Code No. : 20443 E   Sub. Code : CMPH 21

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2023.

Second Semester

Physics — Core

OPTICS AND ACOUSTICS

(For those who joined in July 2021–2022)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. A lens free from chromatic aberration is called
    (a) convex   (b) concave
    (c) chromatic   (d) achromatic

2. The difference in deviation between any two colours is called
    (a) angle of deviation
    (b) angular dispersion
    (c) minimum deviation
    (d) dispersion

3. The transverse nature of light wave is demonstrated only by
    (a) interference   (b) diffraction
    (c) polarization   (d) refraction

4. The condition for brightness in Newton's ring is
    (a) $2t = \dfrac{\lambda}{2}$ (b) $2t = 2n - 1$
    (c) $2t = 2n - 1\dfrac{\lambda}{2}$ (d) $2t = n\lambda$

5. With diffraction grating, the angles are
    (a) small   (b) greater
    (c) zero   (d) close to zero

6. The phase difference of the emerging wave in half wave plate
    (a) 90°   (b) 180°
    (c) 270°   (d) 360°

7. In simple harmonic motion, acceleration of a particle is proportional to
    (a) rate of change of velocity
    (b) displacement
    (c) velocity
    (d) direction

8. Example for transverse wave motion is
    (a) Wave on water surface
    (b) EM waves
    (c) Light waves
    (d) All

9. The intensity of sound is proportional to ———————— of amplitude.
    (a) square root   (b) cube root
    (c) square   (d) cube

10. The unit of absorption is
    (a) Poise   (b) Stoke
    (c) Siemen   (d) Sabin

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is chromatic aberration of a lens? Explain how it is removed.

    Or

    (b) Give the construction and working of a Ramsden eyepiece.

12. (a) Outline the conditions necessary for observing interference fringes.

    Or

    (b) Describe Michelson interferometer and explain the formation of fringes in it.

13. (a) Discuss the theory of a plane diffraction grating for oblique incidence.

    Or

    (b) Explain the phenomenon of double refraction in calcite crystal.

14. (a) State and explain laws of transverse vibration of strings.

Or

(b) Write a note on musical scale.

15. (a) Describe the production and detection of ultrasonic waves in brief with any one method.

Or

(b) Outline the factors affecting the acoustics of buildings.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Derive the condition to produce dispersion without deviation in a combination of prisms.

Or

(b) Explain the construction of a Huygens eyepiece.

17. (a) Explain the theory of air wedge. Explain using air wedge how will you find out the thickness of a thin wire.

Or

(b) Describe with necessary theory for determining the refractive index of a lens using Newtons rings experiment.

18. (a) Explain the complete theory of plane diffraction.

Or

(b) Explain the working of half wave plate.

19. (a) Explain free vibrations, forced vibrations and resonance.

Or

(b) Define intensity level. Distinguish between intensity and loudness. Describe the measurement of loudness of a sound.

20. (a) Describe the piezo electric method of producing ultrasonic waves.

Or

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

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