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

PSCPHYT12-2 - Paper-12 Foundation Course
Fundamentals of Nanoscience and Nanotechnology

P. Pages : 2 **GUG/W/18/11303**

Time : Three Hours * 3 4 0 6 * Max. Marks : 80

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1. Either

a) Explain the particle in one dimension box using Schrodinger time dependent equation. **8**

b) Discuss free electron theory for the behaviour of valance electron in crystal structure of metallic solid. **8**

OR

e) Explain p-n junction and bipolar transistor, how they are operate and fabricated in nanomaterial. **8**

f) Describe in detail Quantum well & Quantum confinement. **8**

2. Either

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

b) Describe types of CNT with the help of neat diagram, how CNT are fabricated. **8**

OR

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

f) Discuss the mechanical properties of CNT. **8**

3. Either

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

b) Discuss the main path of sol-gel process. Explain how acid catalyst helps to enhance the rate the hydrolysis of sol-gel process. **8**

OR

e) Explain wet chemical synthesis process. **8**

f) Explain the principle of low pressure CVD technique. **8**

4. Either

a) Explain the importance of protein nanoparticles also describe the advantage of nanoprotein over bulk protein particle. **8**

b) Explain DNA Double nanowire. **8**

OR

e) Discuss Micelles, Vesicles, & Multilayer film. **8**

f) Explain importance of biosensors. **8**

5. a) State 0D, 1D, 2D & 3D quantum states. **4**

b) Discuss the structure of CNT. **4**

c) Why surface geometry of particle affect the chemical potential. **4**

d) Explain Bilayers. **4**

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