20/11/13

B.E/B.Tech (Full-Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC2013

MATERIALS SCIENCE AND ENGINEERING BRANCH

FIFTH SEMSTER-REGULATION 2008

ML9305- Introduction to Nanotechnology

Time: 3Hr **Max.Mark:100**

Answer ALL Questions

15

Part –A (10x2=20 Marks)

1. What is lotus effect and what is its application in nanotechnology
2. What are the limitations of photolithography?
3. Why three sided pyramid intender is mostly used for nano indentation?
4. Write the principle of STM
5. What is quantum confinement effect?
6. What are the drawbacks of RCS and ARB process?
7. Which of the processes yields more impurities in the CNTs?
8. What is 5-7-7-5 defect in CNT?
9. What is phase stability?
10. If the grin size is reduced below certain nanometer, the grains start rotate/slide which result in reduction in hardness. – Then how super hardness can be achieved?

Part – B (5x16 = 80 Marks)

11		Explain the usefulness of nanostructured coatings in cutting tool applications. and also discuss the methods to access the thermal stability of the coatings	(16)
12a		Discuss the characterization method with AFM, and explain the eigen modes of deformation during cantilever dynamics.	(16)
		OR	
12b		Explain the working principle and applications of SNFOM	(16)
13a		Explain the Mechanochemical synthesis of nanoparticle production with an example	(16)
		OR	
13b	(i)	What is 'nano-indentation'? Explain the factors influencing on nanoindentation	(8)
	(ii)	Explain how the 'E' Value is calculated from nano indentation test	(8)
14a	(i)	Discuss the mechanism of solid phase growth of CNT.	(8)
	(ii)	What is functionalization? Explain different types of functionalization used.	(8)
		OR	
14b		Discuss the principle of VLS technique for the synthesis of nanowire	(16)
15a		Explain at least two methods for the production of Quantum dots	(16)
		OR	
15b		Explain the effects controlling the properties of nanostructured materials	(16)