

22025

Roll No. ....

22025

M. Sc. Physics (CS) 2nd Semester  
Examination – May, 2019

PHYSICS OF LASER AND LASER APPLICATIONS

Paper : Phy(s) – 205

Time : Three hours ] [ Maximum Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt five questions in all, selecting at least one question from each Unit. Question No. 1 is compulsory.

- 1. (a) What is superfluorescence ? 4 × 4 = 16
- (b) Define Pumping efficiency.
- (c) What is a dye laser ?
- (d) What is Raman scattering ?

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UNIT – I

- 2. (a) Discuss spontaneous and stimulated emission. Discuss relation between Einstein coefficients. 12
- (b) The ratio of population of two energy levels out of which upper one corresponds to metastable state is  $1.059 \times 10^{-30}$ . Calculate wavelength of light emitted at 300 K. 4
- 3. Explain the concept of directionality, monochromativity, brightness and coherence as applied to lasers. 16

UNIT – II

- 4. Explain three level laser system and derive it's threshold pumping power per unit volume required to maintain population inversion. 16
- 5. (a) What is Q. switching ? Discuss methods of Q. switching. <https://www.haryanapapers.com> 8
- (b) Explain mode locking. 8

UNIT – III

- 6. Explain construction, working and energy level diagram of N<sub>2</sub> laser. Give its applications. 16

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7. Explain the construction and working of a Nd:YAG laser. Calculate the threshold pump power for the laser.

**UNIT – IV**

8. Explain :
- (a) Multiphoton process
  - (b) Stimulated Raman effect.
9. What is Holography ? How a hologram is made how is it reconstructed ? Write applications of Holography.