(i) Printed Pages : 3 Roll No. .....

(ii) Questions : 7 Sub. Code : 0 3 4 8

Exam. Code : 0 0 0 4

B.A./B.Sc. (General) 4th Semester

(2053)

PHYSICS

Paper : B Optics and Lazer–II

Time Allowed : Three Hours] [Maximum Marks : 44

Note :—Attempt **FIVE** questions in all selecting **TWO** questions each from Sections I & II. Section III is compulsory. Use of non-programmable calculator is allowed.

SECTION—I

1. (a) What is broadening of spectral lines ? Explain natural broadening. 6

   (b) Calculate line width for 6328 Å wavelength of a He-Ne laser operating at 300 K. Given mass of Ne atom = 20 a.m.u. 3

2. (a) What are Einstein's coefficients ? Prove that ratio of Einstein's spontaneous and stimulated emission coefficients is directly proportional to cube of frequency. 6

(b) At thermodynamic equilibrium and room temperature of 27°C, what is the ratio of populations at upper and lower level of a transition if photon energy is 0.1 eV ? 3

3. (a) What is population inversion ? Why it is essential and how it is achieved in laser ? 6

(b) Write short note on three level pumping scheme. 3

SECTION—II

4. (a) Discuss with suitable diagrams, the construction and working of a He-Ne laser. 6

(b) Explain the concept of holography. 3

5. (a) Describe the construction and working of CO_2 laser with neat labelled diagram. 6

(b) In an optical fibre, refractive index of core is 1.4. Calculate refractive index of cladding if acceptance angle of fibre is 30°. 3

6. (a) Discuss in detail, different losses in optical fibre. 6

(b) Write short note on splicing techniques of optical fibre. 3

SECTION—III

7. Attempt any **EIGHT** parts :—

(i) Light emitted by a conventional source is always incoherent. Why ?

(ii) What is basic principle of laser ?

(iii) Why optical quality of gas laser is better ?

(iv) Is it possible to have two level laser ?

(v) What is the function of optical resonator in a laser ?

(vi) Why dye laser is known as tuneable laser ?

(vii) What is spiking in Ruby laser ?

(viii) Give advantage of single mode fibre over multimode fibre.

(ix) Define skip distance of optical fibre.

(x) Why lasers are required for holography ? $1 \times 8 = 8$