

3007

- (b) Compare the advantages of nano-catalysts over traditional bulk catalysts. 5
- (c) Discuss the application of nanomaterials as catalysts in the energy sector. 5

[This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : **3007**

Unique Paper Code : 2173512002

Name of the Course : **B.Sc.(Prog.)**

Name of the Paper : DSE : Nanoscale
Materials and Their
Applications

Semester : IV/VI

Time : 2 Hours **Maximum Marks : 60**

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **Four** questions.
- (c) **All** questions carry equal marks.
- 1.** (a) How are nanomaterials classified based on their dimensionality ? Explain with examples. 5
- (b) Discuss the method of formation, properties and applications of carbon nanotubes. 5

- (c) What do you understand by vacuum deposition ? Describe working of thermal evaporation using suitable diagram. 5
- 2.** (a) Write short notes on. 5
- (i) Fullerenes
- (ii) Nano wires
- (b) Explain the quantum confinement effect in nanostructured materials and its consequences. 5
- (c) Briefly describe how core-shell nanoparticles could be made using either vapour-phase or solution-based techniques. 5
- 3.** (a) Differentiate between SEM and TEM methods of nanomaterial characterization. 5
- (b) Explain the effect of reducing particle size on the band gap of a semiconductor. 5
- (c) Write short notes on.
- (i) Sol-Gel method for the synthesis.
- (ii) Bottom up and Top-down approach for nanomaterials.

- 4.** (a) Give one method of preparation of silver nanoparticles. Explain the steps involved. 5
- (b) Explain Hydrothermal method for the synthesis of nanomaterials. 5
- (c) Give full form of the following. 5
- (i) QW
- (ii) QD
- (iii) SWNT
- (iv) MWNT
- (v) CVD
- 5.** (a) Discuss the application of nanowires in solar cells, LEDs, and transistors. 5
- (b) What are the main Advantage of using nanocomposites as catalysts over conventional homogeneous catalysts. 5
- (c) Discuss on the sol-gel method for the synthesis of nanoparticles. Explain how grain size can be controlled in sol-gel process. 5
- 6.** (a) Explain the significance of the surface-to-volume ratio in nanoparticles. Discuss how this ratio affects the physical and chemical properties of the nanoparticles. 5