

M.Sc. - II (Physics) (NEP Pattern) Semester-III
03MSCPH4.5 - Major Elective-V Paper-IV : Fundamentals of Nanoscience and Nanotechnology

P. Pages : 2

Time : Three Hours



GUG/S/25/16030

Max. Marks : 40

Either :

1. a) State 0D, 1D, 2D & 3D quantum states. 4
- b) Explain in short 4
- 1) Quantum confinement
- 2) Quantum dots

OR

- e) Explain the Heisenberg uncertainty principle. 4
- f) discuss free electron theory for the behavior of valence electron in a crystal structure of metallic solid. 4

Either :

2. a) Explain in brief Sputter deposition And Gas evaporation. 4
- b) Explain the physical vapor deposition method for development of nanomaterials. 4

OR

- e) Explain the complete procedure to make Nano particles by the method of sol-gel auto combustion method. 4
- f) Explain the synthesis of nanomaterials using Hydrothermal combustion and bath deposition. 4

Either :

3. a) Describe briefly Magnetic and structural property of nanomaterial. 4
- b) Discuss the electrical properties of carbon nanostructure. 4

OR

- e) Explain the x ray photoelectron spectroscopy for chemical analysis of nanomaterial. 4
- f) Discuss the instrumentation for characterization of x ray diffraction pattern. 4

Either :

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|-----------|----|---|----------|
| 4. | a) | How the magnetic recording is done with the use of nanomaterials. | 4 |
| | b) | Explain photonic crystal mechanics. | 4 |

OR

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|-----------|-----------------------------|---|----------|
| | e) | Describe quantum dot heterostructure lasers. | 4 |
| | f) | How the optical data can be store using nanomaterials. | 4 |
| 5. | Attempt all the followings. | | |
| | a) | Explain the concept of nanomaterials and hence nanoscience and nanotechnology. | 2 |
| | b) | Explain the Bottom up ball milling synthesis technique for synthesis of nanomaterial. | 2 |
| | c) | State and explain the features of nanomaterials. | 2 |
| | d) | State the application of nanomaterials in electronic devices. | 2 |
