Registration No:

Total Number of Pages: 02

M.Tech

P1PNBC04

1st Semester Regular Examination 2017-18
INTRODUCTION TO NANOTECHNOLOGY
BRANCH : POLYMER NANOTECH
Time : 3 Hours
Max Marks : 100
Q.CODE : B1014

Answer Question No.1 which is compulsory and any FOUR from the rest.

The figures in the right hand margin indicate marks.

Q1   **Answer the following questions**: *Short answer type*   **(2 x 10)**

a) What is a Nanocluster?

b) Describe Lithography.

c) What are Polypeptides?

d) What are NEMS?

e) What do you mean by Reyleigh scattering?

f) What is a quantum wire?

g) Describe Fermi Surface.

h) Define the term 'Nanotechnology'.

i) What are Energy Bands?

j) What do you mean by 'Spectroscopy'?

Q2 a) Differentiate Micro and Macro EM systems based on their properties. Describe which one is advantageous and why?   **(10)**

b) What are actuators? What are their applications? How do carbon nanotubes act as nano-actuators?   **(10)**

Q3 a) What is lithography? What are the different types of lithographic techniques?   **(10)**

b) Explain 'Nanoimprint Lithography' in detail.   **(10)**

Q4 a) What are quantum dots? Why are they called 'zero dimensional structures'? What are their applications?   **(10)**

b) How quantum wires are different from quantum dots & wells? Describe some applications of quantum particles.   **(10)**

Q5 **a)** Explain the preparation of metal nanoparticles by laser induced evaporation. **(10)**

b) What are dendrimers? How are dendrimers synthesized? What are their applications? **(10)**

Q6 **a)** What are metal nanoclusters? What makes metal nanoclusters scientifically so interesting? Give examples to justify your answer. **(10)**

b) Differentiate Elastic and Inelastic Scattering of visible light. Explain how this phenomenon can be used for studying molecular structures? **(10)**

Q7 **Give short notes on**

a) Plasmon Resonance Effect **(5)**

b) Raman Spectroscopy **(5)**

c) Top-down approach in Nanotechnology **(5)**

d) Size dependence of nanoparticles **(5)**