Roll No.....

Total No. of Units : 04
Total No. of Printed Pages : 03

Code No. : 04/101

Fourth Semester Examination, May 2019

M.Sc. PHYSICS

Paper - I

LASER PHYSICS AND APPLICATIONS OF LASERS

Time : 3 Hrs. **Max. Marks : 80**

- Part A and B of each question in each unit consist of very short answer type questions which are to be answered in one or two sentences.
  Part C (Short answer type) of each unit should be answered in 200-250 words.
  Part D (Long answer type) of each unit should be answered within the word limit 400-450.

Unit - I

Q.1 A. Define laser pumping. **(2)**

Q.1 B. Define quality factor of a resonator. **(2)**

Q.1 C. Describe the mode locking process in a laser. **(4)**

OR

Describe losses inside a cavity.

Q.1 D. Describe line broadening mechanism in lasers. Hence describe Doppler Broadening in detail. **(12)**

OR

Describe Giant Pulse Dynamics of Q-Switching.

P.T.O.

Unit - II

Q.2 A. Explain spiking in Ruby lasers. **(2)**

Q.2 B. Why do we call GaAs p-n junction lasers as injection lasers? **(2)**

Q.2 C. Explain lasing mechanism in Nd:Glass lasers. **(4)**

OR

Explain lasing mechanism in Nitrogen lasers.

Q.2 D. Describe construction, working principle and applications of Ruby lasers. **(12)**

OR

Describe construction, working principle and applications of excimer lasers.

Unit - III

Q.3 A. What is the threshold energy for non-linear photo electric effects? **(2)**

Q.3 B. What is hyper Raman Effect? **(2)**

Q.3 C. Write the principle and working of photo acoustic Raman spectroscopy. **(4)**

OR

Explain the phenomena of harmonic generation.

Q.3 D. Describe the phenomena of phase matching and optical mixing and their role in second harmonic generation. **(12)**

OR

Describe the phenomena of phase conjugation optics on the basis of various multiphoton processes.

Unit - IV

Q.4 A. What are the drawbacks of monomode lasers? **(2)**

Q.4 B. Define splice loss in an optical fibre. **(2)**

Q.4 C. Explain the process of isotope separation using lasers. **(4)**

OR

Explain broad band communication process using lasers.

Q.4 D. Write various sources of pulse dispersion in an optical fibre. Hence calculate pulse dispersion for step index fibres. **(12)**

OR

Describe various steps and processes used in an optical fibre communication system.

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