**JEE MAIN : CHAPTER WISE TEST-8**

**SUBJECT :- PHYSICS** **DATE.....**

**CLASS :- 12th** **NAME.....**

**CHAPTER :- WAVE OPTICS** **SECTION.....**

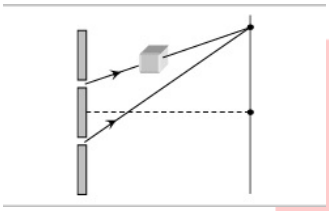
**(SECTION A)**

**1.** Two coherent sources produce waves of different intensities which interfere. After interference, the ratio of the maximum intensity to the minimum intensity is 16. The intensity of the waves are in the ratio :

(A) 4 : 1 (B) 25 : 9

(C) 16 : 9 (D) 5 : 3

**2.** A monochromatic beams of light is used for the formation of fringes on the screen by illuminating the two slits in the Young's double slit mica is interposed in the path of one of the interfering beams then



(A) The fringe width increases

(B) The fringe width decreases

(C) The fringe width remains the same but the pattern shifts

(D) The fringe pattern disappears

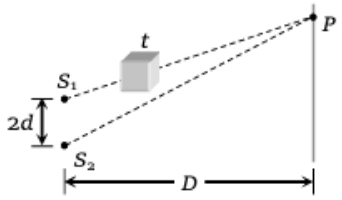
**3.** Two monochromatic light beams of intensity 16 and 9 units are interfering. The ratio of intensities of bright and dark parts of the resultant pattern is:

(A) $\frac{16}{9}$ (B) $\frac{4}{3}$ (C) $\frac{7}{1}$ (D) $\frac{49}{1}$

**4.** In a Young's double slit experiment, the distance between the two identical slits is 6.1 times larger than the slit width. Then the number of intensity maxima observed within the central maximum of the single slit diffraction pattern is:

(A) 3 (B) 6 (C) 12 (D) 24

**5.** If a thin mica sheet of thickness t and refractive index $\mu=(3/5)$ is placed in the path of one of the interfering beams as shown in figure, then the displacement of the fringe system is




(A) $\frac{Dt}{3d}$ (B) $\frac{Dt}{5d}$

(C) $\frac{Dt}{4d}$ (D) $\frac{2Dt}{5d}$

**6.** A Young's double slit experiment uses a mono-chromatic source. The shape of the interference fringes formed on a screen is

(A) circle (B) hyperbola

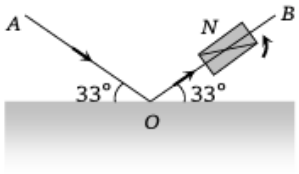
(C) parabola (D) straight line

**7.** In an experiment of single slit diffraction pattern, first minimum for red light coincides with first maximum of some other wavelength. If wavelength of red light is 6600 Å, then wavelength of first maximum will be:

(A)3300 Å (B) 4400 Å

(C)5500 Å (D) 6600 Å

**8.** A beam of light AO is incident on a glass slab ($\mu$=1.54) in a direction as shown in figure. The reflected ray OB is passed through a Nicol prism on viewing through a Nicole prism, we find on rotating the prism that




(A) The intensity is reduced down to zero and remains zero

(B) The intensity reduces down some what and rises again

(C) There is no change in intensity

(D) The intensity gradually reduces to zero and then again increases

**9.** When an un-polarized light of intensity $I_0$ is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

(A) $I_0 / 4$ (B) $I_0 / 2$

(C) $I_0$ (D) zero

**10.** The radial speed of a galaxy is $1.2 \times 10^6$ m/s receding away from earth. What is the percentage change in wavelength in the observed spectrum?
(A) 0.2 (B) 0.36 (C) 1.5 (D) 0.4

**11.** **Statement-1 :** In standard YDSE set up with visible light, the position on screen where phase difference**is** zero appears bright.
**Statement-2 :** In YDSE set up magnitude of electromagnetic field at central bright fringe **is** not varying with time.
Choose the correct alternative
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true.

**12.** Two waves from coherent sources meet at a point in a path difference of Dx. Both the waves have same intensities. Match the following two columns.

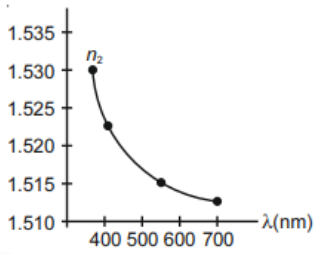
| Column I | Column II |
|---|---|
| (a) If $\Delta x = \lambda/3$ | (p) Resultant intensity willbecomethree times |
| (b) If $\Delta x = \lambda/6$ | (q) Resultantintensity will remain same |
| (c) If $\Delta x = \lambda/4$ | (r) Resultantintensity will Becometwo times |
| (d) If $\Delta x = \lambda/2$ | (s) Resultantintensity will becomezero. |

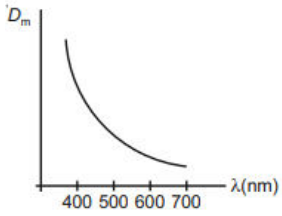
(A) (a) $\rightarrow$ q (b) $\rightarrow$ p (c) $\rightarrow$ s (d) $\rightarrow$ r
(B) (a) $\rightarrow$ p (b) $\rightarrow$ s (c) $\rightarrow$ r (d) $\rightarrow$ q
(C) (a) $\rightarrow$ s (b) $\rightarrow$ p (c) $\rightarrow$ r (d) $\rightarrow$ q
(D) (a) $\rightarrow$ q (b) $\rightarrow$ p (c) $\rightarrow$ r (d) $\rightarrow$ s

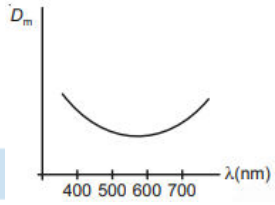
**13.** The speed of light in the medium is.
(A) Maximum on the axis of the beam.
(B) Minimum on the axis of the beam.
(C) The same everywhere in the beam.
(D) Directly proportional to the intensity I.

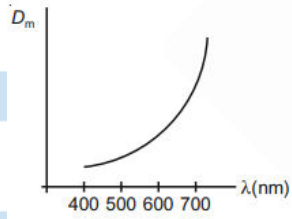
**14.** At two points P and Q on a screen in Young's double slit experiment, waves from slits $S_1$ and $S_2$ have a path difference of 0 and $\frac{\lambda}{4}$ respectively. The ratio of intensities at P and Q will be.
(A) 4 : 1 (B) 3 : 2
(C) 2 : 1 (D) $\sqrt{2}:1$

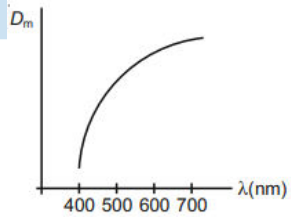
**15.** The variation of refractive index of a crown glass thin prism with wavelength of the incident light is shown. Which of the following graphs is the correct one, if $D_m$ is the angle of minimum deviation?




(A)



(B)



(C)



(D)



**16.** In a double-slit experiment, at a certain point on the screen the path difference between the two interfering waves is $\frac{1}{8}$th of a wavelength. The ratio of the intensity of light at that point to that at the centre of a bright fringe is
(A) 0.568 (B) 0.760
(C) 0.853 (D) 0.672

**17.** The light waves from two coherent sources have same intensity $I_1 = I_2 = I_0$. IN interference pattern the intensity of light at minima is zero. What will be the intensity of light at maxima ?
(A) $I_0$ (B) $2I_0$
(C) $5I_0$ (D) $4I_0$

**18.** In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then, in the interference pattern –

(A) the intensities of both the maxima and the minima increase
(B) the intensity of the maxima increases and the minima has zero intensity
(C) the intensity of the maxima decreases and that of the minima increases
(D) the intensity of the maxima decreases and the minima has zero intensity

**19.** Young's double slit experiment is made in a liquid. The $10^{th}$ bright fringe in liquid lies where $6^{th}$ dark fringe lies in vacuum. The refractive index of the liquid is approximately-
(A) 1.8 (B) 1.54
(C) 1.67 (D) 1.2

**20.** Two light sources are coherent when –
(A) their amplitudes are equal
(B) their frequencies are equal
(C) their wavelengths are equal
(D) their frequencies are equal and their phase difference is constant.

## (SECTION B)

**21.** In young's double slit experiment, the widths of two slits are in the ratio 4 : 1. If the ratio of maximum and minimum intensity in the interference pattern is 3k. The integral value of k would be.

**22.** Orange light of wavelength $6000 \times 10^{-10}$ m illuminates a single slit of width $0.6 \times 10^{-4}$ m. The maximum possible number of diffraction minima produced on both sides of the central maximum is _____.

**23.** Assuming human pupil to have a radius of 0.25 cm and a comfortable viewing distance of 25 cm, what is the wavelength of minimum separation between two objects that human eye can resolve at 500 nm.

**24.** An observer is moving with half the speed of light towards a stationary microwave source emitting waves at frequency 10 GHz. What is the frequency of the microwave measured by the observer? (speed of light = $3 \times 10^8 ms^{-1}$)

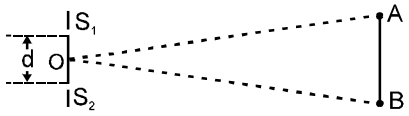
**25.** Two white dots are 1 mm apart on a black paper. They are viewed by eye of pupil diameter 3 mm. What is the maximum distance at which these dots can be resolved by the eye ? $\lambda$ = 500 nm

**26.** In a YDSE (young double slit experiment) screen is placed 1 m from the slits wavelength of light used is 6000 Å. Fringes formed on the screen are observed by a student sitting close to the slits. The student's eye can distinguish two neighboring fringes, if they subtend an angle more than 1 minutes of arc. Calculate the maximum distance between the slits, so that fringes are clearly visible. (give are in mm).

**27.** A glass wedge of angle 0.01 radian is illuminated by monochromatic light of wavelength 6000 Å falling normally on it. At what distance from the edge of wedge will the $10^{th}$ fringe be observed by reflected light is ….. $\times 10^{-1}$ cm.

**28.** In Young's double slit experiment the two slits act as coherent sources of equal amplitude A & wavelength $\lambda$. In another experiment with the same set up the two slits are source of equal amplitude A & wavelength $\lambda$ but are incoherent. The ratio of intensity of light at the mid point of the screen into the first case to that in second case.

**29.** Figure shows two coherent sources $S_1$-$S_2$ vibrating in same phase. AB is a straight wire lying at a far distance from the sources $S_1$ and $S_2$. Let $\frac{\lambda}{d} = 10^{-3}$. $\angle$ BOA = 0.12°. How many bright spots will be seen on the wire, including points A and B.




**30.** An interference is observed due to two coherent sources 'A' & 'B' having phase constant zero separated by a distance 4 $\lambda$ along the y – axis where $\lambda$ is the wavelength of the source. A detector D is moved on the positive x – axis. The number of points on the x – axis excluding the points, x = 0 & x = $\infty$ at which maximum will be observed is