

(7 pages)

Reg. No. : .....

Code No. : 20380 E Sub. Code : EECH 52

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

Fifth Semester

Chemistry — Core

Elective — NANO SCIENCE

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Nano composites are materials made from atleast
  - (a) four components
  - (b) three components
  - (c) two components
  - (d) one component

2. A sonochemical synthesis uses
  - (a) Intense mechanical agitation
  - (b) Intense ultrasonic waves
  - (c) Intense radiation
  - (d) Electro deposition
3. Hematite is also known as
  - (a)  $\alpha\text{-Fe}_2\text{O}_3$
  - (b)  $\gamma\text{-Fe}_2\text{O}_3$
  - (c)  $\varepsilon\text{-Fe}_2\text{O}_3$
  - (d) None
4. The quantum confinement effect
  - (a) enhances photo luminescence
  - (b) degrades photo luminescence
  - (c) stabilises photo luminescence
  - (d) no change in photo luminescences
5. The visible sight spectrum, which ranges
  - (a) from 300 nm to 500 nm
  - (b) from 800 nm to 600 nm
  - (c) from 400 nm to 800 nm
  - (d) from 200 nm to 800 nm

6. Bragg's law is
- (a)  $n\lambda = d \sin \theta$       (b)  $n\lambda = 3d \sin \theta$   
(c)  $n\lambda = 2\theta \sin \theta$       (d)  $n\lambda = 2d \sin \theta$
7. The smaller diameter tubes (CNT) often showing
- (a) decreased reactivity  
(b) increased reactivity  
(c) no relation with reactivity  
(d) none of the above
8. Silica Aero gel is an
- (a) excellent thermal conductor  
(b) excellent thermal insulator  
(c) excellent radiation insulator  
(d) excellent conductor
9. Which one of the following is related to the administration a pharmaceutical compound to a patient to achieve a therapeutic effect?
- (a) Biosensors  
(b) Electronic noses  
(c) Nanoscale sensors  
(d) Drug delivery

10. Which one of the following nano material is used in food packaging?
- (a) Silver      (b) Zinc oxide  
(c)  $\text{TiO}_2$       (d) All the above

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Explain the concept of mechanical dispersion.  
Or  
(b) Discuss on solvothermal synthesis.
12. (a) Write a note on surface enhanced Raman spectroscopy.  
Or  
(b) Explain : optical properties of metals.
13. (a) Explain : optical microscopy.  
Or  
(b) Explain : confocal microscopy.

14. (a) Write your understanding on the reactivity of carbon nanotubes.

Or

(b) Demonstrate on self assembled monolayers.

15. (a) Write a note on biolabelling.

Or

(b) Write the role of nanotechnology in fabric industry.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Explain : synthesis and stabilization of nano-materials (Top down approach).

Or

(b) Discuss on the following :

(i) Electro deposition (4)

(ii) Capping agents. (4)

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17. (a) Explain the following :

(i) Semi conductor nano materials. (4)

(ii) Chemical properties of nano materials. (4)

Or

(b) Explain the following :

(i) Mechanical properties. (4)

(ii) Catalysis. (4)

18. (a) Write a note on the following :

(i) Transmission electron microscopy. (4)

(ii) Scanning electron microscopy. (4)

Or

(b) Write a note on the following :

(i) Scanning probe microscopy. (4)

(ii) Scanning tunneling microscopy. (4)

19. (a) Demonstrate the concept of fuel cells.

Or

(b) Explain : Electrochemical etching.

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20. (a) (i) Discuss on natural nanoscale sensors. (5)  
(ii) Write a short note on electronic noses. (3)

Or

- (b) Elaborate on the nano materials in the next generation computer technology.
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