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

B.Sc. DEGREE EXAMINATION APRIL 2024
BRANCH III - PHYSICS
SIXTH SEMESTER

COURSE : MAJOR – ELECTIVE
PAPER : LASER PHYSICS
SUBJECT CODE : 19PH/ME/LP45
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION - A

ANSWER ALL QUESTIONS: **(10 x 3 =30)**

1. What is population inversion?
2. Explain the importance of optical resonators in laser systems.
3. Give the advantages of a three-level laser system over a two-level system.
4. Define monochromaticity.
5. Explain the energy level diagram of a carbon dioxide laser.
6. Briefly explain the principle operation of chemical laser.
7. Write a short note on doped semiconductor lasers.
8. Discuss the advantages of laser diodes.
9. Define Lidar.
10. Mention any three applications of laser in medicine.

SECTION - B

ANSWER ANY FIVE QUESTIONS: **(5 x 5 = 25)**

11. Identify and describe the basic components required for laser operation.
12. Explain the concepts of temporal and spatial coherence and their importance in laser applications.
13. Describe the construction and operation of a dye laser, highlighting its advantages.
14. Explain the process of recording and reconstructing of holographic images.
15. Discuss the role of lasers in nuclear energy and mention its applications.
16. Discuss the construction of a Helium-Neon (He-Ne) laser in detail.
17. Discuss the process of laser ablation and its applications in material processing.

SECTION - C

ANSWER ANY THREE QUESTIONS: **(3 x 15 = 45)**

18. Establish the relation between Einstein’s coefficients.
19. Describe the construction and working of a Nd:YAG laser with its energy level diagram.
20. Describe the structure and operation of a homojunction laser in detail. Also illustrate its energy level diagram.
21. Discuss the role of lasers in communications and the basic principles of optical computers, providing a detailed explanation of their block diagrams and its applications.

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