

Exam. Code : 103203

Subject Code : 1361

B.A./B.Sc. 3rd Semester

PHYSICS

Paper—B (Optics)

Time Allowed—3 Hours] [Maximum Marks—35

Note :—Attempt ALL questions of Section A and ONE question each from Sections B, C, D and E. All questions carry equal marks.

SECTION—A

- I. (1) Give any two examples of interference by division of wave front.
- (2) Two coherent sources of intensity ratio 100 : 1 interfere. Deduce the ratio of intensity between the maxima and minima in the interference pattern.
- (3) Write a short note on non-reflecting films.
- (4) What is the additional phase difference introduced, when light is reflected from a rarer medium ?
- (5) What are positive and negative zone plates ?
- (6) Diffraction of Radio waves around buildings is remarkable as compared to those of light waves. Why ?
- (7) What is the refractive index of doubly refracting crystals ?

SECTION—B

- II. (1) How can we determine the thickness of Mica sheet using the method of displacement of interference fringes ?
- (2) A Fresnel biprism is placed at a distance of 5 cm from a slit illuminated by Na light of wavelength 5890 Å. The width of fringes obtained on a screen 75 cm from the biprism 9.4×10^{-2} cm. Find the distance between the two coherent sources.
- III. (1) Write a short note on spatial and temporal coherence.
- (2) State the essential as well as desirable conditions for obtaining a sustainable good quality interference pattern.

SECTION—C

- IV. Determine the phenomenon of interference of light due to thin films and find the conditions of maxima and minima. Show that the interference pattern of reflected and transmitted light are complementary.
- V. Describe the principle, construction, working and theory of Michelson interferometer and discuss the nature of fringes produced.

SECTION—D

- VI. What are Fresnel's half period zones ? Discuss their area and amplitude contribution on a plane wave front.
- VII. Discuss Fraunhofer diffraction at a circular aperture in detail. How does diffraction impose a limit to the resolving power of optical instruments ?

SECTION—E

- VIII. (1) Write short notes on :—
- (a) Polarization by reflection
 - (b) Blue color of sky
- (2) The critical angle of light in a certain substance is 45° . What is the polarizing angle ?
- IX. What is a Quarter-wave Plate ? How would you distinguish circularly and elliptically polarized light with it ?