9. (a) Write down the Maxwell's equations in a non-linear media.

   (b) Give the description of laser induced fluorescence spectroscopy. 8+7=15

Roll No. ....

11853

M. Sc. EXAMINATION

(For Batch 2017 & Onwards)

PHYSICS

PHY-403 A

Laser & Spectroscopy-II

Time : *Three Hours* Maximum Marks : 70

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory and of 10 marks. All questions carry equal marks.

1. (i) Write a note on degeneracy of states in a semiconductor laser. 5×2=10

   (ii) Why four level laser system is superior than three level system ?

(iii) What is Q-switching ?

(iv) Write a note on fluorescence excitation spectroscopy.

(v) What is the excitation mechanism of Nd:YAG laser ?

Unit I

2. (a) Write down the rate equations for a Four level laser system.

   (b) Explain the term Lamb Dip.   7+8=15

3. (a) What do you understand by efficiency of a laser system ? How is it affected ?

   (b) Write a note on amplification in an inhomogeneously broadened system.

    8+7=15

Unit II

4. (a) Explain excitation mechanism of Ruby laser.

   (b) Explain the structure and important application of CO_2 laser.

5. (a) Write a note on quantum well laser.

   (b) Explain tunability in argon ion laser system.   8+7=15

Unit III

6. (a) Write about linear and non-linear Optical effects.

   (b) Give an account of mode locking technique.   8+7=15

7. (a) What is Electro-optic effect ?

   (b) Write a note on index ellipsoid ?   7+8=15

Unit IV

8. (a) What is the origin of non-linearity in the medium ?

   (b) Write a note on Laser Raman spectroscopy.   7+8=15