Roll No. .....

(05/24)

15435

M. Sc. EXAMINATION

(For Batch 2021 & Onwards)

(Fourth Semester)

PHYSICS

MSc/Phy/4/DSC5(A)

Material Science–II

Time : Three Hours *Maximum Marks :* 70

Note : The question paper consists of nine questions in all. Q. No. **1** is compulsory and consist of five questions of 2 marks each. In addition, eight more questions are set Unit-wise with two questions from each of the four Units. Attempt *four* more questions of 15 marks each, selecting *one* question from each Unit.

1. (a) Define density of states in bands.

   (b) Mention salient featurs of free electron theory.

   (c) How the particle size of a nanomaterial can be determined ?

   (d) Mention advantages and limitations of top down and bottom up approaches.

   (e) Explain shift in photoluminescence peaks of nanoparticles with size.

Unit I

2. Discuss electron confinement in infinitely deep quantum well.

3. Discuss variation of density of states and band gap with size of nanocrystal.

Unit II

4. Discuss the synthesis, properties and applications of carbon nanotubes.

5. Discuss the nanostructures, quantum well, quantum wire and quantum dot.

Unit III

6. Discuss the Pulsed Laser Deposition (PLD) technique for preparation of nanostructure materials.

7. Discuss the Chemical Vapour Deposition (CVD) technique for the preparation of nanostructured materials.

Unit IV

8. Discuss X-ray Diffraction (XRD) technique for the structural characterization of nanostructured materials.

9. Discuss Scanning Electron Microscopy (SEM) for the microscopic characterization of nanostructured materials.