

(6 pages)

Reg. No. :

Code No. : 30451 E Sub. Code : CMPH 21

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024

Second Semester

Physics — Core

OPTICS AND ACOUSTICS

(For those who joined in July 2021 and 2022 only)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer.

1. The condition for minimum spherical aberration for two lenses separated by a distance (α) is

- (a) $\alpha = f_1 + f_2$
- (b) $\alpha = f_1 - f_2$
- (c) $\alpha = \frac{f_1 + f_2}{2}$
- (d) None

2. In a Huygen's eye piece _____ minimum.

- (a) spherical aberration only
- (b) chromatic aberration only
- (c) both spherical and chromatic aberrations
- (d) none

3. The path difference for constructive interference is _____. ($n = 0, 1, 2, \dots$)

- (a) $(n+1)\lambda/3$
- (b) $(n+1)\lambda/2$
- (c) $n\lambda$
- (d) none

4. In an air-wedge, fringe width (β) is _____.

- (a) constant
- (b) increasing from left
- (c) increasing from right
- (d) none

5. In a Fraunhofer diffraction, the incident waves are _____ waves.

- (a) Plane
- (b) Spherical
- (c) Elliptical
- (d) None

6. A half wave plate produces a path difference of
 (a) $\lambda/4$ (b) $\lambda/2$
 (c) $\lambda/3$ (d) $\pi/2$
7. The loudness of sound is measured in _____.
 (a) decibel (b) pascal
 (c) coulomb (d) none
8. In simple harmonic motion the acceleration is _____ proportional to the displacement from central position.
 (a) directly (b) inversely
 (c) constant (d) none
9. Ultrasonic waves have _____ energy.
 (a) low (b) high
 (c) zero (d) negative
10. Ultrasonic waves produce _____ effect when passed through a substance.
 (a) cooling (b) heating
 (c) magnetic (d) electric

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
 Each answer should not exceed 250 words.

11. (a) Define dispersion. Explain dispersion of light by a prism.
 Or
 (b) Explain the working of constant deviation spectrometer.
12. (a) Explain the testing of plainness of a glass surface using air wedge.
 Or
 (b) What are the applications of Michelson interferometer?
13. (a) Distinguish between Fresnel and Fraunhofer diffractions.
 Or
 (b) Explain the production of circularly polarized light.
14. (a) What are the free and damped vibrations? Give example for each case.
 Or
 (b) State and explain the laws of transverse vibrations of strings.

15. (a) Explain any two applications of ultrasonic waves.

Or

- (b) Give any five factors which are affecting the acoustics of buildings.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain any two aberration in lenses. How they are removed?

Or

- (b) Explain deviation, without dispersion. How can it be achieved using small angled prisms?

17. (a) Explain the experimental determination of thickness of thin wire using air-wedge.

Or

- (b) Explain the interference in their films due to reflected light.

Page 5 Code No. : 30451 E

18. (a) Describe the theory of Fresnel diffraction due to a circular aperture.

Or

- (b) Give the construction and theory of (i) Quarter wave plate and (ii) Half wave plate.

19. (a) Explain frequency of vibration of string and the laws of transverse vibration of strings.

Or

- (b) Explain the determination of a.c. frequency using sonometer.

20. (a) Explain the production of ultrasonic waves by piezo-electric method.

Or

- (b) Derive Sabine's formula for the reverberation time.

Page 6 Code No. : 30451 E