STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
(For candidates admitted from the academic year 2023-2024 & thereafter)

B. Sc. DEGREE EXAMINATION, APRIL 2026
BRANCH III - PHYSICS
FOURTH SEMESTER

COURSE : MAJOR ELECTIVE
PAPER : NANOSCIENCE AND NANOTECHNOLOGY
SUBJECT CODE : 23PH/ME/NN45
TIME : 3 HOURS MAX. MARKS: 100

Q. No.	SECTION A Answer ALL questions (10 x 2 = 20 marks)	CO	KL
1.	Define the Bohr exciton radius.	1	1
2.	What is the importance of surface area in nanomaterials?	1	1
3.	What are one-dimensional nanomaterials?	1	1
4.	What are surface plasmons?	1	1
5.	Give any two advantages of sol-gel synthesis.	1	1
6.	What do you mean by monodispersity?	1	1
7.	What is meant by photoluminescence?	1	1
8.	Explain how the structural morphology of nanoparticles is determined.	1	1
9.	Briefly explain the field emission display.	1	1
10.	Mention the role of nanomaterials in energy production.	1	1
Q. No.	**SECTION B-I** **Answer ANY FOUR questions (4 x 5 = 20 marks)**	**CO**	**KL**
11.	Define nanomaterials. Give the classification of nanomaterials.	2	2
12.	Explain any three properties of nanoparticles.	2	2
13.	What is annealing? Explain its significance in hydrothermal synthesis.	2	2
14.	Explain Bragg's law of diffraction with necessary diagrams.	2	2
15.	Enumerate the applications of carbon nanotubes (CNTs).	2	2
Q. No.	**SECTION B-II** **Answer ANY FOUR questions (4 x 5 = 20 marks)**	**CO**	**KL**
16.	Why is the surface-to-volume ratio very large for nanoparticles compared to bulk materials? Explain with a simple example.	3	3
17.	Discuss the elastic properties of nanoparticle.	3	3
18.	Explain the chemical bath deposition synthesis of nanomaterials.	3	3

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19.	Explain the uses of Scanning Electron Microscopy (SEM) in the study of nano systems.	3	3
20.	What is targeted nano-drug delivery? Explain.	3	3
Q. No.	**SECTION C-I** **Answer ANY TWO questions (2 x 10 = 20 marks)**	**CO**	**KL**
21.	Briefly narrate the history of nanomaterials.	4	4
22.	Define a carbon nanotube. What are the types of carbon nanotubes? Highlight the properties of carbon nanotubes.	4	4
23.	Explain in detail any two physical methods of synthesis of nanomaterials.	4	4
24.	Give a brief account on nanosensors and nanocoating.	4	4
Q. No.	**SECTION C-II** **Answer ANY TWO questions (2 x 10 = 20 marks)**	**CO**	**KL**
25.	Explain the Quantum size confinement in Nano-sized materials.	5	5
26.	Discuss in detail the CVD technique for the synthesis of Nano powders with a neat diagram.	5	5
27.	Why nanomaterials are considered potential materials for the fabrication of solar cells?	5	5
28.	With a neat sketch, explain the working of transmission electron microscopy (TEM).	5	5

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