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Reg. No. : .....

Code No. : 30498 E      Sub. Code : CECH 62

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2024.

Sixth Semester

Chemistry

Major Elective — NANO CHEMISTRY

(For those who joined in July 2021-2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. 1 nanometer =  
(a)  $10^{-11}\text{m}$                       (b)  $10^{-10}\text{m}$   
(c)  $10^{-9}\text{m}$                         (d)  $10^{-11}\text{cm}$
2. Fullerene is an allotroph of \_\_\_\_\_  
(a) carbon                            (b) water  
(c) fluorine                            (d) ZnO
3. Identify a chemical method for the synthesis of nano particles from the following  
(a) Laser ablation method  
(b) Physical vapour deposition method  
(c) Gas condensation method  
(d) Precipitation method
4. Identify a reducing agent from the following  
(a)  $\text{NaBH}_4$                             (b)  $\text{CuSO}_4$   
(c)  $\text{KMnO}_4$                             (d)  $\text{K}_2\text{Cr}_2\text{O}_7$
5. Nanocomposites with \_\_\_\_\_ size limit are used for catalytic activity.  
(a)  $<5\text{ nm}$                             (b)  $<50\text{ nm}$   
(c)  $>100\text{ nm}$                             (d)  $<100\text{ nm}$
6. The wavelength of UV region is \_\_\_\_\_ nm.  
(a) 300-900 nm                            (b) 300-400 nm  
(c) 300-500 nm                            (d) 300-600 nm

7. Which of the following battery has nanomaterial?

- (a) Galvanic cell (b) Daniel cell  
(c) Li ion battery (d) All the above

8. LED is \_\_\_\_\_

- (a) Light exciting device  
(b) Light emitting device  
(c) Light emitting diodes  
(d) Light emitting display

9. Which of the following is not a nanoforms of carbon?

- (a) Fullerene (b) Graphene  
(c) Carbon nanotubes (d) Graphite

10. Identify a semi conducting material from the following

- (a) ZnO (b) TiO<sub>2</sub>  
(c) ZrO<sub>2</sub> (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) What are two dimensional nano materials?  
Give their properties.

Or

(b) Summarize the magnetic properties of nanoparticles.

12. (a) Explain the role of chemical reduction for the synthesis of nano particles.

Or

(b) Elaborate the biosynthesis of nano particles.

13. (a) What is TEM? Give its applications.

Or

(b) How is XRD technique useful for determining the particle size?

14. (a) What are clay nanocomposite materials?  
Give their characteristics.

Or

(b) Write the catalytic applications of nanoparticles.

15. (a) What is graphene? Write their properties.

Or

(b) Discuss the preparation and applications of ZnS.

PART C — (5 × 8 = 40 marks)

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

16. (a) Discuss the size dependence properties of nanoparticles.

Or

(b) Tabulate the properties of nanowires and nanotubes.

17. (a) Explain the role of following methods for the synthesis of nano particles.

(i) Sol-gel synthesis

(ii) Chemical vapour deposition method.

Or

(b) Explain the top-down about bottom-up approaches of synthesis of nano particles.

18. (a) What is XPES? Discuss the role of XPES in the surface analysis of a solid material.

Or

(b) Summarize the principle and applications of SEM.

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19. (a) Explain the applications of nonmaterials in medicine.

Or

(b) Discuss the utility of nanomaterials in fuel cell and solar cell.

20. (a) Explain the following

(i) Carbon nano fibres. (4)

(ii) Buckminster fullerene. (4)

Or

(b) Write the preparation, properties and applications of ZnO.

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