Roll No. _____ **Code No. Q-4399**

FOURTH SEMESTER EXAMINATION 2021-22

M.Sc. PHYSICS

Paper - II

Physics of Lasers & Laser Applications

Time : 3.00 Hrs. **Max. Marks : 80**

Total No. of Printed Page : 02 **Mini. Marks : 29**

Note:- Question paper is divided into three sections. Attempt question of all three section as per direction Distribution of marks is given in each section.

Section 'A'

Very short answer question (in few words)

Q.1 Attempt any six questions from the following : 6x2=12

(i) Name the components that required a laser system.

(ii) What is pumping process ?

(iii) Why four level laser system is more efficient than a three level laser system ?

(iv) Define Mode locking.

(v) Why Electrical discharge method is used for acheiving population inversion in gas lasers ?

(vi) Why the light from gas lasers are more directional than solid state lasers ?

(vii) What is a non-linear medium ?

(viii) Why laser light influence the optical parameters of a medium ?

(ix) How light beam propogates through an optical fibre ?

(x) What type of lasers are used in wedding process ?

Section 'B'

Short answer type question (in 200 words)

Q.1 Attempt any four questions from the following : 4x5=20

(i) Describe a stable optical resonator.

(ii) Explain Longitudinal mode selection.

(iii) Describe about ultra short pulse generation and measurement.

(iv) Describe construction and working of Helium-Neon laser.

(v) Discuss non-linear interaction of light with matter.

(vi) Discuss propogation of light in a medium with varriable refractive index.

(vii) Discuss some engineering applications of lasers.

Section 'C'

Long answer/Essay type question. **4x12=48**

Q.3 Attempt any four questions from the following questions :

(i) Explain Gaussian beam and its properties.

(ii) What are cavity modes ? Explain Mode selection techniques.

(iii) Describe Semiconductor laser and obtain condition for laser action.

(iv) Describe laser induced fluorescence and stimulated Raman scattering.

(v) Discuss Multiphoton process and their uses.

(vi) Describe an optical fibre and also light wave communication.

(vii) Describe ultra high resolution spectroscopy with lasers and their uses.

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