

# 12.10.4

EE22BTECH11008 - Annapureddy Siva Meenakshi\*

Q: In a Young's double-slit experiment, the slits are separated by  $0.28\text{mm}$  and the screen is placed  $1.4\text{m}$  away. The distance between the central bright fringe and the fourth bright fringe is measured to be  $1.2\text{cm}$ . 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	$28 \times 10^{-5}\text{m}$
$\lambda$	wavelength of light	none
$m$	order of fringe	4
$L$	Distance between screen and slits	$1.4\text{m}$
$\Delta y_m$	Distance between central maxima and $m_{th}$ fringe	none
$\Delta y_4$	Distance between central maxima and $4_{th}$ fringe	$12 \times 10^{-3}\text{m}$

TABLE 0

INPUT PARAMETERS

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

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

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

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

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

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

Therefore, the value of wavelength is  $600\text{nm}$ .