

PHYSICS

Topic Test

Topic: 7. Wave Optics

Time : 1 Hour 15 Min

Std: XII

Total Marks: 25

SECTION A

Q.1. Select and write the correct answer:

[04]

- i. A wavefront originating from a _____ source of light at finite distance is called spherical wavefront.
(A) coherent (B) point (C) line (D) monochromatic
- ii. Appearance of colours in soap bubble is an example of _____.
(A) scattering (B) polarisation
(C) interference (D) well resolved point objects
- iii. Width of the central bright fringe, in single slit diffraction is given by
(A) $2\left(\frac{\lambda D}{a}\right)$ (B) $\left(\frac{\lambda D}{a}\right)$ (C) $\left(\frac{\lambda D}{2a}\right)$ (D) $\left(\frac{\lambda a}{D}\right)$
- iv. The resolving power of telescope depends on
(A) focal length of eye-piece (B) focal length of objective lens
(C) length of telescope (D) diameter of objective lens

Q.2. Answer the following:

[03]

- i. Define wavefront.
- ii. Two slits in Young's experiment produce intensities in the ratio 25:9. What is the ratio of the amplitudes of light waves coming from them?
- iii. Explain what is meant by polarization.

SECTION B (Attempt any Four)

[08]

- Q.3. State the merits of Huygens' wave theory of light.
- Q.4. Two polaroid sheets are placed one over other with their axes inclined to each other at an angle θ . If only 25% of intensity of light incident on first sheet emerges from the second sheet calculate value of θ .
- Q.5. What is constructive and destructive interference?
- Q.6. State formula of resolving power of a microscope for a pair of non-luminous (dark) objects. How can resolution of microscope be improved?
- Q.7. What must be the ratio of the slit width to the wavelength for a single slit to have the first diffraction minimum at 30° ?
- Q.8. Distinguish between interference and diffraction.

SECTION C (Attempt any Two)

[06]

- Q.9. Explain the Huygens' construction of spherical wavefront.
- Q.10. In a double-slit arrangement the slits are separated by a distance equal to 200 times the wavelength of the light passing through the slits.
i. What is the angular separation (in radians) between the central maximum and an adjacent maximum?
ii. What is the distance between these maxima on a screen 80 cm from the slits?
- Q.11. Explain what is optical path length. How is it different from actual path length?

SECTION D (Attempt any One)

[04]

- Q.12. Obtain expressions for occurrence of dark and bright fringes on screen in Young's double slit interference experiment. Define fringe width and derive formula for it.
- Q.13. i. Discuss parallel and cross setting of two polarizers.
ii. A star is emitting light at the wavelength of 4000 \AA . Determine the limit of resolution of a telescope having an objective of diameter of 200 inch.