

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
(For candidates admitted from the academic year 2019–20 & thereafter)

**SUBJECT CODE: 19CH/PE/NC15**

**M. Sc. DEGREE EXAMINATION, APRIL 2023**  
**BRANCH IV- CHEMISTRY**  
**FOURTH SEMESTER**

**COURSE : ELECTIVE**  
**PAPER : NANO CHEMISTRY**  
**TIME : 3 HOURS**

**MAX. MARKS: 100**

**SECTION – A**

**Answer all the questions.**

**(20 x 1= 20)**

**Choose the correct answer:**

1. Pick out natural nanomaterial from the following  
(a) skin                      (b) claw                      (c) hair                      (d) all the above
2. 20 microns is equal to  
(a)  $20 \times 10^9$  nm              (b)  $20 \times 10^{-9}$  nm              (c) 2000 nm              (d) 20000 nm
3. A technique is useful to produce nanotubes is  
(a) PVD                      (b) CVD                      (c) SEM                      (d) STM
4. The emission source of TEM is \_\_\_\_\_ filament.  
(a) tungsten                      (b) palladium                      (c) copper                      (d) zinc

**Fill in the blanks:**

5. CNT are a class of allotropes of -----.
6. ----- law is used to explain the X-ray diffraction.
7. STM are usually made from ----- metal.
8. The diameter of human hair is ----- nm.

**State whether true or false:**

9. AFM is one kind scanning probe microscope.
10. Sol-gel process is a dry chemical technique.
11. Inert gas condensation is bottom-up process.
12. Soft lithography is not suited for applications in biotechnology.

**Match the following:**

- |                   |                                       |
|-------------------|---------------------------------------|
| 13. nanofibres    | (a) field of nano medicine            |
| 14. Hydrogen atom | (b) three-dimensional surface profile |
| 15. Nano robots   | (c) textile industry                  |
| 16. AFM           | (d) 0.1 nm                            |

**Answer in a line or two:**

17. What is Quantum confinement effect?
18. What do you understand by High energy ball milling synthesis?
19. Write any two applications of DLS technique in Nanoparticle characterization.
20. What is Quantum dots?

**SECTION – B****Answer any Five Questions:****(5 x 8 = 40)**

21. Write the applications of Nanomaterials in Electronics and Medicine field.
22. Explain the synthesis and applications of pure gold nanoparticles.
23. Write the applications of nanocomposites.
24. Discuss the Optical, Mechanical, Electrical, Magnetic and Thermal properties of Nanophase materials.
25. Write the interfaces of nanomaterials with health and environmental aspects.
26. Write note on Nanowires and Nanomachines.
27. Explain the Electrospinning nanomaterial fabrication technique.

**SECTION – C****Answer any Two Questions:****(2 x 20 = 40)**

28. (a) Describe the synthesis, properties and applications of Fullerenes.  
(b) Explain the synthesis of nanomaterials by Plasma and Sol-gel synthesis method.  
[10+10]
29. (a) Explain the Classification and Properties of Nanocomposites.  
(b) Explain the X-ray diffraction and SEM characterization techniques are useful for Nanophase materials.  
[10 + 10]
30. (a) Write the advantages and disadvantages of Nanomaterials in biological system.  
(b) Explain the synthesis and applications of TiO<sub>2</sub> Nanoparticles. [10 + 10]

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