B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2012

MATERIALS SCIENCE AND ENGINEERING

FIFTH SEMESTER

ML 9305 INTRODUCTION TO NANOTECHNOLOGY

TIME: 3 Hrs. **Max. Marks: 100**

Answer all questions

Part-A (10 x 2 = 20 marks)

1. What do you understand by Moore's law?
2. What are Nano-materials? Mention the likely impacts of nanotechnology.
3. Mention the two different scanning probe microscopic techniques.
4. Why it is not possible to image Nano objects with X-rays?
5. What are the principal difference between Scanning electron and Scanning probe microscopes?
6. What are the secondary radiations coming out of a sample? Which radiations are useful for imaging purpose?
7. What are the diameter dependent properties of CNT?
8. How one would classify carbon Nanotubes?
9. What d o you understand by Quantum confinement effect?
10. How mesoporous materials are useful in drug delivery?

Part – B (5x 16 = 80 marks)

11. Explain in detail Electron beam lithography as a state of art technique for semiconductor manufacturing plans.

12. (a) Describe Scanning Near Field Optical Microscope (SNOM) principle, working and its application.

(OR)

(b) With help of schematic representation of atomic force microscope, discuss the principal functional units, operating modes and its application. .

13. (a). Discuss the recent advances for spatial resolution of SEM and explain how it is useful as throughput characterization tool in Nano- science and technology.

(OR)

(b). Explain the principle behind transmission electron microscopy in analyzing the morphology of nano- structured material.

14. (a) Describe the synthesis of carbon nanotube by chemical vapour deposition method.

(OR)

14. (b) Discuss the thermal, mechanical and electronic properties of Carbon- Nanotubes and its applications.

15. (a) Write a brief note on synthesis of nano-particle by Mechano-chemical method.

(OR)

15. (b) Explain VLSI technique and mechanisms of Nano-wire growth by any one example.