

# 12.10' 7

EE23BTECH11065 - prem sagar

## Question:

In a double-slit experiment the angular width of a fringe is found to be  $0.2^\circ$  on a screen placed 1 m away. The wavelength of light used is 600 nm. What will be the angular width of the fringe if the entire experimental apparatus is immersed in water? Take refractive index of water to be  $\frac{4}{3}$

## solution:

Parameter	Value	Description
$\lambda$	600nm	wavelength of light
d	1m	d is the distance of splits from screen
n	$\frac{4}{3}$	refractive index of water
$\phi = \frac{\lambda}{d}$	$0.2^\circ$	angular width of the fringe
$\phi'$		angular width of fringe whose medium is water
$v = \frac{c}{n}$		velocity of light in medium
c		velocity of light in vaccum
$v = c\lambda$		frequency of light

TABLE 1  
INPUT PARAMETERS

From Table 1

$$\text{as } \phi \propto \lambda$$

$$\therefore \phi \propto \frac{1}{n}$$

$$\Rightarrow \phi' = \frac{\phi}{n} \quad (1)$$

$$\phi' = \frac{0.2^\circ}{\frac{4}{3}} \quad (2)$$

$$\phi' = 0.2^\circ \left( \frac{3}{4} \right) \quad (3)$$

$$= 0.15^\circ \quad (4)$$