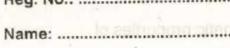
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Fourth Semester M.Sc. Degree (Reg./Suppl./Imp.) Examination, March 2018 PHYSICS

(2014 Admission Onwards) PHY4E11 - Nanoscience and Technology

Time: 3 Hours

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SECTION - A

Answer both questions (Either a or b).

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

- b) With the help of neat diagrams explain how photoelectron spectroscopy can be used to analyse nanomaterials.
- a) Account for size and dimensionality effects in quantum nanostructures.

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.

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- 5. a) What are ferrofluids?
 - 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? (4x9=36)