

**03MSCPH4.5 - Fundamentals of Nanoscience and Nanotechnology Paper-IV**

P. Pages : 2

Time : Two Hours



**GUG/W/24/16030**

Max. Marks : 40

**Either:**

1. a) Describe the Heisenberg's uncertainty principle. 4
- b) Discuss the density of states for one, two and three dimensional materials. 4

**OR**

- e) Describe Schrodinger equation for particle in box. 4
- f) Write note on: 4
- i) Quantum Well
- ii) Quantum Dots.

**Either:**

2. a) Describe the chemical vapour deposition techniques. 4
- b) Explain sol-gel method for synthesis of nanomaterial. 4

**OR**

- e) Explain Bottom up ball milling process in the synthesis of nanomaterials. 4
- f) Explain wet chemical method of synthesis of nanoparticles. 4

**Either:**

3. a) Describe briefly thermal and electrical properties of nanomaterials. 4
- b) Describe briefly magnetic and structural properties of nanomaterials. 4

**OR**

- e) Discuss the electrical properties of carbon nanostructures. 4
- f) Explain in detail optical properties of nanomaterial. 4

**Either:**

- |           |    |  |          |
|-----------|----|--|----------|
| <b>4.</b> | a) | What are the basic principles of magnetic recording and how do nanomaterials enhance these principles. | <b>4</b> |
|           | b) | What are nanophosphors and what are photonic crystals.   | <b>4</b> |

**OR**

- |           |                                |  |          |
|-----------|--------------------------------|--|----------|
|           | e)                             | What are quantum dots and how do their size and shape influence their electronic and optical properties. | <b>4</b> |
|           | f)                             | What is optical switching and how does it differ from traditional electronic switching method?           | <b>4</b> |
| <b>5.</b> | Attempt all of the followings: |  |          |
|           | a)                             | Explain Nanoscience and Nanotechnology.  | <b>2</b> |
|           | b)                             | Discuss the ionized cluster beam deposition method.  | <b>2</b> |
|           | c)                             | Explain mechanical properties of carbon nanostructures.  | <b>2</b> |
|           | d)                             | What is optical data storage.  | <b>2</b> |

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