May 28, 2024 10:30 am - 01:30 pm 1T00538 - B.E.(Chemical Engineering)(SEM-VIII)(Choice Base Credit Grading System) (R- 19) (C Scheme) / 52577 - Technology Stream : Nanotechnology
QP CODE : 10054563

[Time: Three Hours] **[Marks:80]**

N.B:
1. Question **ONE** is compulsory
2. Attempt any **THREE** questions out of the remaining
3. Figure to the right indicate full marks
4. Illustrate answers with sketches wherever required and Diagram at appropriate places carries marks
5. Assume suitable data if necessary and indicate it clearly.

1. Write short notes
   (a) Explain applications of molecular recognition. (05)
   (b) The principle of counter diffusion and fullerene crystal formation at the interface (05)
   (c) Physical properties of CNTs (05)
   (d) Special characteristics of nanomaterials (05)

2. (a) With suitable diagram, explain steps involved in supercritical oligomerization. (10)
   (b) Compare arc discharge method, chemical vapour deposition method and laser ablation methods for CNT synthesis. (10)

3. (a) With suitable diagram explain the principle involved in Transmission Electron microscopy. (05)
   (b) Explain principle of atomic lithography (05)
   (c) Calculate the settling velocity of a particle moving in a gas stream. Assume the following information: $\rho_p =$ 0.899 g/cm^3 ; ρ = 0.0012 g/cm^3; $\boldsymbol{\mu}$(AIR) = 1.82 x 10^{-4} g/cm s; g = 980 cm/s^2 ; d_p= 0.045 mm (10)

4. (a) Explain with formulae, the forces that are the tools that can be used for particulate/ recovery collection. (10)
   (b) What are the main biophysiochemical influences on the interface between nanomaterials and biological systems? (05)
   (c) What is role of gold nanoparticles in drug delivery systems. (05)

5. (a) Compare top down and bottom up strategies for nanostructuring with one example each. (05)
   (b) Explain, how nanoscale particles can be formed from semiconductor compounds and thermoelectric components? (05)
   (c) Explain the method that is used to produce metal powders, especially magnetic metal or metal oxide powders. (10)

6. Write short notes(any 4)

(a)	Electrical Conduction and Ohms Law	(05)
(b)	Biosystems	(05)
(c)	Solar Process for fullerenes	(05)
(d)	Morphology of CNT	(05)
(e)	Principle of Scanning Electron Microscope	(05)