M.Sc.(Physics) CBCS Pattern Semester-III

PSCPHYT12-2 - Paper-XII : Fundamentals of Nanoscience and Nanotechnology

P. Pages : 2 **GUG/W/23/11303**

Time : Three Hours * 6 3 2 0 * Max. Marks : 80

Notes : 1. All questions are compulsory.
2. Draw neat and well labeled diagrams wherever necessary.

Either:

1. a) Describe Schrodinger equation for a particle in a box. **8**

b) Explain in detail the qualitative idea of free electron theory and write its features. **8**

OR

e) Discuss the density of states for zero, one, two and three Dimensional materials. **8**

f) Write a note on: **8**

i) Quantum confinement

ii) Quantum wells

Either:

2. a) Describe briefly magnetic and structural properties of nanomaterials. **8**

b) Discuss the electrical properties of carbon nanostructures. **8**

OR

e) Discuss the structure of carbon nanotubes. **8**

f) Describe the types of CNT with the help of neat diagram. **8**

Either:

3. a) Explain Wet Chemical method of synthesis of nanoparticles. **8**

b) Describe the Chemical Vapour Deposition techniques. **8**

OR

e) Explain in brief Ionised cluster beam deposition of synthesis of nanomaterials. **8**

f) Explain steps of synthesis of nanomaterials by Laser pyrolysis process. **8**

Either:

4. a) Discuss Micelles, Vesicles and Multilayer films. **8**

b) Explain DNA double Nanowire. **8**

OR

e) Explain the terms: **8**

i) Bioelectronics and

ii) Biosensors

f) Explain the importance of protein nanoparticle and also describe the advantage of nanoprotein over bulk protein particle. **8**

5. Attempt all of the followings.

a) Describe the Heisenberg's uncertainty principle. **4**

b) Discuss the optical properties of nanomaterials. **4**

c) Discuss the combustion method of synthesis of nanomaterials. **4**

d) Explain Bilayers. **4**

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