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Code No. : B04-101

Fourth Semester Online Examination, May-June, 2022

M. Sc. PHYSICS

Paper I

LASER PHYSICS & APPLICATION OF LASER

Time : Three Hours]   [Maximum Marks : 80

Note :
- Part A and B of each equation 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) and D (Long answer type) of each question should be answered within the word limit 200-250 and 400-450.

Unit-I

1. (A) Define directionality and its use in LASER. 2

   (B) What is quality factor ? 2

   (C) Explain radiative transitions and its type. 4

Or

Define Coherence Length and explains the types of coherence in LASER.

(D) Define homogenous broadening mechanism and explain in brief collision broadening mechanism. 12

Or

What is population inversion ? How is it achieved in LASER ? Explain why population inversion is not achieved for two levels LASER system.

Unit-II

2. (A) What is the principle of dye LASER ? 2

   (B) What is principle of NdYAG LASER ? 2

   (C) Explain principle and energy level of Nd Glass LASER. 4

Or

Explain principle and energy level of Carbon Di Oxide LASER.

(D) What is difference between continuous and pulse LASER ? Explain principle, construction, and mechanism of Semiconductor LASER. 12

Or

Explain the principle, mechanism and construction of Gas Laser and also give its applications.

Unit-III

3. (A) Define stimulated Raman effect. 2

(B) Explain parametric generation of light. 2

(C) What do you mean by losses in fiber ? Give different types of loss inside fibers. 4

Or

Explain the mechanism of Self Focusing.

(D) Explain Photo Acoustic Raman Spectroscopy in detail. 12

Or

Explain the mechanism of nonlinear interaction of light with matter.

Unit-IV

4. (A) Define stimulated Raman effect. 2

(B) Write two applications of LASER. 2

(C) Write down expression for numerical aperture. 4

Or

How LASER can be used in isotope separation ?

(D) What is refractive index profile of optical fiber ? Explain the types of optical fiber based on refractive index profile. 12

Or

What is V parameter ? Explain the importance of this parameter and established relation between numerical aperture and V parameter.

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