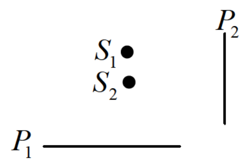
PYQ [IIT-JAM]

(Chapter 2 Interference)

Q1. Consider two coherent point sources (S_1 and S_2) separated by a small distance along a vertical line and two screens P_1 and P_2 as shown in Figure. Which one of the choices represents the shapes of the interference fringes at the central regions on the screens?



(a) Circular on P_1 and straight line on P_2

(b) Circular on P_1 and circular on P_2

(c) Straight lines on P_1 and straight lines on P_2

(d) Straight lines on P_1 and circular on P_2

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Q2. The intensity of the primary maximum in a two-slit interference pattern is given by I_2 and the intensity of the primary maximum in a three-slit interference pattern is given by I_3. Assuming the far-field approximation, same slit parameters and intensity of the incident light in both the cases, I_2 and I_3 are related as

(a) $I_2 = \frac{3}{2} I_3$ (b) $I_2 = \frac{9}{4} I_3$ (c) $I_2 = \frac{2}{3} I_3$ (d) $I_2 = \frac{4}{9} I_3$

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Q3. The condition for maxima in the interference of two waves

$$Ae^{i\left(\frac{k_0}{2}\left(\sqrt{3}x+y\right)-\omega t\right)} \text{ and } Ae^{i\left(\frac{k_0}{\sqrt{2}}(x+y)-\omega t\right)}$$

is given in terms of the wavelength λ and m, an integer, by

(a) $\left(\sqrt{3}-\sqrt{2}\right)x+\left(1-\sqrt{2}\right)y = 2m\lambda$ (b) $\left(\sqrt{3}+\sqrt{2}\right)x+\left(1-\sqrt{2}\right)y = 2m\lambda$

(c) $\left(\sqrt{3}-\sqrt{2}\right)x-\left(1-\sqrt{2}\right)y = m\lambda$ (d) $\left(\sqrt{3}-\sqrt{2}\right)x+\left(1-\sqrt{2}\right)y = (2m+1)\lambda$

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