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Reg. No. :

Code No. : 20081 E Sub. Code : CECH 62

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2025.

Sixth Semester

Chemistry

Major Elective – NANO CHEMISTRY

(For those who joined in July 2021 and 2022 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following best describes quantum effects in nanoparticles?
 - (a) The material behaves the same as in bulk form
 - (b) The electronic and optical properties change due to quantum confinement
 - (c) The material loses its conductivity
 - (d) Nanoparticles remain unaffected by size variations

2. Identify a 1D nanostructured material from the following?

- (a) Nanowires
- (b) Quantum well
- (c) Nanoclusters
- (d) Quantum dots

3. Which of the following is an example of a top-down approach for nanoparticle synthesis?

- (a) Sol-gel method
- (b) Chemical vapor deposition
- (c) Arc discharge method
- (d) Colloidal method

4. What is the primary mechanism behind the sputtering method of nanoparticle synthesis?

- (a) Condensation of vaporized atoms
- (b) Oxidation of bulk material
- (c) High-energy ion bombardment to eject atoms
- (d) Bacterial reduction

5. Which technique can be used to determine the band gap energy of nanoparticles?

- (a) UV-Visible Spectroscopy
- (b) XRD
- (c) AFM
- (d) DLS

6. _____ can be used to determine the crystal structure of nanoparticles.

- (a) UV-Visible Spectroscopy
- (b) XRD
- (c) AFM
- (d) DLS

7. What nanomaterial is most commonly used as a catalyst in hydrogen fuel cells?

- (a) Zinc oxide
- (b) Silver nanoparticles
- (c) Platinum nanoparticles
- (d) Carbon dots

8. The nanomaterial commonly used for water purification due to its photocatalytic properties is _____.

- (a) Gold nanoparticles
- (b) Titanium dioxide
- (c) Copper oxide
- (d) Graphene oxide

9. Nanoform of carbon that has a spherical cage-like structure

- (a) Graphene
- (b) Carbon nanotube
- (c) Buckminster fullerene
- (d) Carbon nanofiber

10. Example of a chalcogenide nanomaterial

- (a) ZnO
- (b) TiO₂
- (c) ZnS
- (d) ZrO₂

PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing either (a) or (b).

Each answer should not exceed 200 words.

11. (a) Explain the chemical properties of nanoparticles.

Or

(b) Discuss the classification nanocomposites.

19. (a) Summarize the applications of nanomaterials in fuel cells and solar cells.

Or

(b) Tabulate the medicinal uses of nanomaterials.

20. (a) Give the preparation, properties and any two applications of ZnO.

Or

(b) Write preparation and properties of carbon nanotubes.
