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

# PSCPHYT12-2 - Paper-XII - F1.2 : Fundamentals of Nanoscience and Nanotechnology

P. Pages : 1 **GUG/W/22/11303**

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

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Either:

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

b) Explain the term density of states for 0D, 1D, 2D and 3D. **8**

**OR**

e) Discuss the working of p-n junction and bipolar Transistor. **8**

f) Explain the term- **8**

i) Quantum well ii) Quantum dots

Either:

**2.** a) Write the importance of optical and thermal behaviour of nano-material compared with bulk material. **8**

b) Discuss mechanical and thermal properties of nanomaterial. **8**

**OR**

e) Explain structural and electrical properties of carbon nanostructure. **8**

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

Either:

**3.** a) Explain Bottom up approach for the synthesis of Nano-materials. **8**

b) Discuss cluster beam deposition in details. **8**

**OR**

e) Discuss LASER Ablation and LASER Pyrolysis. **8**

f) Describe PVD technique for the synthesis of nanoparticles. **8**

Either:

**4.** a) Explain the terms- **8**

i) Bioelectronics ii) Biosensors

b) Describe the structure of DNA double nanowire. **8**

**OR**

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

f) Discuss Micelles, Vesicles. **8**

**5.** Attempt all the followings.

a) Describe the working of FET. **4**

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

c) Discuss the combustion method write its advantage and disadvantage. **4**

d) Explain Bilayers. **4**

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