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24/11/13

B.E/B.Tech (Full-Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2013
MATERIALS SCIENCE AND ENGINEERING BRANCH
FIFTH SEMESTER-REGULATION 2008

ML9305 INTRODUCTION TO NANOTECHNOLOGY

Time: 3Hr

Max.Mark:100

Answer ALL Questions

Part –A (10x2=20 Marks)

(13)

1. What are the limitations of photolithography technique?
2. State "Moore's law."
3. Scanning Probe Microscopy is a non contact type Microscopy. Is it true or false? Justify your answer
4. Piezoelectric scanner is used in STM. Is it true or false? Justify your answer
5. What is inverse Hall-petch effect
6. List down the limitations of SEM
7. What are the allotropes of carbon
8. What is functionalization of CNTs?
9. What are the applications of quantum dots
10. Mention the applications of mesoporous nanostructured Materials

Part – B (5x16 = 80 Marks)

- 11 (i) What are the three types of architecture in CNT (6)
(ii) Explain the synthesis of CNT by template based synthesis and also explain the tip growth mechanism (10)
- 12a (i) Classify the nanostructured materials based on the dimensionality and also give examples in each category and mention its applications (16)
- OR
- 12b (i) Discuss the role of size effects in the properties of nanostructured materials (6)
(ii) Explain the nanostructure fabrication by top down and bottom up approach and list down its limitations (10)
- 13a (i) Explain the different eigen modes during the dynamic motion of AFM probe (8)
(ii) Explain the working principle of STM (8)
- OR
- 13b (i) Explain the working principle of Scanning near-field optical microscopy (8)
(ii) What are the different types of indenter used for nanoindentation purposes (8)
- 14a (i) With neat diagram, explain the working principle of TEM (16)
- OR
- 14b (i) Explain the methods to study the thermal stability of Superhard coatings (8)
(ii) Explain the uses of secondary electron and backscattered electrons imaging (8)
- 15a (i) What are the different SPD techniques to process bulk nanostructured materials (16)
- OR
- 15b (i) Explain solid state processing of nanoparticles (10)
(ii) Describes the phases of liquid crystals (6)