

12.10.4

EE22BTECH11008 - Annapureddy Siva Meenakshi*

Q: In a Young's double-slit experiment, the slits are separated by 0.28mm and the screen is placed 1.4m 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

Variable	Description	Value
d	Distance between two slits	$28 \times 10^{-5}\text{m}$
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	$12 \times 10^{-3}\text{m}$

TABLE 0
INPUT PARAMETERS

the m -th bright fringe is given by the formula:

$$\Delta y_m = m \frac{\lambda L}{d} \quad (1)$$

$$\lambda = \frac{\Delta y_m d}{m L} \quad (2)$$

$$\therefore \lambda = \frac{\Delta y_4 d}{m L} \quad (3)$$

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

$$= 6 \times 10^{-7} \quad (5)$$

$$= 600\text{nm} \quad (6)$$

Therefore, the value of wavelength is 600nm .