



12th Science : Physics
Wave Optics,

DATE:

TIME: 1 hr

MARKS: 25

SEAT NO:

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Note:-

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A

Q.1 Select and Write the correct answer.

(4)

1. The bending of light around corners of an obstacle is called
A) Dispersion B) Refraction
C) Deviation D) Diffraction
2. The distance of 7th dark band from the central bright band of an interference pattern is 5.2 mm. The fringe width is _____
A) 0.5 mm B) 0.4 mm
C) 0.8 mm D) 0.3 mm
3. Light of a certain colour has 1800 waves to the millimeter in air. What is its frequency in water ?
A) 5.4×10^{14} Hz B) 1.67×10^6 Hz
C) 7.2×10^{14} Hz D) 4.05×10^{14} Hz
4. If 'a' is the aperture of telescope and λ is the wavelength of light then resolving power of telescope is
A) $\frac{\lambda}{1.22a}$ B) $\frac{1.22a}{\lambda}$
C) $\frac{1.22\lambda}{a}$ D) $\frac{a}{1.22\lambda}$

Q.2 Answer the following.

(3)

1. Why it is necessary to have both sources of equal intensity?
2. In biprism experiment, the eye piece is placed at a distance of 1.2 metre from the sources. The distance between the virtual sources was found to be 7.5×10^{-4} m. Find the wavelength of light if the eye-piece is to be moved transversely through a distance of 1.888 cm for 20 fringes.
3. Is it true that, both diffraction and interference are involved in Young's double slit experiment?

Section B

Attempt any Four

- Q.3 Why frequency remains unchanged in different media? **(2)**
- Q.4 Explain Lloyd's mirror with diagram. **(2)**
- Q.5 State the principle of superposition of waves. **(2)**
- Q.6 Derive value for maximum and minimum intensity for interference due to two waves of equal amplitude. **(2)**

- Q.7 A double-slit arrangement produces interference fringes for sodium light ($\lambda = 589 \text{ nm}$) that are 0.20° apart. What is the angular fringe separation if the entire arrangement is immersed in water ($n = 1.33$)? (2)
- Q.8 A ray of light travelling through air, falls on the surface of a glass slab at an angle i . It is found that the angle between the reflected and refracted ray is 90° . If the speed of light in glass is $2 \times 10^8 \text{ m/s}$ find the angle of incidence. ($c = 3 \times 10^8 \text{ m/s}$) (2)

Section C
Attempt any Two

- Q.9 What are coherent source? Why are they required for steady interference pattern? (3)
- Q.10 Explain Fresnel's biprism experiment. (3)
- Q.11 In a biprism experiment, the fringes are observed in the focal plane of the eyepiece at a distance of 1.2 m from the slits. The distance between the central bright band and the 20^{th} bright band is 0.4 cm . When a convex lens is placed between the biprism and the eyepiece, 90 cm from the eyepiece, the distance between the two virtual magnified images is found to be 0.9 cm . Determine the wavelength of light used. (3)

Section D
Attempt any One

- Q.12 Why existence and necessity of hypothesized ether was ruled out? (4)
- Light of wavelength 6000 \AA is incident on water surface. Find the frequency and wavelength of light in water if its frequency in air is $5 \times 10^{14} \text{ Hz}$. μ for water = $\frac{4}{3}$
- Q.13 Explain what is optical path length. How is it different from actual path length. (4)