Fringes of Equal Thickness :—

This film reflect light which shows constructive or destructive interference according as

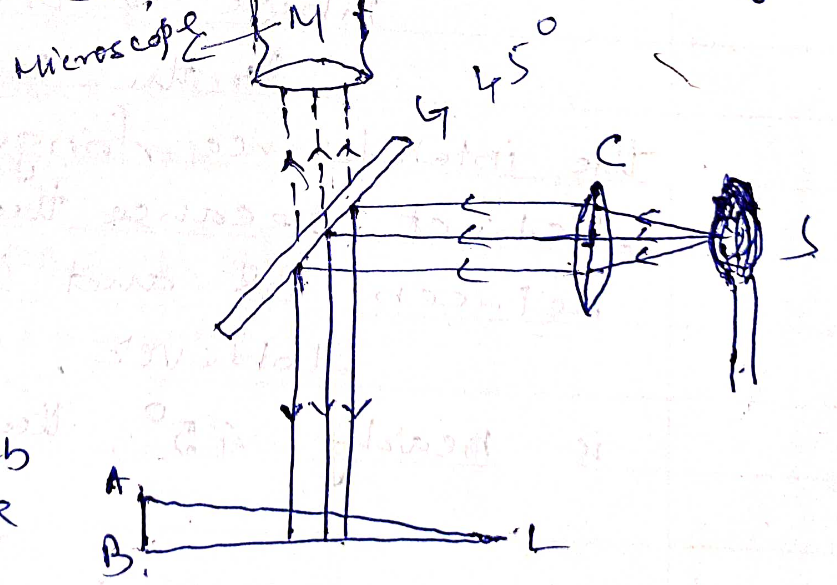
$$2\mu t \cos r = (2n+1)\frac{\lambda}{2} \quad \text{(maxima)}$$

and $$2\mu t \cos r = n\lambda \quad \text{(minima)}$$

If the incident rays are parallel and monochromatic then r and λ will be constant. Then the order number n of the fringes will be controlled by the thickness t of the film. Hence a fringe of particular order will lie on the locus of all the points of the film having a constant thickness.

These fringes are called fringes of equal thickness.

Demonstration:-



When two pieces of glass plate A and B are laid together with a strip of thin paper along one edge.

Now light from a sodium lamp S is made parallel by a convex lens C and is then made to fall on the

Date :

air film betn A & B after being reflected by a glass plate G kept at an angle of 45° to the horizontal. Thus the parallel monochromatic rays are made ~~to~~ incident on the film almost normally. On looking to the air film from nearly vertical position, straight yellow fringes will be observed. These are fringes of equal thickness.

Newton's ring are also fringes of equal thickness.

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Interferrence in Transmitted Light:-

For transmitted light the conditions for the constructive and destructive interference will be opposite to the conditions in reflected light since there is no phase change of π on reflection from a rarer medium at the bottom of the film.

Hence for constructive interference

$$2\mu t \cos r = n\lambda$$

for destructive interference

$$2\mu t \cos r = (2n+1)\lambda/2$$

Thus the fringes observed with the reflected and transmitted light are complimentary to each other. This means that the position of a dark fringe in one corresponds to that of a bright fringe of the other and vice versa.

NAVNEET

Teacher's Signature