

Example: Monochromatic light of wavelength of 600 nm is used in a YDSE. One of the slits is covered by a transparent sheet of thickness 1.8×10^{-5} m made of a material of refractive index 1.6. How many fringes will shift due to the introduction of the sheet?

Solution : As derived earlier, the total fringe shift = $\frac{\beta}{\lambda}(\mu - 1)t$.

As each fringe width = β ,

The number of fringes that will shift = $\frac{\text{total fringe shift}}{\text{fringe width}}$

$$= \frac{\frac{\beta}{\lambda}(\mu - 1)t}{\beta} = \frac{(\mu - 1)t}{\lambda} = \frac{(1.6 - 1) \times 1.8 \times 10^{-5} \text{ m}}{600 \times 10^{-9} \text{ m}} = 18$$

Example: A thin sheet of glass ($\mu = 1.520$) is introduced normally in the path of one of the two interfering waves. The central bright fringe is observed to shift to the position originally occupied by the fifth bright fringe. If $\lambda = 5890 \text{ \AA}$ find the thickness of the glass sheet.