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

SUBJECT CODE : 19PH/PE/MN15

M.Sc. DEGREE EXAMINATION – APRIL 2023
BRANCH III - PHYSICS
FOURTH SEMESTER

CODE : ELECTIVE
PAPER : MATERIAL PHYSICS AND NANOSCIENCE
TIME : 3 HOURS **MAX. MARKS : 100**

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

I. ANSWER ALL QUESTIONS

1. What are smart materials?
2. Define nanotechnology.
3. Discuss the concept of quantum confinement.
4. Define Paramagnetism with an example.
5. What is spray pyrolysis?
6. Give the advantages of Sol-gel method.
7. What do the x and y-axis in an XRD pattern represent?
8. What information can be extracted from a photoluminescence spectroscopy**?**
9. How nanomedicine is a boon to cancer treatment?
10. Define Photovoltaic cell and its principle.

SECTION – B **(5 x 5 = 25)**

II. ANSWER ANY FIVE QUESTIONS

11. Briefly explain top down and bottom up approaches for producing nanomaterials.
12. Write a note on nano structured materials and their applications.
13. Explain in detail about the core shell structures.
14. Describe the principle and experimental set up of electrochemical deposition method.
15. Explain with a neat diagram the SEM instrument and its use in analysing nanostructures.
16. Discuss about of nanomaterials in electronics and its advantages.
17. Discuss the fabrication and applications of quantum dots and quantum wires

SECTION – C **(3 x 15 = 45)**

III. ANSWER ANY THREE QUESTIONS

18. Describe about 1D, 2D and 3D nanostructured materials.
19. Explain in detail electrical, vibrational, and mechanical properties of CNTs.
20. How oxide nanoparticles can be obtained by sol gel method.
21. Describe the principle of SPM and its experimental procedure in analyzing nanostructures.
22. Explain nano drug delivery system with reference to pore and other special structures.

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