

Q 04

In deriving the single slit diffraction pattern, it was stated that the intensity is zero at angles of $\frac{n\lambda}{a}$. Justify this by suitably dividing the slit to bring out the cancellation.

Sol. Let the slit width a be dividing into n equal parts of width ' a ' so that

$$a' = \frac{a}{n}$$

$$\text{or } a = na'$$

$$\text{Then angle } \theta = \frac{n\lambda}{a} = \frac{n\lambda}{na'}$$

$$\text{or } \theta = \frac{\lambda}{a'}$$

At this angle each slit part will make first diffraction minimum. Hence, resultant intensity to all slits will be zero in that direction.