

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 600 086.**  
**(For candidates admitted during the academic year 2008-09 & thereafter)**

**SUBJECT CODE : PH/ME/LP54**

**B.Sc. DEGREE EXAMINATION NOVEMBER 2011**  
**BRANCH III - PHYSICS**  
**FIFTH SEMESTER**

**COURSE : MAJOR – ELECTIVE**  
**PAPER : LASER PHYSICS**  
**TIME : 3 HRS. MAX. MARKS : 100**

**SECTION – A**

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

1. What will be the average of a photon of wavelength?
2. Explain population inversion and stimulated emission.
3. Explain the reason for broadening of spectral line.
4. Explain the principle of Nd-TAG laser.
5. With an example, explain the principle of dye laser.
6. Explain the working of HCl laser.
7. Outline the functioning of Intrinsic semi conductor laser.
8. Give the principle of doped semiconductor laser
9. Explain the role of laser in nuclear fusion.
10. Explain Lidar and mention its application.

**SECTION – B**

**ANSWER ANY FIVE QUESTIONS: (5X6=30)**

11. Explain the methods of pumping to achieve population inversion.
12. Explain spontaneous and stimulated emissions and obtain Einstein coefficients.
13. Derive the rate equations for two and three level laser systems.
14. With a diagram, explain the working of carbon dioxide laser.
15. What is injection laser? Explain its principle and working.
16. Discuss the application of lasers in Industry and Medicine.
17. a) Outline the principle of bar code scanner.  
b) Explain the use of laser in optical communication.

**SECTION – C**

**ANSWER ANY TWO QUESTIONS: (2X20=40)**

18. Derive Towne's threshold condition for laser oscillation in terms of population difference.
19. With energy level diagram, explain the working of Ruby laser.
20. Explain the construction and working of He-Ne laser with energy level diagram.
21. Explain the method of recording and reconstruction of image in holography.

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