

(i) Printed Pages: 3

Roll No.

(ii) Questions : 7

Sub. Code :

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Exam. Code :

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B.A./B.Sc. (General) 4th Semester
(2054)

PHYSICS

Paper : B Optics and Lazer-II

Time Allowed : Three Hours]

[Maximum Marks : 44

Note :—Paper consists of **SEVEN** questions comprising of **three** Units. First **two** Units comprise of **THREE** questions from each of Unit I and II, the third Unit comprises of **ONE** compulsory question of **TEN** short answer type parts. Student will attempt **TWO** questions from each of the first **two** Units and any **EIGHT** parts of the compulsory question. The use of non-programmable calculator is allowed.

UNIT—I

1. (a) Discuss and derive the mathematical expressions for Einstein's coefficients. 7
- (b) Which ones are more difficult to operate — high frequency lasers or the low frequency ones ? Explain. 2

2. (a) Derive an expression for Doppler broadening of LASER light and discuss its physical significance. 7
- (b) Consider a 100 watt LASER with wavelength 7000 \AA , at the focal plane of lens of focal length 8 cm and diameter 6 cm. Calculate the intensity of light so produced. 2
3. Discuss and derive the Fuchbaur-Ladenberg formula. 9

UNIT—II

4. (a) Explain the principle, construction and working of the CO_2 LASER in detail. 7
- (b) Discuss few advantages of semi conductor LASERs. 2
5. Give a detailed account of various types of losses in an optical fibre. 9
6. Write a detailed note on :—
 - (a) Principle and technique of holography. 5
 - (b) Use of optical fibres in communication system. 4

UNIT—III

7. Attempt any **EIGHT** parts :—
 - (a) What are active centers ?
 - (b) What do you mean by 'population inversion' ?
 - (c) Define the term acceptance angle in an optical fibre.

- (d) Can you practically achieve a perfectly monochromatic source ?
- (e) What is meant by mode locking ?
- (f) What is Q switching phenomenon ?
- (g) Which is more advantageous — solid state laser or liquid laser ?
- (h) What is laser pumping ?
- (i) Explain the term 'spatial coherence'.
- (j) What is the basic principle of isotope separation technique ?

1×8=8