

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 ? $4 \times 4 = 16$
(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 1.059×10^{-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 its 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_2 laser. Give its applications. 16

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