or, $R^2 = 4a^2 \cos^2 \frac{\delta}{2}$

The intensity at a point is given by the square of the amplitude

$\therefore I = R^2$

or $\boxed{I = 4a^2 \cos^2 \frac{\delta}{2}}$ ——— (IV)

Special Cases :-

(i) When the phase difference $\delta = 0, 2\pi, 2(2\pi) \cdots n(2\pi)$ the path difference $x = 0, \lambda, 2\lambda \cdots n\lambda$.

Then $I = 4a^2$

Here intensity is max^m because the phase difference is a whole number multiple of 2π or the path difference is a whole number multiple of wavelength.

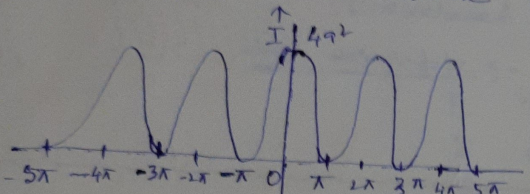
(ii) When the phase difference $\delta = \pi, 3\pi, \cdots (2n+1)\pi$ or the path difference $x = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2} \cdots (2n+1)\frac{\lambda}{2}$.

Then $I = 0$.

Thus the intensity is minimum when the path difference is an odd number multiple of half wavelength.

(iii) <u>Energy distribution:-</u>

From equation (IV) it is found that the intensity at bright points is $4a^2$ and at dark point it is zero.



According to law of conservation of energy, the energy cannot be destroyed. Here also the energy is not destroyed but only transferred from the points of minimum intensity to the points of maximum intensity.

For at bright points, the intensity due to the two waves should be $2a^2$ but actually it is $4a^2$. from fig the intensity varies from 0 to $4a^2$ and the average is still $2a^2$. It is equal to the uniform intensity $2a^2$ which will be present in the absence of the interference phenomenon due to the two waves. Therefore, the formation of interference fringes is in accordance with the law of conservation of energy.

Conti.

Complex