Total No. of Questions : 12]

SEAT No. :

P1112

[Total No. of Pages : 2

[4659] - 309
B.E. (Chemical)
c- NANOTECHNOLOGY
(2008 Course) (Elective - IV) (409350)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain different purification methods used for carbon nanotubes? **[10]**

b) What are the properties of fullerenes? **[8]**

OR

Q2) a) Explain growth mechanism of CNT's? **[8]**

b) Explain the different routes used for chemical modification of carbon nanotubes? **[10]**

Q3) a) Why electro-deposition process is needed to grow nano-rods/wires through alumina nano-pores? **[8]**

b) Explain the difference between ALD and CVD? **[8]**

OR

Q4) a) "Template-assisted synthesis is a very efficient tool to grow highly ordered nanowires/rods"-Explain. **[9]**

b) "Bottom-up technique is more convenient for nano fabrication"-Explain. **[7]**

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Q5) a) Discuss in detail Bragg's law of diffraction and Scherrer expression in X-ray diffraction? **[8]**

b) How do the cantilever deflections in AFM analysis affect the passage of laser beams from excitation source to the specimen to the detector? **[8]**

OR

Q6) a) With neat sketch explain principle and operation of scanning electron microscope (SEM)? **[8]**

b) Explain scanning tunneling microscope (STM) in brief? **[8]**

SECTION - II

Q7) a) What are effective masses of charge carriers in semiconductor. Derive expression for it? **[10]**

b) What is doping? Explain types of dopents used in extrinsic semiconductor? **[8]**

OR

Q8) a) What is de Broglie's hypothesis? **[8]**

b) Derive Schrodinger's equation? Also explain any two applications of Schrodinger's equation? **[10]**

Q9) a) What are the factors affecting contact angles and wetting? **[8]**

b) Write a short note on van der waals forces between colloidal particles? **[8]**

OR

Q10)a) Explain experimental procedure for finding out contact angles. Explain with neat sketch? **[8]**

b) Discuss in detail about Self-assembly and Catalysis? **[8]**

Q11)a) Explain in detail nanostructured photocatalysis? **[8]**

b) Discuss biological applications of nanoparticles. **[8]**

OR

Q12)a) Explain how nanotechnology can be used for environmental pollution abetment? **[8]**

b) Discuss different nanocoatings? Explain its applications and benefits? **[8]**

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