Answer on Question Question #43089, Physics, Optics

Question: “in young's double slit expmnt. the ratio of max. and min. intensities of fringes are 4:1.what are the amplitudes of the coherent sources?”.

Solution:

The total instantaneous electric field E at the point P on the screen is equal to the vector sum of the two sources: $\vec{E} = \vec{E}_1 + \vec{E}_2$. Maximum intensity is $(E_1 + E_2)$ and minimum intensity is $(E_1 - E_2)$.

The intensity I of the light at P is $\approx E^2$.

$$\frac{I_{max}}{I_{min}} = \frac{(E_1+E_2)^2}{(E_1-E_2)^2} = \frac{4}{1}$$

$$\frac{E_1+E_2}{E_1-E_2} = 2$$

Thus we have $E_1 = 3E_2$

Answer: $E_1 = 3E_2$