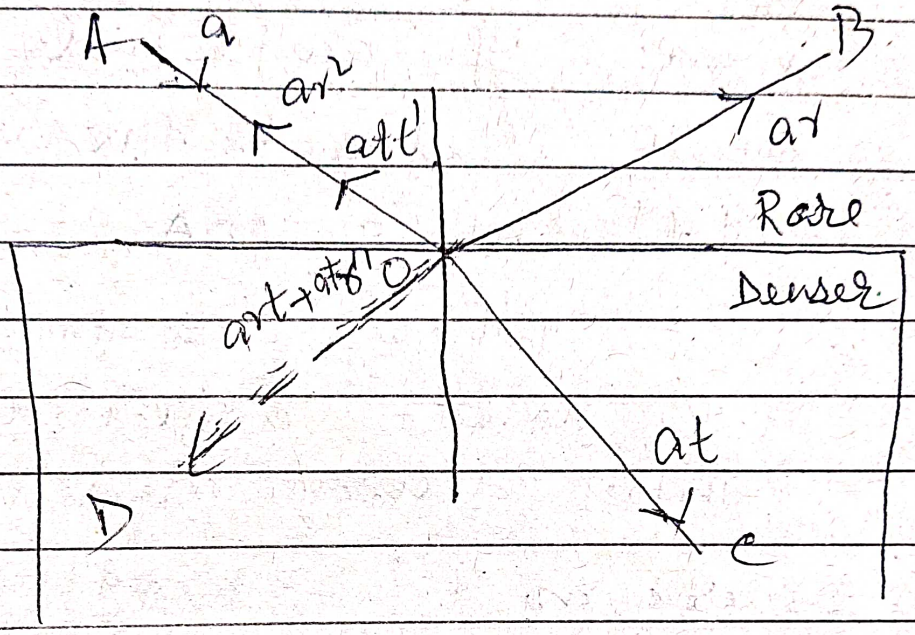
Kindly read as upload notes
On 10.6.21 B.Sc (H) Part II
in place of B.Sc. Part I

Interference

(Division of amplitude) —

Stokes law :-



Let a = amplitude of incident light wave AO

r = fraction of unit amplitude reflected above

t = fraction of unit amplitude refracted below.

∴ ar = amplitude of reflected wave OB

and at = amplitude of refracted wave OC.

Now if reflected wave OB is reversed then we get reflected

wave of amplitude ar^2 along OA and refracted wave of amplitude art along OD.

If the refracted wave OC is reversed then we get reflected wave of amplitude $at\gamma'$ along OD. and refracted wave of amplitude att' along OA.

Where γ' represent the fraction of unit amplitude reflected into denser medium.

whereas t' represent the fraction of unit amplitude refracted into rare medium from denser medium.

∴ The reversal of light must generate a wave of amplitude a along OA

Therefore, $att' + ar^2 = a$

and $art + at\gamma' = 0$

$\therefore tt' + r^2 = 1$

or $tt' = 1 - r^2$

and $r + r' = 0$

or $r' = -r$

The amplitude (r') of the wave reflected from surface of rarer medium is equal and opposite to the amplitude (r) of the wave reflected from the surface of denser medium. A reversal in sign of the amplitude means a displacement in the opposite direction which is equivalent to a phase change of π & a path diff $\lambda/2$.

Thus a phase change of π will occur by reflection from the denser medium.

Colours of thin films:—

When white light falls on a film of oil on the surface of water, brilliant colours are seen. The colours vary with the thickness of film and vanishes altogether when the thickness exceeds a certain limit. These colours are produced by the interference of light waves from the upper and lower surfaces of the film.