Roll No. .....

(01/22-II)

5198

B. Sc. EXAMINATION

(Third Semester)

PHYSICS

PH-302

Wave and Optics–I

Time : Three Hours *Maximum Marks :* 40

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) How localised fringes are observed in Michelson's Interferometers ?

   (b) A zone plat has multiple foci. Explain.

   (c) What do you mean by Rayleigh's criterion of resolution ?

   (d) Why Newton's rings are circular ?

Unit I

2. Derive the condition of maxima and minima in Young's Double Slit interference experiment.

3. (a) Describe the Biprism method of producing the interference fringes. How can it be used to find the thickness of this transparent sheet ?

   (b) Explain Stokes' treatment of reflection.

Unit II

4. (a) Explain the interference by Wedge-shaped film and find the expression of fringe width.

   (b) Explain formation of colours in thin film. Show that a film which appears bright in reflected light, will appear dark in transmitted light.

5. (a) How can Michelson's interferometer be used for the standardization of a metre ?

(b) Derive an expression for the diameter of bright rings in Newton's ring experiment.

Unit III

6. (a) What is Zone Plate ? Explain that zone plate has multiple foci.

   (b) What is the nature of diffraction pattern due to straight edge ?

7. (a) Discuss the diffraction pattern produced by a rectangular slit.

   (b) Find the radius of the first half period zone of a zone plate which behaves as a convex lens of focal length 50 cm for a wavelength of 5000 Å.

Unit IV

8. (a) Discuss Fraunhoffer diffraction at a double slit. Find the position of maxima and minima.

(b) In Fraunhoffer diffraction due to narrow slit, screen is placed 1 m away from the lens to obtain pattern. If slit width is 0.1 mm and first minima lies 4 mm on either side of central maxima, find wavelength of light used.

9. Derive an expression for dispersion power and resolving power of a plane transmission diffraction grating.