

Exam. Code : 103203

Subject Code : 1305

B.A./B.Sc. 3rd Semester (Batch 2020-23)

PHYSICS

Paper-B (Optics and Lasers)

Time Allowed—3 Hours] [Maximum Marks—35

Note :- Attempt FIVE questions in all, selecting at least ONE question from each section. The fifth question may be attempted from any section. All questions carry equal marks.

SECTION-A

1. (a) What are Newton's rings ? Derive an expression for the diameter of bright fringes.
- (b) How can Newton's rings be used to determine the refractive index of a liquid ? Derive the formula used. 4,3
2. (a) Discuss the phase change due to reflection of light from the surface of a denser medium. 3
- (b) Explain the colours, when a thin film of transparent material is observed in reflected light. Why are colors not observed in case of a thick film ? 3,1

SECTION-B

3. Define resolving power and limit of resolution. How are these two related ? Discuss in detail the resolving power of a microscope. 3,1,3

4. What is a zone plate ? How is it constructed ? Give its theory and show that a zone plate has multiple foci. Compare the zone plate with a convex lens. 7

SECTION-C

5. (a) What do you mean by double refraction ?
- (b) Describe the construction of a Nicol's prism. Explain how it can be used as a polariser and an analyser. 2,5
6. (a) Describe polarization of light by scattering. Explain the blue colour of sky and red colour at sunset.
- (b) Explain the construction and use of a quarter wave plate QWP and half wave plate HWP. 3,4

SECTION-D

7. Explain in detail the construction, energy levels, mode of creating population inversion and output characteristics of the following lasers :
 - (a) Ruby Laser
 - (b) He-Ne Laser. 3.5,3.5
8. (a) Write a short note on three level and four level laser schemes.
- (b) Discuss various aspects of an optical resonator. 3,4