$$t = \frac{N\lambda}{2(\mu-1)}$$

where μ is R.I. of the thin transparent sheet

7] In a michelson's interferometer 200 fringes across the field of view, when the movable mirror is moved through 0.0589 mm. What is wavelength of light used?

$$\lambda = \frac{2(d_2-d_1)}{N} = \frac{2d}{N}$$

$$\lambda = \frac{2 \times 0.0589 \times 10^{-3}}{200} = 0.0589 \times 10^{-5}$$

$$= 589 \times 10^{-9}$$

$$= 589\,nm$$

8] In an experiment with Michelson interferometer the readings of two consecutive positions of the movable mirror for the max distintness of fringes were found to be 1.2829 mm & 1.5771 mm. If the mean λ of Na-D-lies is 5893 Å. Find the difference b/w the two λ'

$d_1 = 1.2829$ & $d_2 = 1.5771$ mm

Newtons ring. 9

case

$\lambda = 5893 \times 10^{-10}\,m$

$\Delta\lambda = \lambda_1 - \lambda_2 = \frac{\lambda_2}{2d} = \frac{\lambda_2}{2(d_2 - d_1)}$

$\Delta\lambda = \frac{5893 \times 10^{-10}}{2[(1.5774 \times 10^{-3}) - (1.2829 \times 10^{-3})]}$

$= \frac{5893^2 \times 10^{-20}}{2 \times 10^{-3}(1.5774 - 1.2829)}$

$= \frac{5.896 \quad 5893^2 \times 10^{-17}}{2(\quad)}$

$= 5.896 \times 10^{-10}$

$= 5.896\,A' = 0.5896\,nm$

Newtons ring.

9] In a newtons rings exp the diameter of 10th ring changes from 1.4 cm to 1.27 cm when a drop of liquid is introduced b/w the lens & the glass plate. Calc refractive index of the liq

$n = 10 \quad d_1 = 1.4\,cm = 1.4 \times 10^{-2}\,m$

$d_2 = 1.27\,cm = 1.27 \times 10^{-2}\,m$

~~$\lambda = ?$~~ $\quad \mu = ?$

diameter nth ring

$D_n = 2\sqrt{\frac{n\lambda R}{\mu}}$

case 1

air film :- $\mu = 1$

$(D_{10})_{air} = 2\sqrt{n\lambda R} = 2\sqrt{10 \times \lambda R} \rightarrow$

case 2:- for liq. film

let μ be the RI of liquid introduced b/w the glass plate & the plane convex lens.

Then $(D)_{liq} = 2\sqrt{\frac{10 \times \lambda R}{\mu}} \rightarrow (2)$

divide (1) by (2)

$$\frac{(D)_{air}}{(D)_{liq}} = \frac{2\sqrt{10 \times \lambda R}}{2\sqrt{\frac{10 \times \lambda R}{\mu}}} = \sqrt{\mu}$$

$$\mu = \frac{(1.4 \times 10^{-2})^2}{(1.27 \times 10^{-2})^2}$$

$$\mu = \left(\frac{1.4}{1.2}\right)^2 = 1.21$$