STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
(For candidates admitted during the academic year 2019-2020 & thereafter)

M.Sc. DEGREE EXAMINATION – APRIL 2024
BRANCH III - PHYSICS
FOURTH SEMESTER

CODE : ELECTIVE
PAPER : MATERIAL PHYSICS AND NANOSCIENCE
SUBJECT CODE : 19PH/PE/MN15
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION - A **(10 x 3= 30)**

I. ANSWER ALL QUESTIONS

1. Define nanomaterial and give an account on nano existence in nature.
2. Why are the properties of nanomaterials different from bulk materials?
3. What are the applications of Superpara magnetic materials?
4. Define the structure of C_{60}.
5. Give the principle of electric arc deposition technique.
6. What is the use of Langmuir-Blodgett film?
7. Bring out the significance of XPS in characterization of nanomaterials.
8. Write the principle of scanning probe microscopy.
9. Write a short note on quantum computing.
10. What is the application of nanotechnology in LED?

SECTION – B **(5 x 5 = 25)**

II. ANSWER ANY FIVE QUESTIONS

11. Discuss nanomaterials classification on the basis of its dimension.
12. What are excitons? Explain quantum confinement effect of nanomaterials.
13. Explain the fundamentals of sol-gel method of nanostructured synthesis.
14. Elucidate the working of an atomic force microscopy with a neat block diagram.
15. Write a short note on electrochemical sensors.
16. Briefly explain nanoparticle synthesis by spray pyrolysis method.
17. Discuss the working of vibrating sample magnetometer with a neat diagram.

SECTION – C **(3 x 15 = 45)**

III. ANSWER ANY THREE QUESTIONS

18. What are smart materials? Classify them and discuss its types with suitable examples.
19. Explain different types of Core shell nanocomposites and its structural behaviour.
20. Describe the principle and experimental setup of molecular beam epitaxy. Discuss its advantages and disadvantages.
21. Discuss the essential principle and working of a TEM with a neat block diagram
22. Explain the mechanism of photocatalysis and its application in environmental remediation.

****