K18P 0270

Reg. No.: .....

Name: .....

Fourth Semester M.Sc. Degree (Reg./Suppl./Imp.) Examination, March 2018
PHYSICS
(2014 Admission Onwards)
PHY4E11 – Nanoscience and Technology

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer both questions (Either **a** or **b**).

1. a) Discuss the systematic evolution and the applications of nanotechnology.

OR

b) With the help of neat diagrams explain how photoelectron spectroscopy can be used to analyse nanomaterials.

2. a) Account for size and dimensionality effects in quantum nanostructures.

OR

b) With the help of necessary theory explain how structural analysis of a sample is made possible by X-ray diffraction technique. **(2×12=24)**

SECTION – B

Answer **any four** questions (**1** mark for Part **a**, **3** marks for Part **b**, **5** marks for Part **c**).

3. a) What is the principle of AFM ?
   b) Distinguish electron microscopes from optical microscopes.
   c) With the help of a neat diagram explain the working of a SEM.

4. a) What are carbon nanotubes ?
   b) Give three applications of carbon nanotubes.
   c) Discuss briefly the properties of carbon nanotubes.

P.T.O.

5. a) What are ferrofluids ?
   b) Discuss how bulk nanostructuring affects the magnetic properties of materials.
   c) Account for nanopore containment of magnetic particles.
6. a) What is SIMS ?
   b) Distinguish quantum wells from quantum dots.
   c) Discuss any two methods of synthesizing solid disordered nanostructures.
7. a) What are photonic crystals ?
   b) Write a short note on photofragmentation.
   c) Account for the optical properties of semiconducting nanoparticles.
8. a) What are excitons ?
   b) What are magic numbers associated with metal nanoclusters ?
   c) What is partial confinement effect in quantum nanostructures ? **(4×9=36)**
