নাম : আবু হামেদ জুয়েল

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Intake: 38

Section : A

27.16//

For dark rings

$$D_n^2 = \frac{4n\lambda R}{\mu}$$

$$\text{or, } (0.5)^2 = \frac{4 \times 10 \times 5900 \times 10^{-8} \times R}{1}$$

$$\text{or, } R = 106 \text{ cm}$$

For dark rings, the thickness of the air-film is given by $2\mu e = n\lambda$

$$\text{or, } 2 \times 1 \times e = 10 \times 5900 \times 10^{-8}$$

$$\text{or, } e = 29.5 \times 10^{-5} \text{ cm}$$

Ans:

27.17//

$2\mu e = (2n-1)\cdot\frac{\lambda}{2}$ where $n=4$

or, $2\mu e = (2n+1)\frac{\lambda}{2}$ where $n=3$

$\therefore e = \frac{7\times5\times10^{-5}}{4} \quad (\mu=1)$

$= 8.75\times10^{-5}$ cm

Ans:

27.18// The diameter of the dark rings are proportional to square root of the natural number i.e.

$D_n^2 \propto n$

Hence, $(2D_{10})^2 \propto n$

or, $\frac{n}{10} = \frac{(2D_{10})^2}{(D_{10})^2} = 4$

or $n = 40$

Ans!

27.19//

For bright rings, $D_n^2 = \frac{2\lambda R}{\mu}(2n-1)$

or, $\mu = \frac{2\lambda R(2n-1)}{D_n^2}$

$= \frac{2 \times 5890 \times 10^{-8} \times 90 \times (3 \times 2 - 1)}{(0.2)^2}$

or, $\mu = 1.325$

A;

27.20//

For the air film, $D_{15}^2 = 4n\lambda R$

or, $(0.59)^2 = 4 \times 15 \times \lambda R$

For, Liquid film $D_{15}^2 = \frac{4n\lambda R}{\mu}$

or, $(0.59 - 0.09)^2 = \frac{4 \times 15 \times \lambda R}{\mu}$

or, $\mu = \frac{(0.59)^2}{(0.5)^2}$

$= 1.3924$

A.

27.21

For bright rings,

$$(D_n^2)_{air} = 2\lambda R(2n-1)$$

and $$(D_n^2)_{liquid} = \frac{2\lambda R(2n-1)}{\mu}$$

Hence, $$\mu = \frac{(D_{10}^2)_{air}}{(D_{10}^2)_{liquid}}$$

$$= \frac{(1.40)^2}{(1.27)^2}$$

$$= 1.215$$

Ans.

27.22//

For dark ring,

$$D_n^2 = \frac{4n\lambda R}{\mu} = 4n\lambda R$$

$$\therefore D_{n+1}^2 - D_n^2 = 4(n+1)\lambda R - 4n\lambda R$$

$$= 4\lambda R$$

Or, $$R = \frac{D_{n+1}^2 - D_n^2}{4.\lambda}$$

$$= \frac{(0.2236)^2 - (0.2)^2}{4 \times 5.9 \times 10^{-5}}$$

$$= 42.36 \text{ cm}$$

27.23//

$$D^2_{n+p} - D^2_n = 4p\lambda R$$

or, $\frac{D_8^2 - D_4^2}{4p\lambda} = \frac{(0.455)^2 - (0.32)^2}{4 \times 4 \times 6.145 \times 10^{-5}}$

$= 105.76$ cm

Ans.

27.24//

$$D^2 = 4n\lambda_1 R = 4(n+1)\lambda_2 R$$

On substituting the values of λ_1 and λ_2 in the above equation, we have,

$$4n \times 6 \times 10^{-5} = 4(n+1) \times 4.5 \times 10^{-5}$$

or, $n = 3$

Hence, $D = \sqrt{4n\lambda_1 R}$

$= \sqrt{4 \times 3 \times 6 \times 10^{-5} \times 90}$

$= 0.545$ cm

Ans.

27.25//

The radius of the n^{th} dark ring due to λ_1

$\sqrt{n\lambda_1 R}$ ..... (i)

The radius of the $(n+1)^{th}$ dark ring due to λ_2 = $\sqrt{(n+1)\lambda_2 R}$ ..... (ii)

As (i) and (ii) are equal

$$r = \sqrt{n\lambda_1 R} = \sqrt{(n+1)\lambda_2 R}$$

$$\text{Or, } n\lambda_1 R = (n+1)\lambda_2 R$$

$$\text{Or, } n = \frac{\lambda_2}{\lambda_1 - \lambda_2} \quad \ldots\ldots \text{(iii)}$$

$$r = \sqrt{n\lambda_1 R}$$

$$= \sqrt{\frac{\lambda_1 \lambda_2 R}{\lambda_1 - \lambda_2}}$$

27.26//

$D_n = 0.42\ cm$, $D_{n+8} = 0.7\ cm$

$R = 200\ cm$; $P = 8$

$$\lambda = \frac{D_{n+8}^2 - D_n^2}{4PR} = \frac{(0.7)^2 - (0.42)^2}{4 \times 8 \times 200}$$

or, $\lambda = 4900 \times 10^{-8}\ cm$

Now, $D_n^2 = (2n-1)\frac{2\lambda R}{\mu}$ for brigth rings

or, $(0.42)^2 = (2n-1) \times 2 \times 4.9 \times 10^{-5} \times 200$

$= (2n-1) \times 19.6 \times 10^{-3}$

or, $(2n-1) = 9$

or, $n = \frac{9+1}{2}$

$= 5$

27.27//

$$D_{15}^2 - D_5^2 = \frac{4n\lambda R}{\mu}$$

or, $$\mu = \frac{4n\lambda R}{D_{15}^2 - D_5^2}$$

$$= \frac{4 \times 10 \times 5890 \times 10^{-9} \times 80}{(0.451)^2 - (0.278)^2}$$

$$= 1.5$$

Ans: