

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.
(For candidates admitted during the academic year 2011-12)

SUBJECT CODE : 11PH/ME/NS63

B.Sc. DEGREE EXAMINATION APRIL 2014
BRANCH III - PHYSICS
SIXTH SEMESTER

COURSE : MAJOR ELECTIVE
PAPER : NANO SCIENCE
TIME : 3 HOURS **MAX. MARKS : 100**

Section-A

10X3=30

Answer all Questions:

1. What are nanomaterials? Name any three nanostructures that you see in nature.
2. What are the surface effects of nanomaterials?
3. Explain quantum confinement in quantum dots.
4. What are excitons?
5. Write a note on fullerenes?
6. State the principle of sonochemical method for synthesis of nanomaterials.
7. What is meant by 'bright field imaging mode' in TEM?
8. Calculate the wavelength of the electron beam accelerated by a potential of 60 kV in an electron microscope.
9. Name any three nanomaterials used in light emitting devices.
10. How does field emission take place in carbon nanotubes? Name one application of this effect.

Section-B

5X6=30

Answer any Five Questions:

11. Discuss the electronic structure of nanocrystals.
12. Discuss any five properties of nanomaterials that differ from their bulk properties.
13. How is the absorption spectra correlated with the size of the Quantum dots?
14. Describe the electrochemical method for metal nanoparticle deposition.
15. Describe Powder X-ray diffraction method to determine the crystal structure.
16. Explain how the absorption spectra of samples can be obtained in a UV-visible spectrometer.
17. Discuss the application of carbon nanotubes in fuel cells.

Section-C

2X20=40

Answer any Two Questions:

18. How are carbon nano tubes fabricated? Discuss their mechanical and optical properties.
19. With a neat schematic diagram, describe the various steps involved in sol-gel method and explain how different nano structured materials are obtained.
20. What are the properties of electrons on which electron microscopy is based? Discuss the construction and the working of a scanning electron microscope
21. Discuss the application of nanomaterials in (i) targeted nano drug delivery system (ii) electrochemical sensors and (iii) biosensors.

▲▲▲▲▲▲▲▲▲▲