SINGLE CORRECT OPTION TYPE

1. In Fraunhoffer diffraction experiment, L is the distance between screen and the obstacle. 'b' is the size of obstacle and λ is wavelength of incident light. The general condition for the applicability of Fraunhoffer diffraction is _________
   (A) $\frac{b^2}{L\lambda} >> 1$ (B) $\frac{b^2}{L\lambda} = 1$ (C) $\frac{b^2}{L\lambda} << 1$ (D) $\frac{b^2}{L\lambda} \neq 1$

2. The numerical aperture of an objective of a microscope is 0.5 and wavelength of light used is 500 nm its limit of resolution will be _______ m
   (A) 6.1×10^{-3} (B) 1.22×10^{-3} (C) 6.1×10^{-6} (D) 1.22×10^{-6}

3. Eye is most sensitive to a light of wavelength 555 nm. If eye behaves indentical to a telescope with respect to a resolution and the diameter of the pupil is about 2.4 mm. The angular limit of resolution of the eye will be _______ rad.
   (A) 0.282×10^{-4} (B) 2.82×10^{-4} (C) 28.2×10^{-4} (D) 0.0282×10^{-4}

4. Unpolarised light passes through a polariser and analyser which are at an angle of $45°$ with respect to each other the intensity of polarised light coming from analyser is $5\,w/m^2$. The intensity of unpolarised light incident on polariser is _________ w/m^2
   (A) $5\sqrt{3}$ (B) 10 (C) 20 (D) $\frac{5\sqrt{3}}{4}$

5. The axes of the polarised and analyser are inclined to each other at $45°$. If the amplitude of the unpolarised light incident on the polariser is A. The amplitude of the light transmitted through the analyser is _______.
   (A) $\frac{A}{2}$ (B) $\frac{A}{\sqrt{2}}$ (C) $\frac{\sqrt{3}A}{2}$ (D) $\frac{3A}{4}$

6. If unpolarised light is incident on a crystal at $60°$ so that the reflected light is completely polarised, then refractive index of the crystal should be
   (A) $\sqrt{2}$ (B) 1 (C) $\sqrt{3}$ (D) 1.1

7. A polarizer and an analyser are oriented so that the maximum amount of light is transmitted. To what fraction of its maximum value is the intensity of the transmitted light reduced when the analyser is rotated through $45°$
   (A) $1.25\ I_o$ (B) $2.25\ I_o$ (C) $3.25\ I_o$ (D) $0.25\ I_o$

8. Young's double slit apparatus has slits separated by 0.25 mm and a screen 48 cm away from the slits. The whole apparatus is immersed in water and the slits are illuminated by the red light ($\lambda = 700\text{nm}$ is vacuum). Find the fringe width of the pattern formed on the screen.
   (A) 0.9 nm (B) 0.09 nm (C) 0.18 nm (D) 0.018 nm

9. In a two slit experiment with monochromatic light fringes are obtained on a screen placed at some distance from the slits. If the screen is moved by 5×10^{-2}m towards the slits. The change in fringe width is 3×10^{-5}m. If separation between the slits in 10^{-3}m. The wavelength of light used is ______.
   (A) 6000 Å (B) 5000Å (C) 3000 Å (D) 4500 Å

10. The axes of the polariser and analyser are inclined to each other at 60°. If the amplitude of polarised light emergent through analyser is A. The amplitude of unpolarised light incident on polariser is ________

(A) $\frac{A}{2}$ (B) A (C) 2A (D) $2\sqrt{2}A$

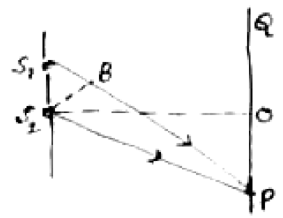
11. A window fitted with a wire mesh located at a distance of 200 m is being viewed with the help of a telescope. The spacing between the wires of the mesh is 2 mm. The wavelength of light used is 500 nm. The minimum diameter of the telescope objective must be ___________.

(A) 6.1 cm (B) 0.061 cm (C) 1.22 cm (D) 0.0122 cm

12. Unpolarised light of intensity $32 w\cdot m^{-2}$ passes through three polarisers such that the transmission axis of the last polariser is crossed with first. If the intensity of the emerging light is $3 w\cdot m^{-2}$. The angle between the axis of the first two polarisers is ___________

(A) 45° (B) 60° (C) 30° (D) 0°

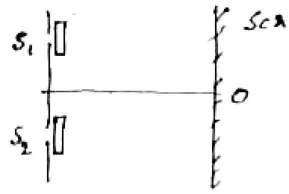
13. In figure young's double slit experiment Q is the position of the first bright fringe on the right side of 'O', P is the 11^{th} fringe on the other side, as measured from Q. If $\lambda = 6000A^\circ$, then S.B will be equal to __________



(A) 6×10^{-6}m (B) 6.6×10^{-6}m

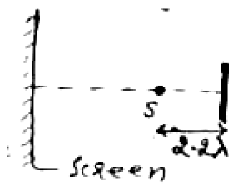
(C) 3.318×10^{-7}m (D) 3.144×10^{-7}m

14. Young's double slit experiment is carried with two thin sheets of thickness $10.4\mu m$ each and refractive index $\mu_1 = 1.52$ and $\mu_2 = 1.40$ covering the slits s_1 and s_2 respectively. If white light of range 400 nm to 780 nm is used then which wavelength will form maxima exactly at point 'o', the centre of the screen?



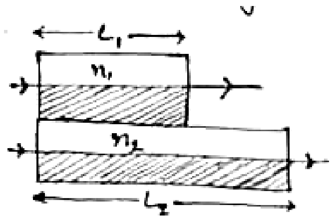
(A) 416 nm only (B) 624 nm only
(C) 416 nm and 624 nm only (D) none of these

15. Considering interference of direct and reflected light in situation as shown in figure. Find the number of minima that will be formed on the screen



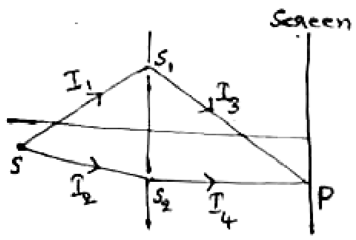
(A) 10 (B) 11
(C) 12 (D) none of the above

16. Two waves of light in air have the same wavelength and are initially in phase. They then travel through plastic layers with thickness of $L_1 = 3.5\mu m$ and $L_2 = 5.0\mu m$ and indices of refraction $n_1 = 1.7$ and $n_2 = 1.25$ as shown in figure. The rays later arrive at a common point. The longest wavelength of light for which constructive interference occurs at the point is



(A) $0.6\mu m$ (B) $1.2\mu m$ (C) $2.4\mu m$ (D) $0.3\mu m$

17. The YDSE apparatus is as shown in figure. The condition for point 'p' to be a dark fringe is ________ (λ - wavelength of light waves)



(A) $(\lambda_1-\lambda_3)+(\lambda_2-\lambda_4)=n\lambda$

(B) $(\lambda_1-\lambda_2)+(\lambda_3-\lambda_4)=n\lambda$

(C) $(\lambda_1+\lambda_2)+(\lambda_2+\lambda_4)=\left(\frac{2n-1}{2}\right)\lambda$

(D) $(\lambda_1-\lambda_2)+(\lambda_4-\lambda_3)=\left(\frac{2n-1}{2}\right)\lambda$

18. An unpolarised light is incident on a plate of refractive index $\sqrt{3}$ and the reflected light is found to be completely plane polarised. The angles of incidence and refraction are respectively _________.

(A) $60°, 30°$ (B) $30°, 60°$ (C) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right), 45°$ (D) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right), 30°$

19. A beam of ordinary light is incident on a system of four polaroids which are arranged in succession such that each polaroid is turned through $30°$ with respect to the preceding one. The percentage of the incident intensity that emerges out from the system is approximately _________.

(A) 56% (B) 6.25% (C) 21% (D) 14%

20. The polariser and analyser are inclined to each other at $60°$. If $\frac{I}{2}$ is the intensity of the polarised light emergent from analyser. Then the intensity of the unpolarised light incident on the polariser is ________

(A) 8I (B) 4I (C) 2I (D) I

INTEGER TYPE

21. $\frac{d}{D} = 10^{-4}$ in young's double slit experiment, where $'d'$ is distance between slits and $'D'$ is the distance of screen from the slits. The resulting intensity is equal to the intensity due to individual slits I_o at a point on the screen. Find the distance of point $'p'$ from the ___________.

22. The separation between two coherent point sources s_1 and s_2 vibrating in phase emitting light of wave length λ and 2λ. The smallest distance from s_2 on a line passing through s_2 and perpendicular to s_1s_2 where minimum of intensity occurs is $\frac{I\lambda}{12}$ where I is an integer. Find the value of I.

23. A beam of monochromatic light of wavelength 5.82×10^{-7}m falls normally on a glass wedge with the wedge angle of 20 second of an arc. If the refractive index of glass is 1.5. Find the number of dark interference fringes per cm of the wedge length.

24. Two glass plates are touching at one end and separated by a thin wire at the other end. When a monochromatic parallel beam of wavelength 4200Å incident normally on the glass plates is reflected an interference pattern of 30 fringes are observed. If the wavelength of light used is taken 7000Å instead of 4200Å, the number of fringes observed are $2(k)$. Find $'k'$.

25. A long narrow horizontal slit lies 1 mm above a plane mirror. The interference pattern produced by the slit and its image is viewed on a screen distant 1 m from the slit. The wavelength of light is 600 nm. The distance of first maximum above the mirror is $5 \times p \times 10^{-5}$m. Find $'p'$?

KEY

1.	C	**2.**	A	**3.**	B	**4.**	C	**5.**	A
6.	C	**7.**	D	**8.**	A	**9.**	A	**10.**	D
11.	A	**12.**	B	**13.**	A	**14.**	C	**15.**	D
16.	B	**17.**	C	**18.**	A	**19.**	C	**20.**	B
21.	2	**22.**	7	**23.**	6	**24.**	9	**25.**	3