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

PSCPHYT11-2 - Core Elective E1.2-Paper-XI : Nanoscience and Nanotechnology-I

P. Pages : 2 **GUG/S/23/11299**

Time : Three Hours * 1 4 6 7 * Max. Marks : 80

Either:

1. i) Discuss free electron theory for the behavior of valence electron in a crystal structure of metallic solid. **6**

ii) Describe briefly Quantum wells and Quantum confinement. **6**

iii) Discuss the density of states for zero, one, two three Dimensional materials. **4**

OR

a) Explain the photoexcitation and shift of peaks in photoluminescence. **8**

b) Explain the Raman spectra of nano-materials. **8**

Either:

2. i) Draw a schematic diagram of synthesis of nanoparticles by physical Vapour deposition and explain its working. **8**

ii) Explain the terms Laser pyrolysis. Discuss the use of laser pyrolysis in the synthesis of nanomaterials. **8**

OR

a) Explain Bottom-up Ball Milling synthesis. **6**

b) Explain in brief Ionised cluster beam deposition. **4**

c) Explain the terms- **6**
i) Langmuir-Blodgett method ii) Microemulsions

Either:

3. i) Explain the construction and working of Scanning Electron Microscopy. **10**

ii) Explain in brief Vibration Sample Magnetometer. **6**

OR

a) What are the similarities and differences between Transmissoin Electron Microscopy, Scanning Electron Microscopy and Scanning Tunneling Electron Microscopy. **8**

b) How the atomic and molecular structure of a nanoparticle can be determined using XRD. **8**

Either:

4. i) Describe types of CNT with the help of neat diagram. **6**

ii) How CNT are fabricated. **6**

iii) Discuss the electrical properties of carbon nanostructures. **4**

OR

a) Discuss thermal and optical properties of nanomaterials. **8**

b) Describe briefly Magnetic and structural property of nanomaterial. **8**

5. Attempt **all** the following.

i) State and explain the factors affecting to particle size when it turns to nanoparticles. **4**

ii) Give the complete details of Sol-gel method. **4**

iii) Explain in brief Spintronics. **4**

iv) Metal and semiconductor nanoclusters. **4**

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