

2025

3rd Semester Examination (CCFUP : NEP)

Paper : MDC 3-T

**NANO MATERIALS
AND APPLICATIONS**

Full Marks : 40

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *five* questions : $2 \times 5 = 10$

1. Define nanomaterial.
2. Mention any two characteristic length scales relevant to nanomaterials.
3. State one reason why nanomaterials have unique properties compared to their bulk counterparts.
4. Name one chemical and one mechanical method of nanomaterial synthesis.
5. What is self-assembly in nanoscience?
6. Give an example of each category, 0D and 1D nanomaterial.
7. Mention one industrial application of nanocoatings.
8. What is fullerene?

P.T.O.

Group - B

Answer any *four* questions : $5 \times 4 = 20$

9. Explain the difference between top-down and bottom-up synthesis approaches for nanomaterials.
10. List three unique properties emerging at the nanoscale and explain any one in detail.
11. Describe the role of nanomaterials in medical/healthcare applications with two examples.
12. How does increasing surface-to-volume ratio affect the catalytic properties of nanoparticles?
13. With suitable examples, explain classification of nanomaterials according to their dimensions.
14. Discuss the advantages and limitations of using nanotubes in electronic devices.

Group - C

Answer any *one* question : $10 \times 1 = 10$

15. Evaluate the potential benefits and risks associated with the widespread use of nanomaterials in healthcare and environmental applications. $5+5$
16. (a) Describe in detail physical methods used for the synthesis of nanomaterials.

(b) Illustrate your answer with examples and discuss the advantages and limitations of this method. $6+4$