Maximum Marks: 75
Note: All questions are compulsory.

1. (a) What do you understand by ‘Nanosensors’? (2)

(b) Define the following terms: Accuracy, Precision, Resolution, Sensitivity, Noise, Drift, MDS, Repeatability, Response time and Span. (10)

(c) Write the relationship between the input and output of any linear time invariant sensing system. Explain the response of the system for various forms of the input signal. (7)

2. (a) Write notes on four important physical effects used in fabrication of sensors. (8)

(b) Define density of states and use this parameter to explain confinement in quantum dimensions. (7)

(c) Distinguish between direct lattice and reciprocal lattice. Deduce relationships between direct lattice vectors and reciprocal lattice vectors. (4)

OR

(c) Write a note on one dimensional transducers and gas sensors. (4)

3. (a) Write the formula for quantum resistance and give its numerical value. (2)

(b) On which phenomenon, the working of single electron transistor is based. (1)

(c) Name one device application of single electron transistor. (1)

(d) How resonant tunnelling is different from Coulomb blockading? (3)

(e) Draw the simple geometry of single electron transistor naming the various parts. (2)

(f) Write a note on Quantum Well Infrared Photodetector. (5)

(g) Describe in detail the working of Quantum Well Injection Laser. (5)

4. (a) Draw a schematic diagram showing the main components of a biosensor. (7)

(b) Discuss the salient features of biosensor and define its three generations. (11)

OR

(b) Write a note on an optical biosensor. (11)
2011-2012
M. Tech. III SEMESTER EXAMINATION
(NANOTECHNOLOGY)
(CARBON NANOTUBE AND ITS FUNCTIONALIZATION)
(AP-520)

Maximum Marks : 75
Note : Answer ALL questions.

1(a). What are the special properties of CNTs and explain its growth mechanism? 5
(b). Describe laser ablation and chemical vapour deposition methods for preparation of SWNTs and MWNTs with their limitations. 14

2(a). Explain the thermal, optical and mechanical properties of carbon nanotubes. 18

2'(a). Give the potential applications of CNTs in fuel cells. How CNTs could be used in energy storage devices? 9
(b). What are field emitting devices? Explain single nanotube emitters and continuous film emitters. 9

3(a). Define covalent functionalization and explain four most important methods employed for sidewall functionalization. 9
(b). Give the advantages of non-covalent functionalization of CNTs and describe its two different approaches. 10

4(a). For what obvious reasons it has always been tempting to obtain graphene through exfoliation? 2
(b). What are the primary drawbacks of mechanical exfoliation synthesis method and the main advantages of chemical exfoliation for obtaining graphene? 3
(c). Discuss in detail the chemical exfoliation method of synthesizing graphene and its characterization through Raman spectroscopy. 7
(d). What are Fullerenes? Write in detail the method of synthesis and purification of Fullerenes along with a schematic illustration of the processes involved. 7

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2011-2012
M.Tech. 3rd Semester Examination
(NANOTECHNOLOGY)
Nanoentrepreneurship
AP-521
Max Marks: 75
Time: Three Hours

Answer any four questions. All questions carry equal marks

1) a) Discuss the main law under which companies are governed in India. How can it be improved?

b) What are the basic differences between companies and cooperatives? For what type of business is each suited?

c) Explain in detail the concept of the independent director.

d) Discuss the various stock exchanges that exist in India. What is meant by demat account?

2) a) What is the full form of SEBI? Discuss its activities.

b) What is franchise? What are its advantages and disadvantages?

c) Discuss the different types of accounting and their international standard, if any.

d) Write a note on Corporate Social Responsibility.

3) a) What is India's business ranking in different surveys of the countries of the world? What events can lead to its improvement?

b) How many nanotechnology based products have so far become
available in world markets? What are the major countries and categories of these products?

c) Discuss the role played by Sabir Bhatia and Anita Goel in spreading nanotechnology entrepreneurship in India.

d) What are active and passive products? Which of these two types are the nanotechnology products that have come out so far?

4) a) What are good nanotechnology areas in which small, medium and big business players in India might get involved in the immediate as well as in the distant future?

b) Discuss the major reasons why nanotechnology business has so far been slow to take off in India.

c) Write a detailed note on the health problems associated with nanotechnology products.

d) Give examples of cheating in nanotechnology business. How can it be controlled?

5) a) If laws were to be enacted to regulate nanotechnology business, what are the important points they should include?

b) Compare the expected revolution of nanotechnology with the big wave of information technology of the past twenty years.

c) Discuss the scope of consultancy in nanotechnology business.

d) What is Nano Science and Technology Consortium? What types of work are they doing?