

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

M.Sc.(Applied Physics) (2016 to 2019) (Sem.-4)

PHYSICS OF NANOMATERIALS

Subject Code : MPH-402

M.Code : 71693

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt FIVE questions in ALL including COMPULSORY questions no. 9.

1. a) Why nanomaterials show different properties from its bulk part. (8)
b) What do you mean by quantum confinement. Find the energy of an electron confined in one dimensional potential well. (3+9=12)
2. a) What is a quantum dot? Discuss the structure and characteristics of various types of quantum dots. (2+10=12)
b) Find the density of electronic states in 1D, 2D and 3D nanostructures. (8)
3. a) What is the difference between the 'Bottom up' and 'Top down' methods for preparation of nano particle. (8)
b) Describe the principle and process in molecular beam epitaxy (MBE) method for synthesis of nano structured materials. (12)
4. a) Describe the principles in chemical and physical vapour deposition (CVD & PVD) methods for synthesis of nano structure materials. (8)
b) Describe the principles and process in mechanical milling and attrition for synthesis of nano structure materials. (12)
5. a) Give Moore's I and II law. (8)
b) Explain the working of scanning tunnelling microscopy (STM) with a neat sketch. (12)
6. a) Write short notes on FTIR spectroscopy of nano materials. (8)
b) State and explain Debye-Scherer equation. What is its significance in analysis of nano particles? (12)

7. a) Write an essay about the preparation and instrumentation of nano structure thin films. (12)
b) How are mechanical properties of CNTs different from conventional materials? (8)
8. a) Define nanocomposites? Explain in detail the synthesis of polymer nanocomposites. (12)
b) What are the methods for producing Bucky balls. (8)
9. **Write briefly :** (8×2.5=20)
- a) What are quantum wires?
- b) What are Nano sensors?
- c) Why gold nanoparticles are frequently used in the synthesis of nano-bio assemblies?
- d) What are the architectural characteristics of carbon nanotubes?
- e) What is graphene?
- f) Define Nano science
- g) What is surface Plasmon resonance?
- h) Write some applications of carbon nanotubes.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.