Printed Pages: 02 **Sub Code: EOE042/NOE042**

Paper Id: | 1 | 9 | 9 | 4 | 1 | 2 | **Roll No.** | | | | | | | | | | |

B.TECH.
(SEM IV) THEORY EXAMINATION 2017-18
NANO SCIENCES

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. What is Photo fragmentation?
b. Define Raman Spectroscopy.
c. Calculate Atomic Packing factor for body centred cube.
d. Define Shallow centre.
e. What are FCC nanoparticles members?
f. What are localized particles?
g. Give two applications of Nenotechnology.
h. What are super-fluid clusters?
i. What do you mean by magic numbers?
j. What are the nano tubes?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. Explain face centered cubic nanoparticles with neat sketch.
b. Describe tetrahedrally bonded semiconductor structure.
c. Derive time dependent Schrödinger wave equations and discuss the quantization of energy for a particle in a box.
d. Write a note on optical properties of semi conducting nanoparticles. Also, discuss photo fragmentation.
e. What are quantum dot lasers and superconductivity? Explain

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) What are quantum dots and quantum wire ? Discuss preparation and applications
(b) Describe methods of measuring properties of nanoparticles such as atomic structure, particle size determination and surface structure. .

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write a note on optical properties of semi conducting nanoparticles. Also, discuss photo fragmentation.
(b) Explain Sol Gel technique and electron deposition technique for fabrication of nanoscale materials

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Derive an expression for wave function and energy of a particle confined in

one dimensional potential box using Schrodinger wave equation.

(b) Discuss the basic principle and fabrication of AFM & STM.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) What do you mean by infrared spectrum? What are the applications of infra-red spectroscopy? Describe in brief the vibration modes of H20 and C02 molecules.

(b) What is the structure of carbon nanotubes? Explain the properties of carbon nanotubes .

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Describe the principle and working of Transmission Electron Microscope.

(b) Write short notes on the following (i) Atomic Spectroscopy (ii) Vapour-Liquid –Solid method.