B.E. (SEM.-VIII) (CGS) (Mechanical Engg.)

Nanotechnology

30th May 2016

11.00 am to 2.00 pm

Q.P. Code : 735502

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** question from question No. 2 to 6.
(3) Assume suitable **data** wherever **necessary** and **justify** the same.
(4) Draw neat **sketches / diagram** wherever **necessary**.

1. (a) Write short note on Nanopens and Nanopipettes. **5**
   (b) Write in brief about the mechanical properties ofnanocomposite material. **5**
   (c) Draw neat label diagram showing interaction of electrons with specimen. **5**
   (d) Give few applications of Smart Materials with cause and effect in brief. **5**

2. (a) What are core shell nanoparticles and hybrid nanostructures? What are its advantages? Give any 1 application of core shell nanoparticle in detail. **10**
   (b) Explain the working of nanostructured based solar cells. **10**

3. (a) Explain diffraction phenomena in a crystal. Derive Bragg's law. Why X-rays are used for diffraction of crystals and not visible light. Give mathematical description. **10**
   (b) (i) Give difference between electron and ionic spectroscopy. **5**
   (ii) Give difference between electrochemical and electrophoretic method of synthesis ofnanostructure. **5**

4. (a) Use shrondingers wave equation to derive the wave function for particle in a box and give its eigen states. **10**
   (b) Explain with neat diagram the Chemical vapor deposition method for synthesis of CNTs. **10**

5. (a) Explain in short the MEMS and NEMS devices. **10**
   (b) Explain the Vapor liquid solid method of synthesis of nanostructures. **10**

6. (a) What are nanobots. Give biological applications of nanobots. **10**
   (b) Explain the basic principle of Liquid phase co-precipitation method for synthesis of nanoparticles. Explain the role of surfactants in the synthesis of nanoparticles. **10**
