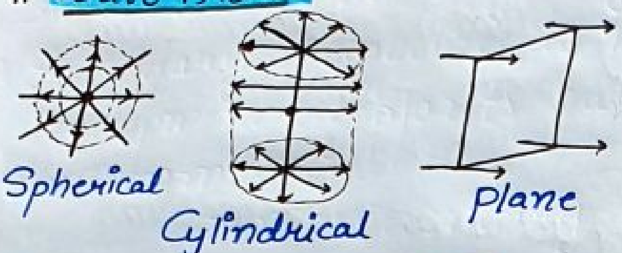
Wave Optics Mindmap

Wave Front :→



Huygen's Principle :→

Each point on the wavefront is the source of a secondary disturbance.

Interference

→ phase difference does not change with time = Coherent sources

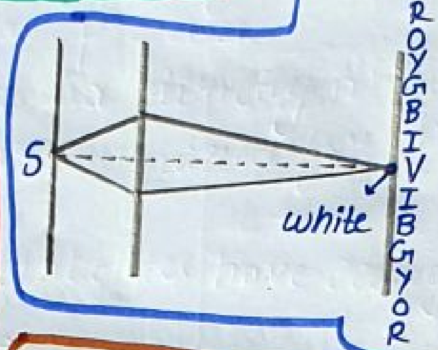
$$\boxed{A_{net}^2 = A_1^2 + A_2^2 + 2A_1A_2\cos\phi}$$

$$\boxed{I_{net} = I_1 + I_2 + 2\sqrt{I_1}\sqrt{I_2}\cos\phi}$$

YDSE

- Fridge width, $\boxed{\beta = \frac{\lambda D}{d}}$
- Position of n^{th} bright fringe - $\boxed{y_{bright} = \frac{n\lambda D}{d}}$
- Position of n^{th} dark fringe - $\boxed{y_{dark} = \frac{(2n-1)\lambda D}{2d}}$
- For bright fringe $\boxed{\Delta x = n\lambda}$
- For dark fringe - $\boxed{\Delta x = \left[n + \frac{1}{2}\right]\lambda}$

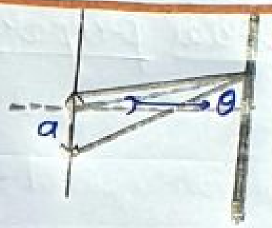
YDSE with White Light :



If, $\boxed{\Delta x = \frac{\lambda_{red}}{2}}$ → red missing

If, $\boxed{\Delta x = \frac{\lambda_{violet}}{2}}$ → violet missing

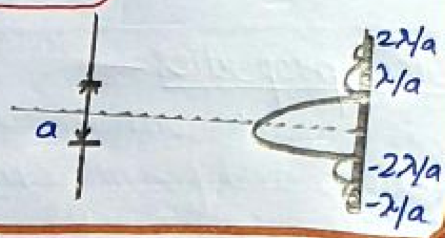
Diffraction →



For minima $\boxed{a\theta = n\lambda}$

For maxima $\boxed{a\theta = \left[n + \frac{1}{2}\right]\lambda}$

Angular width $= 2\theta = \frac{2\lambda}{a}$



Polarisation :→

- Unpolarised :→ $\vec{E}$ perpendicular to propagation → in all directions.
- polarised :→ $\vec{E}$ perpendicular to propagation → confined only in 1-direction.
- Law of Malus : $\boxed{I_T = I_0\cos^2\theta}$
- Resolving Power :

For Telescope - $\boxed{RP = \frac{1}{\Delta\theta_{min}} = \frac{D}{1.22\lambda}}$

For Microscope - $\boxed{RP = \frac{1}{d_{min}} = \frac{2\mu\sin\theta}{1.22\lambda}}$