LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - **PHYSICS**

THIRD SEMESTER – **NOVEMBER 2013**

PH 3875/4958 - NANO SCIENCE

Date : 12/11/2013 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

PART - A

Answer **ALL** questions (10 x 2 = 20)

1. What is nanotechnology? What is its impact in electronics industry?
2. Write the scherrer's equation for particle size determination.
3. Distinguish between SEM and FESEM.
4. Using the energy level diagram explain the formation of excitons.
5. What is solvothermal process?
6. Define microemulsion.
7. What is the advantage in using lithium for energy storage in CNTs?
8. Mention the use of TiO_2/apatite nanopaint.
9. How is the target gas sensed in electrochemical sensors?
10. Define surfactant. Give an example.

PART - B

Answer any **FOUR** questions (4 x 7.5 = 30)

11. Explain the applications of Nanotechnology in a) Drug Delivery. b) Energy. c) Aerospace d) Food Packaging.
12. Discuss the fabrication of a nano crystalline semiconductor LEDs.
13. Briefly discuss the synthesis procedure of TiO_2 nanoparticle.
14. Explain the preparation of copper nanorods by electrochemical synthesis.
15. What is nanofiltration? Explain the working principle.

PART - C

Answer any **FOUR** questions (4 x 12.5 = 50)

16. Explain the formation of Quantum dots,Quantum wells and Quantum wires on the basis of Quantum mechanical approach.
17. Discuss the electronic band structure of nano crystals and solids using "particle in a box" model and energy band diagram.
18. Write short notes on the following:
    a) types of deposition of LB films, b) preparation of any one nanobiopolymer
19. Explain the steps involved in the preparation of nanomaterials by LB method.
20. a) Explain how nano ZnO is prepared by co-precipitation method?
    b) Discuss the various applications of photocatalysis with the photocatalyst employed.