

PHYSICS PAPER-B

(Optics and Lasers—I)

Time Allowed : 3 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

1. (a) Explain principle and working of Michelson Interferometer. 3
- (b) Explain the difference between temporal and spatial coherence. 1

2. (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
3. (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 6mm. If the distance between the screen and slits is 1.5 meters. Calculate wavelength of light. 1

SECTION—B

4. (a) Explain the Fraunhofer diffraction at a circular aperture. 2
 (b) Explain the phenomenon of double refraction in a calcite crystal. 2
5. (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
6. (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 1.5×10^{-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).

7. (a) What are coherent sources of light? 1
 (b) What do you mean by grating element of a grating? 1
 (c) Consider a non-reflecting film of R.I. 1.38 having thickness 9×10^{-6} cm. Calculate the wavelength of light for which thin film will be non-reflecting. 1
 (d) Why broad source of light is necessary for observing colours in thin films? 1
 (e) Name three ways by which a plane polarized light can be produced. 1
 (f) Distinguish between E-Ray and O-Ray. 1
 (g) How will you increase the resolving power of diffraction grating? 1

1×6=6