NEET : CHAPTER WISE TEST-9

SUBJECT :- PHYSICS
CLASS :- 12th
CHAPTER :- WAVE OPTICS

DATE..
NAME..
SECTION..

(SECTION-A)

1. Two coherent monochromatic light beams of intensities I and $4I$ are superposed. The maximum and minimum possible intensities in the resulting beam are
(A) $5I$ and I (B) $5I$ and $3I$
(C) $9I$ and I (D) $9I$ and $3I$

2. The similarity between the sound waves and light waves is
(A) Both are electromagnetic waves
(B) Both are longitudinal waves
(C) Both have the same speed in a medium
(D) They can produce interference

3. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be
(A) $(2n-1)\frac{\lambda}{4}$ (B) $(2n-1)\frac{\lambda}{2}$
(C) $n\lambda$ (D) $(2n+1)\frac{\lambda}{2}$

4. Intensity of light depends upon
(A) Velocity (B) Wavelength
(C) Amplitude (D) Frequency

5. Two beams of light having intensities I and $4I$ interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\frac{\pi}{2}$ at point A and π at point B. Then the difference between the resultant intensities at A and B is
(A) $2I$ (B) $4I$ (C) $5I$ (D) $7I$

6. Two waves are represented by the equations $y_1 = a\sin\omega t$ and $y_2 = a\cos\omega t$. The first wave
(A) Leads the second by π
(B) Lags the second by π
(C) Leads the second by $\frac{\pi}{2}$
(D) Lags the second by $\frac{\pi}{2}$

7. Light waves producing interference have their amplitudes in the ratio 3 : 2. The intensity ratio of maximum and minimum of interference fringes is
(A) 36 : 1 (B) 9 : 4
(C) 25 : 1 (D) 6 : 4

8. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is
(A) Polarised
(B) Of longer wavelength
(C) Of shorter wavelength
(D) Of high intensity

9. The phase difference between incident wave and reflected wave is 180° when light ray
(A) Enters into glass from air
(B) Enters into air from glass
(C) Enters into glass from diamond
(D) Enters into water from glass

10. Two waves of intensity I undergo Interference. The maximum intensity obtained is
(A) $I/2$ (B) I (C) $2I$ (D) $4I$

11. Monochromatic green light of wavelength $5\times10^{-7}\,m$ illuminates a pair of slits 1 mm apart. The separation of bright lines on the interference pattern formed on a screen 2 m away is
(A) 0.25 mm (B) 0.1 mm
(C) 1.0 mm (D) 0.01 mm

12. In Young's double slit experiment, if the slit widths are in the ratio 1 : 9, then the ratio of the intensity at minima to that at maxima will be
(A) 1 (B) 1/9 (C) 1/4 (D) 1/3

13. The maximum intensity of fringes in Young's experiment is I. If one of the slit is closed, then the intensity at that place becomes I_o. Which of the following relation is true ?
(A) $I = I_o$
(B) $I = 2I_o$
(C) $I = 4I_o$
(D) There is no relation between I and I_o

14. In double slit experiment, the angular width of the fringes is 0.20° for the sodium light (λ =5890 Å). In order to increase the angular width of the fringes by 10%, the necessary change in the wavelength is
(A) Increase of 589 Å
(B) Decrease of 589 Å
(C) Increase of 6479 Å
(D) Zero

15. In a Young's experiment, two coherent sources are placed 0.90 *mm* apart and the fringes are observed one metre away. If it produces the second dark fringe at a distance of 1 *mm* from the central fringe, the wavelength of monochromatic light used would be

(A) $60\times10^{-4}\,cm$ (B) $10\times10^{-4}\,cm$
(C) $10\times10^{-5}\,cm$ (D) $6\times10^{-5}\,cm$

16. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 *nm* is used. If the wavelength of light is changed to 400 *nm*, number of fringes observed in the same segment of the screen is given by

(A) 12 (B) 18 (C) 24 (D) 30

17. A double slit experiment is performed with light of wavelength 500 *nm*. A thin film of thickness 2 μm and refractive index 1.5 is introduced in the path of the upper beam. The location of the central maximum will

(A) Remain unshifted
(B) Shift downward by nearly two fringes
(C) Shift upward by nearly two fringes
(D) Shift downward by 10 fringes

18. In Young's double slit experiment, distance between two sources is 0.1 *mm*. The distance of screen from the sources is 20 *cm*. Wavelength of light used is 5460 Å. Then angular position of the first dark fringe is

(A) 0.08° (B) 0.16°
(C) 0.20° (D) 0.313°

19. In Young's double slit experiment maximum intensity is I than the angular position where the intensity becomes $\frac{I}{4}$ is :

(A) $\sin^{-1}\left(\frac{\lambda}{d}\right)$ (B) $\sin^{-1}\left(\frac{\lambda}{3d}\right)$

(C) $\sin^{-1}\left(\frac{\lambda}{2d}\right)$ (D) $\sin^{-1}\left(\frac{\lambda}{4d}\right)$

20. In Young's double slit experiment, the aperture screen distance is 2*m*. The fringe width is 1 *mm*. Light of 600 *nm* is used. If a thin plate of glass (μ = 1.5) of thickness 0.06 *mm* is placed over one of the slits, then there will be a lateral displacement of the fringes by

(A) 0 *cm* (B) 5 *cm*
(C) 10 *cm* (D) 15 *cm*

21. A spectral line λ = 5000 Å in the light coming from a distant star is observed as a 5200 Å. What will be recession velocity of the star

(A) $1.15\times10^{7}\,cm/\sec$
(B) $1.15\times10^{7}\,m/\sec$
(C) $1.15\times10^{7}\,km/\sec$
(D) 1.15 *km/sec*

22. A light source approaches the observer with velocity 0.8 *c*. The doppler shift for the light of wavelength 5500 Å is

(A) 4400 Å (B) 1833 Å
(C) 3167 Å (D) 7333 Å

23. Light coming from a star is observed to have a wavelength of 3737 Å, while its real wavelength is 3700 Å. The speed of the star relative to the earth is [Speed of light $3\times10^{8}\,m/s$]

(A) $3\times10^{5}\,m/s$ (B) $3\times10^{6}\,m/s$
(C) $3.7\times10^{7}\,m/s$ (D) $3.7\times10^{6}\,m/s$

24. At two points P and Q on a screen in Young's double slit experiment, waves from slits S_1 and S_2 have a path difference of 0 and $\frac{\lambda}{4}$ respectively. The ratio of intensities at P and Q will be :

(A) 2 : 1 (B) $\sqrt{2}:1$ (C) 4 : 1 (D)3: 2

25. The wavelength of light observed on the earth, from a moving star is found to decrease by 0.05%. Relative to the earth the star is

(A) Moving away with a velocity of $1.5\times10^{5}\,m/s$
(B) Coming closer with a velocity of $1.5\times10^{5}\,m/s$
(C) Moving away with a velocity of $1.5\times10^{4}\,m/s$
(D) Coming closer with a velocity of $1.5\times10^{4}\,m/s$

26. **Assertion :** Thin films such as soap bubble or a thin layer of oil on water show beautiful colours when illuminated by white light.
Reason : It happens due to the interference of light reflected from the upper surface of the thin film.
(A) If both assertion and reason are true and reason is the correct explanation of assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of assertion.
(C) If Assertion is true but reason is false.
(D) If both assertion and reason are false.

27. A star is going away from the earth. An observer on the earth will see the wavelength of light coming from the star

(A) Decreased

(B) Increased

(C) Neither decreased nor increased

(D) Decreased or increased depending upon the velocity of the star

28. A rocket is going away from the earth at a speed 0.2*c*, where *c* = speed of light. It emits a signal of frequency $4 \times 10^7 Hz$. What will be the frequency observed by an observer on the earth

(A) $4 \times 10^6 Hz$ (B) $3.2 \times 10^7 Hz$

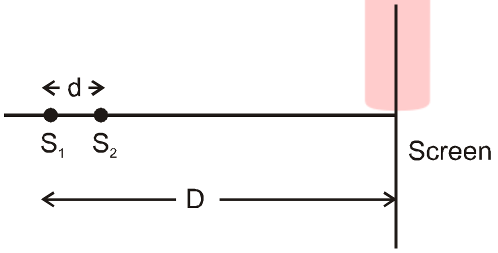
(C) $3 \times 10^6 Hz$ (D) $5 \times 10^7 Hz$

29. If a star is moving towards the earth, then the lines are shifted towards

(A) Red (B) Infrared

(C) Blue (D) Green

30. Two coherent point sources S_1 and S_2 are separated by a small distance 'd' as shown. The fringes obtained on the screen will be :



(A) points

(B) straight lines

(C) semi-circles

(D) concentric circles

31. A heavenly body is receding from earth such that the fractional change in λ is 1, then its velocity is

(A) *C* (B) $\frac{3C}{5}$ (C) $\frac{C}{5}$ (D) $\frac{2C}{5}$

32. A slit of width *a* is illuminated by white light. For red light (λ = 6500 Å), the first minima is obtained at $\theta = 30^o$. Then the value of *a* will be

(A) 3250 Å (B) $6.5 \times 10^{-4} mm$

(C) 1.24 *microns* (D) $2.6 \times 10^{-4} cm$

33. The light of wavelength 6328 Å is incident on a slit of width 0.2 *mm* perpendicularly, the angular width of central maxima will be

(A) 0.36^o (B) 0.18^o

(C) 0.72^o (D) 0.09^o

34. The penetration of light into the region of geometrical shadow is called

(A) Polarisation (B) Interference

(C) Diffraction (D) Refraction

35. A diffraction is obtained by using a beam of red light. What will happen if the red light is replaced by the blue light

(A) Bands will narrower and crowd full together

(B) Bands become broader and further apart

(C) No change will take place

(D) Bands disappear

(SECTION-B)

36. Angular width of the central maximum in the Fraunhofer diffraction for λ = 6000 Å is θ_0. When the same slit is illuminated by another monochromatic light, the angular width decreases by 30%. The wavelength of this light is :

(A) 1800 Å (B) 4200 Å

(C) 6000 Å (D) 420 Å

37. A parallel monochromatic beam of light is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of incident beam. At the first maximum of the diffraction pattern the phase difference between the rays coming from the edges of the slit is

(A) 0 (B) $\frac{\pi}{2}$ (C) π (D) 2π

38. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit should be

(A) Spherical (B) Cylindrical

(C) Plane (D) Elliptical

39. To observe diffraction the size of an obstacle

(A) Should be of the same order as wavelength

(B) Should be much larger than the wavelength

(C) Have no relation to wavelength

(D) Should be exactly $\frac{\lambda}{2}$

40. In the far field diffraction pattern of a single slit under polychromatic illumination, the first minimum with the wavelength λ_1 is found to be coincident with the third maximum at λ_2. So

(A) $3\lambda_1 = 0.3\lambda_2$ (B) $3\lambda_1 = \lambda_2$

(C) $\lambda_1 = 3.5\lambda_2$ (D) $0.3\lambda_1 = 3\lambda_2$

41. Light of wavelength λ = 5000 $\AA$ falls normally on a narrow slit. A screen placed at a distance of 1 *m* from the slit and perpendicular to the direction of light. The first minima of the diffraction pattern is situated at 5 *mm* from the centre of central maximum. The width of the slit is

(A) 0.1 *mm* (B) 1.0 *mm*

(C) 0.5 *mm* (D) 0.2 *mm*

42. In Young's double slit experiment, the intensity on the screen at a point where path difference is λ is K. What will be the intensity at the point where path difference is $\lambda/4$

(A) $\frac{K}{4}$ (B) $\frac{K}{2}$

(C) K (D) Zero

43. A polariser is used to

(A) Reduce intensity of light

(B) Produce polarised light

(C) Increase intensity of light

(D) Produce unpolarised light

44. A light has amplitude *A* and angle between analyser and polariser is 60°. Light is reflected by analyser has amplitude

(A) $A\sqrt{2}$ (B) $A/\sqrt{2}$

(C) $\sqrt{3}A/2$ (D) $A/2$

45. Two Nicols are oriented with their principal planes making an angle of 60°. The percentage of incident unpolarized light which passes through the system is

(A) 50% (B) 100%

(C) 12.5% (D) 37.5%

46. When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

(A) Zero (B) I_0

(C) $\frac{1}{2}I_0$ (C) $\frac{1}{4}I_0$

47. For the study of the helical structure of nucleic acids, the property of electromagnetic radiation generally used is

(A) Reflection (B) Interference

(C) Diffraction (D) Polarization

48. **Assertion:** For best contrast between maxima and minima in the interference pattern of young's double slit experiment , the intensity of light emerging out of the two slits should be equal.

Reason: The intensity of interference pattern is proportional to square of amplitude.

(A) If both assertion and reason are true and reason is the correct explanation of assertion.

(B) If both assertion and reason are true but reason is not the correct explanation of assertion.

(C) If Assertion is true but reason is false.

(D) If both assertion and reason are false.

49. The Brewsters angle i_b for an interface shouldbe :

(A) i_b = 90° (B) 0° < i_b < 30°

(C) 30° < i_b < 45° (D) 45° < i_b < 90°

50. A Young's double slit experiment, if the separation betwene coherent sources is halved and the distance of the screen from the coherent sources is doubled then the fringe width becomes :

(A) one-fourth (B) double

(C) half (D) four times