(6 pages)

S.No. 6150 **P 22 BTE 3 B**

(For candidates admitted from 2022–2023 onwards)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Biotechnology – Elective

NANOBIOTECHNOLOGY

Time : Three hours Maximum : 75 marks

PART A — (20 marks)

Answer ALL questions.

I. (A) Multiple choice questions: (5 × 1 = 5)

1. Which of the following is an example of nanomaterial?

   (a) Sand grain

   (b) Quark

   (c) Hair

   (d) Gold nanoparticles

2. What causes the colour change observed in nanoparticle synthesis using biological routes?

   (a) Nanoparticles reflect ambient light

   (b) Biological enzymes alter the nanoparticle colour

   (c) Nanoparticles undergo chemical reactions

   (d) Nanoparticles absorb specific wavelengths of light

3. Silver nanoparticles are used as effective topical application for improving wound healing because of their _____.

   (a) Antimicrobial property

   (b) Neurotoxic property

   (c) Dye degradation potential

   (d) None of the above

4. S layers are typically composed of what type of subunits?

   (a) Glucose/Sucrose

   (b) Lipids

   (c) Proteins/glycoproteins

   (d) Carbon nanotubes

5. Which is the specialized feature of nanofertilizers?

(a) Size

(b) Bright colouration

(c) High density

(d) Odour

(B) Fill in the blanks: (5 × 1 = 5)

6. _____ are systems in which the drug is soluble in the core, confined to a cavity surrounded by a polymer membrane.

7. _____ is a single-stranded nucleic acid oligomer made of RNA or DNA.

8. The well diffusion assay is a common method used to assess the _____ of nanoparticles against bacteria.

9. In the self-assembly of DNA nanoparticles, complementary DNA strands with _____ sequences can spontaneously bind together.

10. Nanotechnology is employed to formulate _____ agents that prevent ice formation on surfaces, ensuring safety in cold climates.

II. Answer ALL questions: (5 × 2 = 10)

11. What are nanospheres?

12. What are aptamers?

13. Give two examples of nanomedicines.

14. What is Nanobio-machine?

15. What are Nanopigments?

PART B — (5 × 5 = 25)

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

16. (a) Give a short note on the applications of nanomaterials.

Or

(b) Brief the history and scope of nanobiotechnology.

17. (a) Write the mechanism of biogenic synthesis of nanoparticles.

Or

(b) Brief on the generation of hybrid nano-conjugates.

18. (a) Write a brief note on the anticancer properties of nanomaterials.

Or

(b) Brief on the mechanisms of cellular uptake of nanomaterials.

19. (a) Write short notes on the methodology of generation of DNA-protein nanostructure.

Or

(b) Brief the applications of DNA and proteins as biomolecular templates.

20. (a) Brief the applications of nanobiotechnology in agriculture.

Or

(b) Write short notes on the contribution of nanoparticles in food packaging.

PART C — (3 × 10 = 30)

Answer any THREE questions.

21. Explain the applications of biological macromolecules in nanotechnology.

22. Explain the critical parameters involved in the biological synthesis of efficient nanoparticles.

23. Discuss the fate of nanomaterials in the metabolism of aquatic organisms

24. Give a detailed account of the concepts in nanobio-machines.

25. Discuss the environmental risks associated with the engineered nanomaterials.

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