

Total No. of Questions : 10]

SEAT No. :

P6170

[Total No. of Pages : 2

[5561]-343

**B.E. (Chemical Engineering)**  
**NANOTECHNOLOGY (Elective - IV)**  
**(2012 Pattern)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume Suitable data if necessary.*

- Q1)** a) Explain any two synthesis methods used for synthesis of CNTs. [5]  
b) Write a short note on Diamond nanostructures. [5]

OR

- Q2)** a) Write a note on Feynman's vision about Nanotechnology. [5]  
b) Write a short note on different types of functionalization for carbon nanotubes. [5]

- Q3)** a) State the merits & demerits of solution based nanomaterials fabrication techniques. [5]  
b) Differentiate between bottom-up and top-down approaches. [5]

OR

- Q4)** a) Explain scanning tunneling microscope (STM) in brief. [5]  
b) Write down in detail about Interaction of electron beam with matter and Principle of electron microscopes? [5]

- Q5)** a) Explain Heisenberg uncertainty principle? [7]  
b) Write short note on Extrinsic semiconductors and intrinsic semiconductors? [10]

**P.T.O.**

OR

- Q6)** a) What is effective masses of charge carriers in semiconductor. Derive expression for it. [10]  
b) Write down the short note on Quantum Cryptography. [7]

- Q7)** a) Enlist and Explain colloidal properties of nanoparticles. [10]  
b) Explain various methods for measuring surface tension. [7]

OR

- Q8)** a) Discuss the various nanostructured materials for Photocatalysis along with their properties. [7]  
b) What are the factors affecting micelle concentration? [10]

- Q9)** a) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps for treatment of various diseases? [8]  
b) Discuss different nanocoatings. Explain its applications and benefits. [8]

OR

**Q10)** Write short notes on : [16]

- a) Environmental impacts of nanotechnology.
- b) Hydrophobic nanoparticles.
- c) Self cleaning materials.
- d) Biological nanomaterials.

