DPP 02

Y.D.S.E.

Q.1 In a Young's double slit experiment 15 fringes are observed on a small portion of the screen when light of wavelength 500 nm is used. Ten fringes are observed on the same section of the screen when another light source of wavelength λ is used. Then the value of λ is (in nm) _____.

Q.2 A Young's double-slit experiment is performed using monochromatic light of wavelength λ. The intensity of light at a point on the screen, where the path difference is λ, is K units. The intensity of light at a point where the path difference is $\frac{\lambda}{6}$ is given by $\frac{nK}{12}$, where n is an integer. The value of n is _____.

Q.3 In a Young's double slit experiment, the separation between the slits is 0.15 mm. In the experiment, a source of light of wavelength 589 nm is used and the interference pattern is observed on a screen kept 1.5 m away. The separation between the successive bright fringes on the screen is_____mm.

Q.4 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) 0.505 (B) 0.853 (C) 0.767 (D) 0.666

Q.5 In a Young's double slit experiment, the ratio of the slit's width is 4: 1. The ratio of the intensity of maxima to minima, close to the central fringe on the screen, will be

(A) 3: 16 (B) 9: 1 (C) 25: 9 (D) 4: 1

Q.6 In a double slit experiment, when a thin film of thickness t having refractive index μ is introduced in front of one of the slits, the maximum at the centre of the fringe pattern shifts by one fringe width. The value of t is (λ is the wavelength of the light used)

(A) $\frac{\lambda}{(\mu-1)}$ (B) $\frac{\lambda}{(2\mu-1)}$ (C) $\frac{2\lambda}{(\mu-1)}$ (D) $\frac{\lambda}{2(\mu-1)}$

Q.7 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 is in the ratio

(A) 6: 9 (B) 25: 3 (C) 25: 9 (D) 4: 1

Q.8 In a Young's double slit experiment, the slits are placed 0.320 mm apart. Light of wavelength $\lambda = 500$ nm is incident on the slits. The total number of bright fringes that are observed in the angular range $-30^\circ \leq \theta \leq 30^\circ$ is

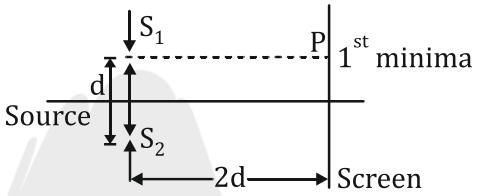
(A) 641 (B) 321 (C) 640 (D) 320

Q.9 In a Young's double slit experiment with slit separation 0.1 mm, one observes a bright fringe at angle $\frac{1}{40}$ rad by using 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 set up. Given that λ_1 and λ_2 are in 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.10 Consider a Young's double slit experiment as shown in figure. What should be the slit separation d in terms of wavelength λ such that the first minima occur directly in front of the slit (S_1) ?



(A) $\frac{\lambda}{2(\sqrt{5}-2)}$ (B) $\frac{\lambda}{(5-\sqrt{2})}$ (C) $\frac{\lambda}{(\sqrt{5}-2)}$ (D) $\frac{\lambda}{2(5-\sqrt{2})}$

Q.11 In a Young's double slit experiment, the path difference, at a certain point on the screen, between two interfering waves is $\frac{1}{8}$ th of wavelength. The ratio of the intensity at this point to that at the center of a bright fringe is close to

(A) 0.80 (B) 0.94 (C) 0.85 (D) 0.74

ANSWER KEY

1. 750 **2.** 9 **3.** 5.9 **4.** (B) **5.** (B) **6.** (A) **7.** (C)
8. (A) **9.** (B) **10.** (A) **11.** (C)

Home Work

Ex. 1	Q. 2,3,4,7,8,9,10,11,13,15
Ex. 2	Q. 2,5,9,12
Ex.3	Q.1,3,5,7,8,9,10,11,12
Ex.4	Q. 1,4,7,14
Ex.5	Q.