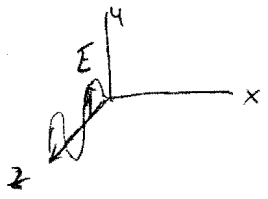
1



(a) With E in the y direction, B must be in either + or − x direction. If B were in + x direction, $\vec{E} \times \vec{B}$ would be in − z direction. ⇒ B is in the −x direction.

$B_x = -B_0 \cos k(z - ct)$ with $B_0 = \frac{E_0}{c} = \frac{2.34 \times 10^{-4} V/m}{3 \times 10^8 m/s}$

$= 7.8 \times 10^{-13} T$

$B_y = B_z = 0$.

(b) $k = 9.72 \times 10^6 m^{-1} = \frac{2\pi}{\lambda}$ ⇒ $\lambda = 6.46 \times 10^{-7} m$

$f = \frac{c}{\lambda} = 4.64 \times 10^{14} Hz$

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2 $\vec{S} = \frac{1}{\mu_0} \vec{E} \times \vec{B}$

$|\vec{S}| = \frac{1}{\mu_0} E B = \frac{1}{\mu_0} E \frac{E}{c}$

$E = \sqrt{\mu_0 c |\vec{S}|} = \sqrt{(4\pi \times 10^{-7})(3 \times 10^8)(2800 \frac{W}{m^2})} = 1030 \frac{V}{m}$

$B = \frac{E}{c} = 3.43 \times 10^{-6} T$