(6 pages) Reg. No. : .....

Code No. : 5415 **Sub. Code : ZCHE 21**

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Second Semester

Chemistry

Elective — NANO SCIENCE AND NANO TECHNOLOGY

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Synthesis of nanomaterials from the bulk materials is called _____
   (a) Top-down method
   (b) Bottom up method
   (c) Synchronised method
   (d) Sonolysis method

2. Fullerene is an allotrope of _____
   (a) Carbon (b) Sulphur
   (c) Phosphorus (d) none of the above

3. A catalyst _____ the speed of a chemical reaction.
   (a) Increases
   (b) Decreases
   (c) Both (a) and (b)
   (d) First increases then decreases

4. Natural bone is a _____
   (a) Composite (b) Nano composite
   (c) Nanofiber (d) Whisker

5. CNT is _____ times stronger than steel of the same mass.
   (a) 10 (b) 25
   (c) 50 (d) 1000

6. What are the advantages of nanocomposite packages?
   (a) Lighter and biodegradable
   (b) Enhanced thermal stability conductivity and mechanical strength
   (c) Gas barrier properties
   (d) All of the above

7. The processing of separation consolidation and deformation of materials by one atom or one molecule is called as _____
   (a) Biotechnology
   (b) Physics
   (c) Nanobiotechnology
   (d) Chemistry

8. The hybridization of carbon in graphene is _____
   (a) sp (b) sp^2
   (c) sp^3 (d) dsp^2

9. Organic nanorobots are a combination of DNA cells of _____
   (a) Polymer (b) Starch
   (c) Virus and bacteria (d) Fullerene

10. One of the main interests of research using nanorobots is _____
    (a) medicine
    (b) astronomy
    (c) marine engineering
    (d) coastal studies

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Describe the electronic properties of nanomaterials.

Or

(b) Discuss the classification of nanoparticles based on dimension.

12. (a) Write a note on physical vapor deposition.

Or

(b) Describe the nucleation process for growth of nanoparticles.

13. (a) Discuss in detail about the classification of Nanocomposites.

Or

(b) Explain the properties of Nanocomposites.

14. (a) Discuss in detail about fullerenes.

Or

(b) How will you synthesize graphene by chemical vapor deposition?

15. (a) What are dendrimers? Mention its biomedical applications?

Or

(b) Write comprehensive note on nanomedicines.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Discuss in detail

(i) surface energy

(ii) surface reconstruction

(iii) surface area to volume ratio.

Or

(b) Give a comprehensive note on magnetic properties of nanomaterials.

17. (a) Discuss the bottom-up and Top-down approaches in nanoparticles synthesis.

Or

(b) Give the synthesis of nanomaterials using laser ablation and chemical vapour deposition methods.

18. (a) Discuss in detail about the polymer based nanocomposites.

Or

(b) Explain polybutylene terephthalate (PBT) based nanocomposites.

19. (a) Give a brief account on functionalized graphene polymer nanocomposites (FPNS).

Or

(b) Discuss in detail the optical and mechanical properties of CNT.

20. (a) Discuss the materials used in tissue engineering.

Or

(b) Highlight the recent developments in modern cancer chemotherapy.

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