

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86**  
**(For candidates admitted from the academic year 2015–16 & thereafter)**

**SUBJECT CODE: 15CH/PE/NC14**

**M. Sc. DEGREE EXAMINATION, APRIL 2019**  
**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)**

**I. Choose the correct answer:**

1. Pick out natural nanomaterial from the following  
(a) skin                      (b) claw                      (c) hair                      (d) all the above
2. 20 micron 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

**II. 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.

**III. 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.

**IV. Match the following:**

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

**V. Answer in one or two lines:**

17. Define nanotechnology.
18. What do you understand by sol-gel synthesis?
19. What is TEM?
20. Write the uses of XRD.

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

21. Explain briefly about nanowires and nanomachines.
22. Write an account on self-assembled monolayer.
23. Write a note on PVD method.
24. Discuss the surface Plasmon resonance and its applications.
25. Mention the applications of nanocomposites.
26. Explain the technique used in the synthesis of pure gold nano material.
27. Write the interfaces of nanoscience with health and environmental aspects.

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

28. (a) Discuss the properties and applications of nanomaterials.  
(b) How will you synthesize nanophase materials by electro deposition method?  
[10+10]
29. (a) Explain the instrumentation of TEM and discuss how it is used in structure determination  
(b) Describe the role of Polystyrene and Epoxyresins as matrix for preparation of nanocomposites  
[10+10]
30. (a) Describe the instrumentation and structure determination of AFM.  
(b) Explain the applications of nanomaterials in electronics and sensors. [10+10]

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