(i) Printed Pages :2 Roll No. .....

(ii) Questions :7

Sub. Code : 0346

Exam. Code: 0004

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

1046

PHYSICS

Paper -B:Optics and Laser-II

Time Allowed: Three Hours] **[Maximum Marks : 22**

Note :- Attempt **two** questions from Section I, **two** question from Section II and **six** parts of the question in Section III. Only non-programmable calculators are allowed to be used.

SECTION-I

I. (a) Explain Stimulated emission, spontaneous emission and induced absorption. Derive relation between Einstein Spontaneous and Stimulated emission coefficients. 3

(b) What are main features of Laser light ? 1.5

II . (a) What do you mean by broadening of spectral lines derive an expression for Doppler Broadening. 3

(b) Find the Doppler Broadening for 6328 A° laser transition in He - Ne assuming a single isotope of NE^{20} and that the Laser operates at temperature Of 373K 1.5

III. (a) What is population inversion . why is it essential and how is it achieved in a Laser 3

(b) Explain the elementary thoery of optical cavity. 1.5

SECTION-II

IV. (a)Discuss construction and Working of Ruby Laser.

(b)What are applications of Lasers ?

V. (a)Discuss construction and working of CO_2 Laser With -_____ labelled diagram.

(b)Find possible frequency spread when transition take place from unstable upper state having life time 10^{-3}s.

VI. (a) What is holography ? Describe recording of a hologram and reconstruction of image. How holography is different from ordinary photography ?

(b) What are sources of attenuation of signal in optical fibres.

SECTION-III

VII. Attemot any **six** parts:

(i) Distinguish between LASER and MASER

(ii) How does Laser light differ from the light lamp

(iii) Can we obtain light amplification in absence of simultaneous emissiom?

(IV) Define temporal coherence and spatial Coherence .

(v) Do you think energy conservation is violated in laser.

(vi) Define coherence time.

(Vii)What is Laser Pumping ?