

**M. TECH. (NANO TECHNOLOGY) SEM-II (CBCS – 2015
COURSE) : WINTER - 2017
SUBJECT: NANO CHARACTERIZATION**

Day : **Wednesday**
Date : **29/11/2017**

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

W-2017-2752

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.
- 4) Answers to both the sections should be written in **SEPARATE** answer books.

SECTION – I

Q.1 Explain in detail why electron microscopes have better magnification and resolution than optical microscope. **[10]**

OR

What do you understand by quantum mechanical tunneling? How it is used in Scanning Tunneling Microscope (STM)?

Q.2 Explain the characterization tools used for thermal analysis of nanomaterials and nanostructures. **[10]**

OR

Differentiate between Differential Scanning Calorimeter (DSC) and Scanning Electron Microscope (SEM).

Q.3 Explain Atomic Force Microscope (AFM) with neat sketch showing its working principle. List advantages, limitations and applications. **[10]**

OR

Explain why Confocal microscope has better resolution than a conventional optical microscope employing visible light.

SECTION – II

Q.4 Describe similarity and difference between Infrared and Raman spectroscopy. State how these two techniques are complementary to one other. **[10]**

OR

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

Q.5 Describe nanotribometer. State its advantages and limitations. List the applications in Nanotechnology. **[10]**

OR

Explain with neat sketch working principle of Friction Force Microscope (FFM). State its advantages and limitations. List its applications.

Q.6 Explain what you understand by luminescence. Explain how luminescence of materials changes when the size is reduced from bulk to nanometer. **[10]**

OR

Explain different methods of X-ray diffraction and state their strength and limitations.

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