✓ **The fringe width is affected due to:**

i. Change in width of slit [if slit width is doubled, the width of central maxima will be halved]

ii. Change in wavelength of light [is directly proportional to wavelength]

iii. Insertion of certain transparent medium in between the slit and the screen.
[when the whole apparatus is immersed in water, the width of central maxima decreases due to decrease in wavelength of light in water $\left\{\mu = \frac{\lambda_{in\ air}}{\lambda_{in\ water}}\right\}$] $[\beta_{liquid} = \frac{\beta_{air}}{\mu_{liquid}}]$

1. The angular width of the central bright maximum in interference pattern of a slit width $12 \times 10^{-5} cm$ when the slit is illuminated by monochromatic light of wavelength $6000 A^o$ is:
   a. $\mathbf{30^o}$ b. 60^o c. 80^o d. 90^o
2. In a Young's double slit experiment, the separation of four bright fringes is $2.5\, mm$ when the wavelength used is $6.2 \times 10^{-7}\, m$. The distance from the slits to the screen is $0.80\, m$. Calculate the separation of the two slits. **[$Ans: 5.95 \times 10^{-4}\, m$]**
3. In a Young's experiment the width of the fringes obtained with light of wavelength $6000\, A^o$ is $2\, mm$. What will be the fringe width if the entire apparatus is immersed in a liquid of refractive index 1.33? **[Ans: $1.5 \times 10^{-3}\, m$]**
4. In a two slit interference experiment, the distance between the central and the tenth bright fringe on either side is $3.44\ cm$. Distance between the slits and the screen is $2m$. If the wavelength of the light used is $5.89 \times 10^{-7}\, m$, determine the slit separation and the angle made by central fringe at the slit. **[Ans: $3.42 \times 10^{-4} m; 1.72 \times 10^{-3}\, rad$]**
5. In Young's double slit experiment, fringe width is $2mm$. Calculate the separation between 9^{th} bright fringe and 2^{nd} dark fringe from the centre of fringe system. **[$15mm$]**
6. Young's double slit experiment is made in a liquid. The 10^{th} bright fringe in liquid lies where the 6^{th} dark fringe lies in vacuum. What is the refractive index of the liquid? **[1.8]**

OPTICAL PATH:

Optical path of a medium is defined as the **distance that light would travel** in a **vacuum** at the same time it travels in the medium.

Let, $c = speed\ of\ light\ in\ vacuum$

$v = speed\ of\ light\ in\ a\ medium$

Then, distance travelled by light in vacuum in time 't': $D = ct$

$$t = \frac{D}{c} \quad \dots \dots (1)$$

And, distance travelled by light in medium in same time 't': $x = vt$

$$t = \frac{x}{v} \quad \dots \dots (2)$$

From equations (1) and (2)

$$\frac{D}{c} = \frac{x}{v}$$

or $$D = \frac{c}{v} x \qquad \left[\because \mu_{medium} = \frac{velocity\ of\ light\ in\ vacuum}{vlocity\ of\ light\ in\ the\ medium}\right]$$