12.10.4

EE22BTECH11008 - Annapureddy Siva Meenakshi*

Q:In a Young's double-slit experiment, the slits ar e separated by 0.28mm 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 1.2cm. Determine the wavelength of light used in the experiment.

Solution:

The distance between the central bright fringe and the m-th bright fringe is given by the formula:

Variable	Description	Value
d	Distance between two slits	$28 \times 10^{-5} m$
λ	wavelength of light	none
m	order of fringe	4
θ	Angle between central maxima and n_{th} fringe	none
Δx	Path difference between waves	none
L	Distance between screen and slits	$1.4m$
Δy_m	Distance between central maxima and m_{th} fringe	none
Δy_4	Distance between central maxima and 4_{th} fringe	$12 \times 10^{-3} m$

TABLE 0
INPUT PARAMETERS

$$\Delta y_m = m\frac{\lambda L}{d} \tag{1}$$

$$\lambda = \frac{\Delta y_m d}{mL} \tag{2}$$

$$\therefore \ \lambda = \frac{\Delta y_4 d}{mL} \tag{3}$$

$$= \frac{12 \times 10^{-3} \times 28 \times 10^{-5}}{4 \times 1.4} \tag{4}$$

$$= 6 \times 10^{-7} \tag{5}$$

$$= 600nm \tag{6}$$

Therefore,the value of wavelength is 600nm.