

## Answer to Question # 86071, Physics / Optics

If  $d$  is the distance between two slits in young slit experiment,  $D$  is the distance between slits and the screen on which interference picture/pattern is obtained,  $\theta$  is the angle of diffraction then the condition of maxima is

$$d \sin \theta = n\lambda$$

It is for constructive interference

The condition for minima is when the path difference is the multiple of half wavelengths and given by

$$d \sin \theta = \left(n + \frac{1}{2}\right)\lambda$$

Where  $n$  takes any integers including zero

Now if a film of thickness ' $t$ ' and refractive index ' $m$ ' is introduced in the path of one of the sources either  $S_1$  or  $S_2$ , then fringe shift occurs due to change of the optical path difference

$$P = S_2P - [S_1P + mt - t] = S_2P - S_1P - (m-1)t = \frac{yd}{(D - (m-1)t)}$$

The  $n$ th fringe is shifted by

$$\Delta y = \frac{D(m-1)t}{d} = \frac{w}{\lambda(m-1)t}$$

Where  $S_1$  and  $S_2$  are the sources,

Film is introduced at  $S_1$

$P$  is the point of formations

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