Ch21 -

46) $B = 1.5\times10^{-7}\,T$, $E = ?$, Avg. P per area $= ?$

b) $\frac{\text{Avg P}}{\text{area}} = \frac{c}{2\mu_0} B_{max}^2$

$= \frac{3\times10^8}{2(4\pi\times10^{-7})}(1.5\times10^{-7})^2$

$= 2.7\ \frac{\text{Watts}}{m^2}$

a) $\frac{E}{B} = c$ $\quad E = cB = 1.5\times10^{-7}(3\times10^8) = 45\ \frac{V}{m}$

47) $f, \lambda, v = ?$ $\quad v = f\lambda$

$= 0.06(2.45\times10^9) = 147{,}000{,}000\ \frac{m}{s}$

49) $P_{avg} = 1340\ \frac{\text{Watts}}{m^2}$ find E_{max}, B_{max}

$\frac{P_{avg}}{\text{area}} = \frac{E_{max}B_{max}}{2\mu_0} = \frac{cB^2}{2\mu_0}$

$1340\ \frac{\text{Watts}}{m^2} = \frac{cB^2}{2\mu_0}$

$B = \sqrt{\frac{1340(2)(4\pi\times10^{-7})}{3\times10^8}}$

$= 3.35\times10^{-6}\,T$

$\frac{E}{B} = c$ $\quad E = Bc = 3.35\times10^{-6}(3\times10^8)$

$= 1005\ \frac{V}{m}$

51) a) $\lambda = ?$ AM waves

$f \Rightarrow$ 540 kHz – 1600 kHz

$f = 540{,}000\ Hz - 1600000\ Hz$

$v = f\lambda$ $\quad \lambda = \frac{v}{f} = \frac{3\times10^8}{540{,}000} = 556\,m$ to $\lambda = \frac{v}{f} = \frac{3\times10^8}{1600{,}000} = 188\,m$

54) $d = 100\,km = 100{,}000\,m$

radio $v_{light} = 3\times10^8\ \frac{m}{s}$, $t = ?$ $\quad v = \frac{d}{t}$ $\quad t = \frac{d}{v} = \frac{100{,}000}{3\times10^8} = .00033\ s$

this is faster

assume person is right next to radio

sound $d = 3m$, $v = 343\ \frac{m}{s}$, $t = ?$ $\quad t = \frac{3}{343} = 0.0087\ s$