



B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

MATERIAL SCIENCE

Semester V

ML 9305 INTRODUCTION TO NANOTECHNOLOGY

(REGULATIONS 2008)

Time: 3 hours

Max. Marks: 100

Answer all Questions

PART-A (10 x 2 =20)

1. Define moore's law.
2. List the advantages and disadvantages of Electron beam lithography.
3. What is the difference between STM & AFM?
4. What are the salient features of SNFOM.
5. What do you mean by primary, secondary, backscattered electrons in relation with SEM?
6. Compare SEM and TEM.
7. Give any two excellent properties of carbon nanotubes?
8. What is the need for the fictionalization of carbon nanotubes?
9. What are surfactants? give examples.
10. List any four applications of micelles.

Part – B (5x16 = 80 Marks)

- 11 (i) Why [surface area/volume] ratio is very large for nanoparticles compared to bulk materials? (4)
- (ii) Explain with a simple example? Highlight any two problems associated with increase in surface area? (6)
- (iii) Explain the fabrication techniques of photo lithography. (6)
- 12a. (i) Explain the working of atomic force microscopy (AFM) with a neat sketch? (16)
- (or)
- 12b. (i) Explain the working of scanning probe microscopy (SPM) with a neat sketch? List the advantages and disadvantages of SPM techniques. (16)

13a. (i) Explain the working of scanning electron microscopy (SEM) with a neat sketch? (16)

(or)

13b. (i) With neat sketch, discuss the detailed instrumentation of transmission electron microscopy. (16)

14a. (i) With relevant examples and mechanisms, explain in details the recent advances in SWCNT growth control. (16)

(or)

14b. (i) List the methods for producing carbon nanotubes and explain any one of the method with a neat sketch? (16)

15a. (i) Discuss the physical properties of mesoporous nanostructured materials and list their applications. (16)

(or)

15b. (i) Explain how to obtain nanostructures at low temperature without using any surfactant, capping, and stabilizing agents? (8)

(ii) Explain in details on surfactants and their phase behavior. (8)