5. In a double-slit experiment using the light of wavelength 600 nm, the angular width of a fringe formed on a distant screen is 0.1°. What is the spacing between the two slits?

Sol. Wavelength of light, $\lambda = 600nm = 600 \times 10^{-9}m$

Angular fringe width $B_\theta = \frac{\lambda}{d}$

$\Rightarrow \quad d = \frac{\lambda}{B_\theta}$

Where, d is the distance between the slits.

Now,

$\beta_\theta = 0.1° = \frac{0.1 \times \pi}{180}$ radian

$= \frac{0.1 \times 3.14}{180}$ radian

thus Angular width of a fringe is related to slit spacing as:-

$\therefore d = \frac{600 \times 10^{-9} \times 180}{0.1 \times 3.14} m = 3.44 \times 10^{-4}m$

is the required spacing between the two slits.