

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

SUBJECT : SELF STUDY – II: NANOPROCESSING

Day : **Tuesday**
Date : **19/06/2018**

S-2018-2964

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) Answers to both the sections should be written in the **SEPARATE** answer books.

SECTION – I

- Q.1** Explain why electron microscopes have better magnification and resolution than optical microscopes. Explain how electron beam is manipulated by using Electrostatic and Magnetostatic lens in Electron Microscopes. [10]

OR

Describe the advantages and disadvantages of Transmission Electron Microscopy (TEM) over Scanning Electron Microscopy (SEM) for characterization of nanomaterials / nanostructures.

- Q.2** What are different types of microscope included in probe microscopy? How Magnetic Force Microscope (MFM) can be used to characterize magnetic materials? [10]

OR

Explain the working principle of Atomic Force Microscopy (AFM) with its advantages, limitations and applications.

- Q.3** Explain how 'Quantum Dots' are different from Nanoparticles. Explain processing of TiO₂ nanoparticles for building Dye Sensitized Solar Cells (DSSC) [10]

OR

Describe in detail the three methods of X-ray diffraction (i.e., Single crystal diffraction, Laue method and Powder X-ray diffraction method).

SECTION – II

- Q.4** Explain Sol-Gel or Hydrothermal method for synthesis of oxide nanoparticles. [10]

OR

Explain what do you understand by 'Ageing Effect' in semiconductor nanoparticles. What can be done in order to suppress this ageing effect in semiconductor nanoparticles?

- Q.5** Explain the method based on "Spatially Confined Growth" of nanomaterial / nanostructures for synthesis of highly porous materials / structures. [10]

OR

What is core-shell nanoparticles? Explain the synthesis method with an suitable example.

- Q.6** Explain any three Top-down processes to synthesis nanostructures. [10]

OR

Explain any three Bottom-up processes to synthesis 1D nanostructures.

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