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Page no : 1/4

Q2.
B.
→

Given: $L_r = 90°$, $D_n = 2.18\,mm = 2.18 \times 10^{-1}\,cm$

$D_{n+m} = 4.51\,mm = 4.51 \times 10^{-1}\,cm.$

$\lambda = 5893\,Å = 5.893 \times 10^{-5}\,cm.$

$R = 90\,cm$

Formula: $\left| D_{n^2+m^2} - D_{n^2} \right| = \frac{4m\lambda R}{\mu}$

Solution: $\left| D_{n^2+m^2} - D_{n^2} \right| = \frac{4m\lambda R}{\mu}$

$$\left(\frac{4.51}{10}\right)^2 - \left(\frac{2.18}{10}\right)^2 = \frac{4 \times 10 \times 5.893 \times 10^{-3} \times 90}{\mu}$$

$$0.2034 - 0.0475 = \frac{212.14 \times 10^{-3}}{\mu}$$

$$\mu \times 0.1559 = 212.14 \times 10^{-3}$$

$$\mu = \frac{212.14}{155.9} = 1.360$$

$\therefore \mu = 1.36.$

∴ The refractive index of the liquid is 1.36.

Q2.
c.
→

Given: $n_e = 2.5 \times 10^{21}/m^3$, $B = 0.5\ Wb/m^2$,
$J = 500\ A/m^2$, $w = 4mm = 4 \times 10^{-3} m$.

Formula: $V_H = \frac{BJd}{n_e \times e}$

Solution: $V_H = \frac{BJd}{n_e \times e}$

$= \frac{0.5 \times 500 \times 4 \times 10^{-3}}{2.5 \times 10^{21} \times 1.6 \times 10^{-19}}$

$\therefore V_H = 2.5mV$

Conclusion: The effective Hall voltage is 2.5mV.

Q2. D →

When a number of waves of slightly different wavelength travels in the same direction, they form a wave group or ~~waveler~~ wavepacket.

Schrodinger postulated that a wavepacket/wavegroup represents a particle. A wavegroup/wavepacket consists of a group of harmonic waves, each having slightly different wavelengths. The ~~supp~~ superposition of these harmonic waves differing slightly in frequency will produce a single wave group.

A moving particle is equivalent to a wavegroup/packet. Although the particle is somewhere within the wavepacket, it is difficult to locate the exact position of microparticle. This is an uncertainity Δx (linear spread of wavepacket) in the position of particle. As a result, the momentum of the particle at that instant cannot be determined precisely. This is an uncertainity in the determination of momentum (Δp) of the particle.

∴ The position and momentum of a microparticle in a wavegroup cannot be determined simultaneously with acuracy.