Exam.Code:0004
Sub. Code: 0348

2071

B.A./B.Sc. (General) Fourth Semester

Physics

Paper – B: Optics and Lazer – II

Time allowed: 3 Hours Max. Marks: 44

NOTE: *Attempt five questions in all, including Question No.VII (Unit- III) which is compulsory and selecting two questions each from Unit I - II. Use of non-programmable calculator is allowed.*

x-x-x

UNIT – I

I. a) Describe in detail temporal and spatial coherence. Hence, define coherence time and coherence length.

b) Calculate line width for 6328 A° wavelength of a He-Ne laser operating at 300 K. Given mass of Ne atom = 20 a.m.u. (6,3)

II. a) What are Einstein's co-efficient? Derive a relation between Einstein's spontaneous and stimulated emission coefficients.

b) A laser beam of 1.4mm diameter has a power of 22 mW. Find the intensity of the beam. (6,3)

III. a) Laser is basically a three-component device. Explain.

b) Write a short note on mechanism of luminescence. (6,3)

UNIT - II

IV. a) Discuss with suitable diagrams, the principle, construction and working of a He-Ne laser.

b) What are applications of laser? (6,3)

V. a) Describe the construction and working of Nd:YAG laser.

b) In an optical fibre, the core material has refractive index 1.6 and refractive index of clad material is 1.3. Calculate angle of acceptance cone. (6,3)

P.T.O.

VI. a) Describe causes of signal attenuation in optical fibre.

b) Write short note on splicing technique of optical fibre. (6,3)

UNIT - III

VII. Attempt any eight parts: -

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

b) What is population inversion?

c) What is importance of metastable state in a laser?

d) What is the cause of broadening of spectral line?

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

f) Why is dye laser known as tuneable laser?

g) What is spiking in Ruby laser?

h) Write any two features of semiconductor laser.

i) Differentiate between photograph and hologram.

j) What is use of cladding in optical fibre? (8x1)

x-x-x