Related Problem with Solution :

In a Young's double-slit experiment, the slits are separated by 0.28 mm and the screen is placed 1.4 m away. The distance between the central bright fringe and the fourth bright fringe is measured to be 1.2 cm. Determine the wavelength of light used in the experiment.

Answer

Distance between the slits, d = 0.28 mm = 0.28×10^{-3} m

Distance between the slits and the screen, D = 1.4 m

Distance between the central fringe and the fourth (n = 4) fringe,

u = 1.2 cm = 1.2×10^{-2} m

In case of a constructive interference, we have the relation for the distance between the two fringes as:

$$u = n\lambda \frac{D}{d}$$

Where, n = Order of fringes

= 4 λ = Wavelength of light

used

$$\therefore \quad \lambda = \frac{ud}{nD}$$

$$= \frac{1.2 \times 10^{-2} \times 0.28 \times 10^{-3}}{4 \times 1.4}$$

$$= 6 \times 10^{-7}$$

$$= 600 \text{ nm}$$

Hence, the wavelength of the light is 600 nm.