

## Physics Tutorial Test - I

Q1)

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$$I_M = I_M/2$$

$$\therefore \frac{I_M}{2} = I_M \cos^2 \theta$$

$$\therefore \cos^2 \theta = \frac{1}{2}$$

$$\therefore \theta = \underline{\underline{45^\circ}}$$

$$I_0 = 25\% \quad I_M = \frac{1}{4} I_M$$

$$\frac{1}{4} I_M = I_M \cos^2 \theta$$

$$\therefore \cos \theta = \frac{1}{2}$$

$$\therefore \theta = \underline{\underline{\pi/3}}$$

(Q2)

$$n = 5000 \text{ lines}$$

$$m = 65 \times 10^4$$

$$N = 4$$

$$\sin \theta = n N \lambda$$

$$1 = n N \lambda$$

$$\lambda = \frac{1}{5000 \times 4}$$

$$= \frac{10^{-4}}{50 \times 4}$$

$$\lambda = 0.00005 \times 10^{-4}$$
$$= \underline{5000 \text{ \AA}}$$



Q3)  $\theta = 20^\circ 14'$   $n = 1$

2 cm wide.

$$\sin \theta = n N \lambda$$

$$\sin (20^\circ 14') = 1 \times N \times 6 \times 10^{-5} \text{ cm}$$

$$\sin (20^\circ 14') = N$$

$$\sin \theta = n N \lambda$$

$$\sin (20^\circ 14') = N \times 6 \times 10^{-5} \text{ cm}$$

$$\frac{0.3458 \times 10^8}{6 \text{ cm}} = N$$

$$0.05763 \times 10^5 = N$$

$$5763.3 \text{ cm} = N$$

$$\therefore \text{Total lines} = 5763 \times 2 \\ = 11526 \text{ lines}$$

Q4) i) Quarter wave plate

$$t = \frac{1}{4}$$

$$\begin{aligned} & 4(\text{He-Ne}) \\ &= \frac{7600 \times 10^{-10}}{4 \times (1.553 - 1.544)} = \frac{7600 \times 10^{-10}}{4 \times 0.009} = \frac{1750 \times 10^{-10}}{0.009} \\ &= 194444 \times 10^{-10} \\ &= \underline{1.9 \times 10^{-5} \text{ m}} \end{aligned}$$

ii)  $t = \frac{\lambda}{2}$

$$2(\text{de-d}_0)$$

$$= \frac{7600 \times 10^{-10}}{2 \times 0.009} = \frac{2500 \times 10^{-10}}{0.009} = \underline{3.88 \times 10^{-5} \text{ m}}$$

$$N = 2000/\text{cm} = 2 \times 10^5 \text{ cm.}$$



$$\text{Q5)} \quad \lambda = 2.5 \times 10^{-7} \text{ m}$$

$$N = 2000 / \text{cm}$$

$$= 2 \times 10^5 / \text{cm}$$

$$n = 2$$

$$\sin \theta = n N \lambda$$

$$= 2 \times 2 \times 10^4 \times 2.5 \times 10^{-7}$$

$$= 10 \times 10^{-2}$$

$$= 1$$

$$\therefore \sin \theta (n) = \underline{\underline{90^\circ}}$$