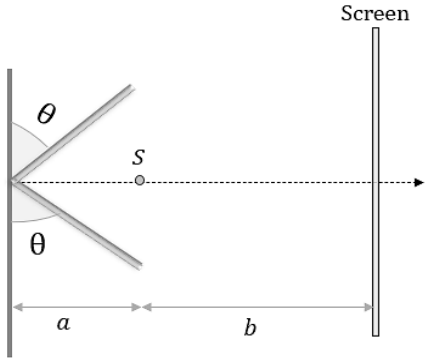
Q.1 In Young's double-slit experiment with slit separation 0.1 m, one observes a bright fringe at angle 1/40 rad by using the light of wavelength λ_1. When the light of wavelength λ_2 is used a bright fringe is seen at the same angle in the same setup. Given that λ_1 and λ_2 are in the visible range (380 nm to 740 nm), their values are

(A)400 nm, 500 nm **(B)**625 nm, 500 nm **(C)**380 nm, 525 nm **(D)**380 nm, 500 nm

Q.2 Two plane mirrors, a source S of light, emitting monochromatic rays of wavelength λ and a screen are arranged as shown in figure. If angle θ is very small, find the fringe width of the interference pattern formed by reflected rays.



(A)$\frac{\lambda(b+2a)}{4a\theta}$ **(B)**$\frac{\lambda(b+2a)}{2a\theta}$ **(C)**$\frac{\lambda(b+2a)}{2b\theta}$ **(D)**$\frac{\lambda(b+a)}{2b\theta}$

Q.3 In Lloyd's mirror experiment, a light wave emitted directly by the source S (narrowslit) interferes with the wave reflected from a mirror M. As a result, an interference fringe pattern is formed on the screen which is 1 m far from mirror. The source and the mirror are separated by a distance $l = 100$ cm. At a certain position of the source, the fringe width on the screen was equal to $\beta = 0.25$ mm and after the source was moved away from the mirror plane by $\Delta h = 0.60$ mm the fringe width decreased by 1.5 times. Find the wavelength of light from the source.

(A)0.4 μm **(B)**0.2 μm **(C)**0.6 μm **(D)**1 μm

Q.4 A monochromatic light source S of wavelength 440 nm is placed slightly above a plane mirror M as shown. Image of S in M can be used as a virtual source to produce interference fringes on the screen. The distance of source S from O is 20.0 cm, and the distance of screen from O is 100.0 cm (figure is not to scale). If the angle $\theta = 0.50 \times 10^{-3}$ radian, the width of the interference fringes observed on the screen is

(A)2.20 mm **(B)**2.64 mm **(C)**2.10 mm **(D)**0.5 mm

Q.5 M_1 and M_2 are plane mirrors and kept parallel to each other. At point O, there will be a maximum for wavelength λ. Light from a monochromatic source S of wavelength λ is not reaching directly on the screen. Then λ is

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

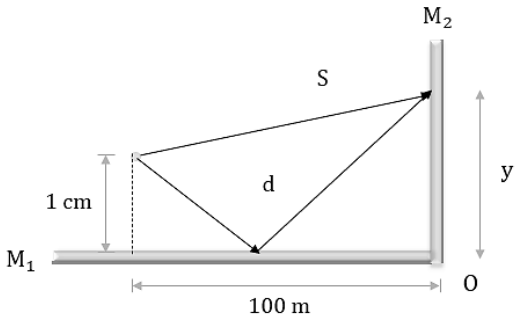
Q.6 Light is incident at an angle ϕ with the normal to a plane containing two slits of separation d. Select the expression that correctly describes the positions of the interference maxima in terms of the incoming angle ϕ and outgoing angle θ.

(A)$\sin\phi + \sin\theta = \left(m + \frac{1}{2}\right)\lambda/d$ **(B)**$d\sin\theta = m\lambda$

(C)$\sin\phi - \sin\theta = \frac{(m+1)\lambda}{d}$ **(D)**$sin\phi + sin\theta = \frac{m\lambda}{d}$

Q.7 Interference effects are produced at point P on a screen as a result of direct rays from a 500 nmsource and reflected rays from the mirror as shown in figure. Assume the source is 100 m to

the left of the screen and 1.00 cm above the mirror. Find the distance y to the first dark band above the mirror.



(A)3.5 mm **(B)**0.5 mm **(C)**1.5 mm **(D)**2.5 mm

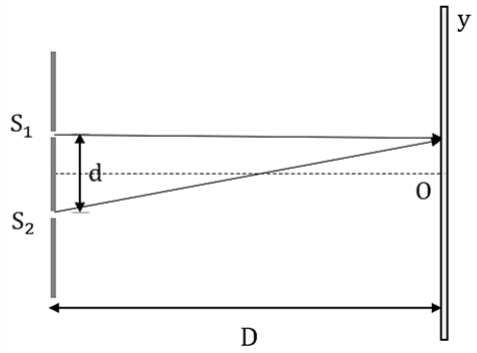
Q.8 White light is passed through the double slit and interference pattern is observed on a screen 2.5 m away. The separation between the slits is 0.5 mm. The first violet and red fringes are formed at distances of 2 mm and 3.5 mm away from the central white fringe respectively. Calculate wavelengths of red and violet light.

(A)800 nm and 400 nm **(B)**350 nm and 200 nm **(C)**750 nm and 350 nm **(D)**700 nm and 400 nm

Q.9 In a double slit experiment, the separation between the slits is 1 mm, the wavelength of light used is 5×10^{-7} m and the distance of the screen from the slits is 1 m. How many bright fringes are formed in one centimeter width, on the screen?

(A)20 **(B)**25 **(C)**30 **(D)**40

Q.10 White light is used to illuminate the two slits in a Young's double slits experiment. The separation between the slits is d and the screen is at a distance $D(>> d)$ from the slits. At a point on the screen, directly in front of one of the slits, certain wavelengths are missing. One of these missing wavelengths is:



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

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(B)	(A)	(C)	(B)	(B)	(D)	(D)	(D)	(A)	(A)