

Roll No. 223112340007

Exam Code : M-24

Subject Code—61408

B. Sc. EXAMINATION

(Main/Reappear) (Batch 2019 Onwards)

(Fourth Semester)

PHYSICS

CPL-403 (Core Course-VIII)

Wave and Optics

Time : 3 Hours

Maximum Marks : 80

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

(Compulsory Question)

1. (a) What are the characteristics of standing waves ? 4

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- (b) How does the interference pattern by reflection in thin films differ from that by refraction ? 4
- (c) What is the difference between a convex lens and zone plate ? 4
- (d) Explain the role of Canada Balsam in Nicol Prism. 4

Section A

2. (a) Derive a relation between group velocity and phase velocity in a dispersive medium. 8
- (b) What is wave intensity ? Derive exponential law of absorption. 8

Or

3. (a) Give an analytical treatment of standing waves on a stretched string. 10
- (b) A simple progressive wave is given by the equation $y = 0.5 \sin(314t - 12.56x)$; where y and x are expressed in meters

and t in seconds. Find (i) amplitude
(ii) wavelength (iii) speed of the wave
(iv) frequency. 6

Section B

4. Give the theory, experimental arrangement and method to determine the wavelength of light by Newton's Ring apparatus. 16

Or

5. (a) Discuss the interference in-wedge-shaped films. 8
(b) Discuss interference in thin films due to reflected light. 8

Section C

6. (a) What is half period zones ? On its basis explain propagation of light. 8
(b) Explain Rayleigh's criterion for resolution of an instrument. 4

- (c) Calculate the radius of the 3rd-half period zone of a zone plate of focal length 1.5 m, illuminated by a light of wavelength 593 nm. 4

Or

7. (a) What is resolving power ? Obtain an expression for resolving power of telescope. 8
- (b) Discuss Fraunhofer diffraction at a single slit. Find the width of central maxima. 8

Section D

8. (a) State Brewster's law and prove that if light is incident on a transparent medium at polarizing angle then reflected and refracted beams travel perpendicular to each other. 8
- (b) What are uni-axial, biaxial, positive and negative crystals ? 8

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Or

9. (a) What is meant by a hologram ? What are the properties of a hologram ? 8
- (b) State and explain law of Malus. 4
- (c) What is elliptically polarized light ? 4

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