

6. Write short note on any 3 :

- (a) Carbon nanotubes and their types
- (b) Inorganic nanomaterials
- (c) Chemical methods for nanoparticle synthesis
- (d) Polymer-matrix composite

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7928

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Unique Paper Code : 2173520034

Name of the Paper : NANOMATERIALS AND
THEIR BIOLOGICAL
APPLICATIONS

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

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any 4 questions out of 6 questions.
3. **Each** question carries equal marks.
4. Use of scientific calculator and logarithmic tables is allowed.

Attempt any four questions.

1. (a) Explain concept of surface plasmon resonance in gold and silver metallic nanoparticles.

(b) Discuss bioinorganic nanomaterials and their applications in medicine and environmental science.

(c) How can DNA be used as a template for nanomaterial synthesis? (5,5,5)
2. (a) Why is the matrix important even though reinforcement provides strength?

(b) Explain the classification of composites based on matrix type.

(c) What are polymer-matrix composites (PMCs) and ceramic-matrix composites (CMCs)? (5,5,5)
3. (a) Explain the classification of hydrogels based on origin (natural, synthetic, hybrid).

- (b) What are alginate-based and PEGDA hydrogels? Mention their advantages.
- (c) Describe the applications of hydrogels in environmental, food, and biomedical fields. (5,5,5)
4. (a) Describe the application of magnetic nanoparticles in targeted drug delivery.

(b) Explain nanotoxicology, its challenges, and safety considerations.

(c) Discuss nanofibers and nanocomposites as scaffold materials for tissue engineering. (5,5,5)
5. (a) Give a detailed overview of nanostructures and nanomaterials, including their classification and properties.

(b) List advantages of metal-matrix composites.

(c) Explain the preparation and properties of alginate hydrogels. (5,5,5)