

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 9

Sub. Code : 

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Exam. Code : 

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**B.A./B.Sc. (General) 3<sup>rd</sup> Semester**

**1125**

**PHYSICS**

**Paper– B : Optics and Lasers–I**

**Time Allowed : Three Hours]**

**[Maximum Marks : 22**

**Note:–** (i) Attempt **five** questions in all.

(ii) Attempt **two** questions each from Section–A and Section B.

(iii) Section C is compulsory for all.

(iv) The use of non-programmable calculator will be allowed.

**SECTION–A**

- I. (a) Explain principle and working of Michelson Interferometer. 3  
(b) Explain the difference between temporal and spatial coherence. 1
- II. (a) Describe Fabry Perot interferometer and derive an expression for intensity distribution in fringes. 3  
(b) Calculate the coherence length for white light whose wavelength ranges from 400 nm to 750 nm. 1
- III. (a) Explain analytically the formation of colours in thin films. 3  
(b) Distance between two shifts is 0.1 mm and the width of fringes formed on screen is 6 mm. If the distance between the screen and slits is 1.5 meters. Calculate wavelength of light. 1

## SECTION-B

- IV. (a) Explain the Fraunhofer diffraction at a circular aperture. 2  
(b) Explain the phenomenon of double refraction in a calcite crystal. 2
- V. (a) Explain the theory of zone plate and derive expression for its focal length. 2  
(b) What is relation between thickness of half wave plate and quarter wave plate? 1  
(c) What is the radius of first half period zone in zone plate which behaves as convex lens of focal length 40 cm for a wavelength of 400 nm? 1
- VI. (a) Explain construction and working of quarter wave plate. How it is used to produce circularly and elliptically polarized light? 3  
(b) Show whether diffraction grating with grating element  $1.5 \times 10^{-6}$  m and light of wavelength 550 nm, third order maximum is visible or not. 1

## SECTION-C

**Note :-** Attempt any **Six** parts (each part carries **one** mark).

- VII. (a) What are coherent sources of light?  
(b) What do you mean by grating element of a grating?  
(c) Consider a non-reflecting film of R.I. 1.38 having thickness  $9 \times 10^{-6}$  cm. Calculate the wavelength of light for which thin film will be non-reflecting.



- (d) Why broad source of light is necessary for observing colours in thin films?
- (e) Name three ways by which a plane polarized light can be produced.
- (f) Distinguish between E-Ray and O-Ray.
- (g) How will you increase the resolving power of diffraction grating ?

1×6=6