

Name:

Roll no:.....

St. Pius X College, Rajapuram

***VI semester BSc Physics ,Terminal Examination, February 2018**

Course Title : **6B12PHY: Photonics & Spectroscopy**

Time: 3 hours

Maximum marks:40

Section A:

(Very short answer type. Each carries 1 mark. Answer all 4 questions)

1. Name a molecule that shows microwave spectroscopy.
2. Name the first gas laser.
3. What is the wavelength of Ruby laser?
4. Give an example of a three level laser (4x1=4)

SECTION B

(Short answer type. Each carries 2 marks. Answer 7 questions out of 10)

5. Explain Total internal Reflection
6. What are the special characters of laser?
7. What is meant by population inversion in laser?
8. Explain recording of a Hologram
9. Define cavity life time .Obtain an expression for it.
10. Outline various line broadening mechanism
11. Distinguish between Single mode Fiber and Multi mode Fibers.
- 12 Explain the effect of isotopic substitution on the rotational spectra of diatomic molecule.
13. Outline the principle of working of a microwave oven.
14. Explain the main components of the laser.. (7x2=14)

SECTION C

(Short essay / problem type. Each carries 3 marks. Answer 4 questions out of 6)

15. Explain the Theory of Holography
16. What is parabolic index fiber? compare the ray dispersion in parabolic index fiber and step index fiber
- 17 .Calculate the numerical aperture and critical angle of an optical fiber if the refractive indices of the core and cladding are 1.48 and 1.46 respectively.
18. A step index fiber in air has $NA = 0.15$, core of refractive index 1.52 and diameter 50 μm . Determine the V-number of the fiber when light of wavelength 0.75 μm is transmitted.
19. How molecules are classified into groups according to their three principal moment of inertia. Explain with examples
- 20.Explain Ruby laser (3x4=12)

SECTION D

(Long essay type. Each carries 5 marks. Answer 2 questions out of 4)

- 21 Briefly explain the working of He-Ne Laser.
22. Define numerical aperture of an optical fibre. Obtain an expression for the numerical aperture in terms of refractive indices of the core and cladding.
23. Discuss the rotational spectra of a rigid diatomic molecule. Draw the rotational energy levels.
24. What are Einstein's Coefficients? Obtain the relations between them. (2*5=10)