of X-ray diffractometry. State their strengths and limitations. **(10)**

OR

State if visible light can get diffracted from crystals and why. Explain applications of diffraction phenomena in general (Any seven) **(10)**