No
Date

Gelombang : $y = y_m \sin(\omega t \pm kx + \phi_0)$

Diket : $E(x,t) = E_0 \sin\left(\left(\frac{3}{2}10^{10}s^{-1}\right)t - (50\,m^{-1})x\right)$

$k = 50\,m^{-1}$ //

2) $E(z,t) = 5 \sin(10^6 z - \omega t)\hat{y}$

Nyatakan komponen medan magnet!

$\omega = kc = 10^6(3\times10^8)$

$= 3\times10^{14}\,s^{-1}$

$k = 10^6 = \frac{2\pi}{\lambda} \rightarrow \lambda = 2\pi\times10^{-6}\,m$

$B_m = \frac{E_m}{c} = \frac{5}{3\times10^8} = \frac{5}{3}\times10^{-8}\,T$

$f = \frac{c}{\lambda} = \frac{3\times10^8}{2\pi\times10^{-6}}$

$\vec{B} = \frac{3}{5}\times10^{-8}\sin(10^6 z - 3\times10^{14}t)(-\hat{z})\,T$ //

3) komponen $= \vec{B}(y,t) = 4\times10^{-6}\sin\left(\frac{\pi}{2}10^7 y + \omega t\right)\hat{i}$

panjang frekuensi :

$\Rightarrow k = \frac{\pi}{2}\times10^7 = \frac{2\pi}{\lambda} = \lambda = 4\times10^{-7}\,m$

$f = \frac{c}{\lambda} = \frac{3\times10^8}{4\times10^{-7}} = 0{,}75\times10^{15}\,Hz$

$I = \frac{B_m^2 c}{2\mu_0}$

$= \frac{(4\times10^{-6})^2(3\times10^8)}{2\times4\pi\times10^{-7}}$

$= 1910{,}0\,Wm^{-2}$

$\frac{E}{B} = c$

$E = B\times c$

4) $E_{rms} = 2\times10^9\,N/C$

luas permukaan $= 1{,}6\times10^{-5}\,m^2$

Prata2 ?

$I = \frac{P_{avg}}{A} = \frac{E_m^2}{2c\mu_0} = \frac{E_{rms}^2}{c\mu_0}$

$P_{avg} = \frac{(2\times10^9)^2(1{,}6\times10^{-5})}{(3\times10^8)(4\pi\times10^{-7})}$

$= 1{,}7\times10^{11}\,W$ //

5. $\lambda_0 = 589\,nm$

jarak $= 3{,}5\times10^3$ rad

Berapa panjang gel. saat jarak antar spektrum 10% ?

$\theta \sim \lambda$

$\frac{\theta_1}{\theta_2} = \frac{\lambda_1}{\lambda_2} \rightarrow \lambda_2 = \frac{\theta_2}{\theta_1}\lambda_1$

$= 110\%\,\lambda_1$

$= 647{,}9\,nm$ //

6. Diket $\lambda = 500\,nm = 500\times10^{-9}$

$d = 1\,mm = 1\times10^{-3}\,m$

$L = 5\,m$

Ditt $= y_1$?

$d\sin\theta = n\lambda$

$d\frac{y_n}{L} = n_1\lambda$

$y_1 = \frac{\lambda L}{d}$

$= \frac{500\times10^{-9}\times5}{1\times10^{-3}}$

$= 2{,}5\times10^{-3}\,m$ //

7. Diket : $d = 5\,mm = 5\times10^{-3}\,m$

$L = 1\,m$

$\lambda_1 = 500\,nm$

$\lambda_{a\mu} = 600\,nm$

Ditt = selisih?

$y_n = \frac{n\lambda L}{d}$

$y_1 = \frac{3\lambda_1 L}{d}$

$y_2 = \frac{3\lambda_2 L}{d}$

$\Delta y = \frac{3L}{d}(\lambda_2 - \lambda_1)$

$= \frac{3(1)}{5\times10^{-3}}(100\times10^{-9})$

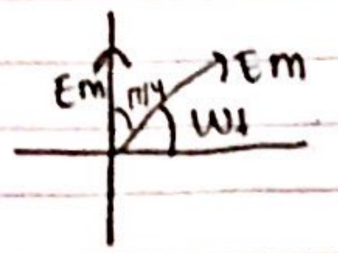
$= 6\times10^{-5}\,m$ //

8. $E_1(t) = 2\sin(2\times10^{15}t)$

$E_2(t) = 2\sin\left(2\times10^{15}t + \frac{\pi}{4}\right)$

a) Di pusat pola interferensi, sel. sefase: $A_0 = 2+2 = 4$

Di P, $\Phi = \pi/4$



b) Resultan sel = $\sqrt{2^2+2^2+2.2\cos\pi/4}$

$A_P = 3{,}29$

$I \sim A^2$

$\frac{I_P}{I_0} = \frac{3{,}29}{4^2}$

$= 0{,}60 = 1{,}6\times10^{-5}$ m //

9. Pola gelap = $d\sin(\theta) = \frac{dy}{L} = \left(m+\frac{1}{2}\right)\lambda$

m = 0 (minimum pertama)

m = 1, ____, x (x=10)

$\Delta y = \left(0+\frac{1}{2}\right)\frac{L\lambda}{d} - \frac{1}{2}\frac{L\lambda}{d}$

$= \frac{0L\lambda}{d}$ // $\Leftrightarrow \lambda = \frac{d\Delta y}{0L}$

$= \frac{(1\times10^{-3})(0{,}3\times10^{-3})}{1\times10^{-2}}$

$= 3\times10^{-3}$ m //

10. $\sin\theta = \frac{y}{L} = \frac{1\times10^{-2}}{2} = 5\times10^{-3}$

lebar celah =

$a\sin\theta = n.\lambda = 2\lambda$

$a = \frac{2\times400\times10^{-9}}{5\times10^{-3}}$

$= 1{,}6\times10^{-4}$ m

11. Dik: $\lambda = 500$ nm

$L = 3$ m

Dit: jarak 2 gelap?

↳ gelap: $a\sin\theta = n\lambda$, n: 1, 2, 3,

$\sin\theta = \frac{y}{L} \rightarrow y_n = \frac{n\lambda L}{a}$

jarak pertama: $y_1 = \frac{1\times500\times10^{-9}\times3}{1\times10^{-3}}$

$= 15\times10^{-4}$ m

jarak kedua: $y_2 = \frac{2\times500\times10^{-9}\times3}{1\times10^{-3}}$

$= 30\times10^{-4}$ m //

12. orde 1

$\sin\theta \approx \frac{y}{L}$

$\frac{m\lambda}{d} = \frac{(1)(440\times10^{-9})}{20\times10^{-6}}$

$= 0{,}022$ rad

orde 2

$\theta = \frac{2(440\times10^{-9})}{20\times10^{-6}}$

$= 4{,}4$

↳ $a_{m=1} = \frac{\pi a\sin\theta}{\lambda}$

$= \frac{\pi(5\times10^{-6})\sin(0{,}022\text{ rad})}{440\times10^{-9}}$

$= 0{,}7707$ rad

dan

$a_{m2} = \frac{\pi a\sin\theta}{\lambda}$

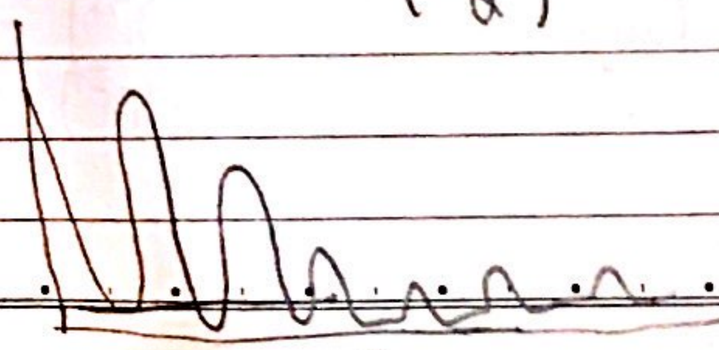
$= \frac{\pi(5\times10^{-6})\sin(0{,}044\text{ rad})}{1140\times10^{-9}}$

$= 1{,}557$ rad

$I_1 = I_0\left(\frac{\sin\alpha}{\alpha}\right)^2$

$= 0{,}81351_0$

$I_1 = I_0\left(\frac{\sin\theta}{\alpha}\right)^2 = 0{,}41241_0$



13.) $\frac{n}{m} = 4$ (warna

$\frac{d}{a} = \frac{n}{m} = 4$

14) $\frac{n}{m} = \frac{d}{a} = 3$

$n = 3m$

$m = 1 \rightarrow 90$

13.) $\frac{n}{m}$ = 4 (mencari minimum distance)

$\frac{d}{a} = \frac{n}{m} = 4$ jadi :

$\frac{d}{a} = 4$ //

14) $\frac{n=d}{m\ a} = 3$

$n = 3\ m$

$m = 1$ → pola pertama