

SUBJECT: NANOSCIENCE & NANOTECHNOLOGY

Day: Monday
Date: 03/12/2018

Time: 11.00 AM TO 02.00 PM
Max Marks: 60

W-2018-3078

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.
- 5) Assume suitable data if necessary.

SECTION – I

- Q.1 Define Nanotechnology. Differentiate between nano, micro and macro material with suitable example. [10]

OR

Define Nanotechnology. Discuss history of Nanotechnology and contributions of the various scientist in development of Nanotechnology

- Q.2 Describe the role of surface energy with respect to the length scale of nanostructure. Discuss how the intermolecular forces are influenced by the change in length scales. [10]

OR

Give classification of nano structure with respect to synthesis process, characterization techniques and applications.

- Q.3 Describe the composition, properties, synthesis and applications of: [10]
i) CNT's ii) Quantum Dots iii) Nano fibers

OR

Explain biological nanostructure properties and applications:

- i) Proteins ii) Micelles iii) Vesicles

SECTION – II

- Q.4 Define and explain 'Evolution of band structure' and 'Fermi Surface'. [10]

OR

What are energy landscapes? Explain the concept of energy landscapes with respect to properties of macro, micro and nano-material with suitable example.

- Q.5 How does the influence of nanostructuring alter the magnetic and chemical properties of nanomaterials? Explain with suitable examples. [10]

OR

Explain how Quantum wire can be used for electronic transport. Justify with suitable example. What are steps to commercialize it?

- Q.6 Explain the concept of 'Green House Effect' and 'Global warming' in the present context. How can Nanotechnology help in countering this problem? [10]

OR

What are Green / sustainable / recyclable products? How does Nanotechnology will help to convert Non-green / Non-sustainable / Non-recyclable product as usable product and increase the economics of country? Explain.