Questions Paper Set Number: Set B

Name of Course :   B.Sc. Hons. Physics-CBCS_DSE

Semester   :   VI- Semester

Name of the Paper: :   Nano Materials and Applications

Unique Paper Code :   32227612

Medium of setting the Question paper: English   Language

Duration: 2hour   Maximum Marks: 75

Instructions for Candidates:
(a) Attempt four questions in all.
(b) All questions carry equal marks.
(c) Symbols have their usual meanings.

Q 1.When does Quantum size effect starts becoming visible? What is the difference between quantum well and a quantum wire? If a solid cube with one cm side is divided into Nano-size tiny cubes with 10 nm side, calculate the surface to volume ratio R for the total material in two cases.

Q 2.What is meant by Top-Down and Bottom-Up approach in Nano particles (NPs) synthesis? Explain why the bottom up technique is more convenient for Nano fabrication . Explain briefly the Sol Gel method.

Q 3.Define briefly the Bragg's Law of diffraction and describe how it is useful in XRD. Why do we observe peaks of different heights in the XRD pattern? The X-ray data is observe for a crystalline material displays a prominent peak at $2\theta=98°$. Calculate the 'd' spacing for this peak by using following data :
given x-rays wavelength= 0.154nm, Sin98=0.99 and Sin49=0.75.

Q 4.Explain in detail dielectric constant and its importance in optical devices.   Explain briefly quasi particles and excitons . Discuss in detail tunneling and hopping conductivity.

Q 5.Explain the traps and surface defects .Briefly explain the Recombination Mechanism

Q 6.How can monochromatic lasers be generated using photo-luminescent quantum dots? What are advantages of quantum dot lasers over conventional semiconductor lasers?