Answers Week 11

11-1 $E \rightarrow \dfrac{Volt}{meter}$ $\qquad\qquad \dfrac{B}{\mu_0} \rightarrow \dfrac{Amp}{meter}$

(Volt x Amp) = Power = $\dfrac{ENERGY}{TIME}$

So $\dfrac{EB}{\mu_0} = \dfrac{Volt\,x\,Amp}{(meter)^2} \rightarrow \dfrac{ENERGY}{(TIME)(meter)^2}$

11-3 Conduction Current: $i_C = \dfrac{\Delta q}{\Delta t}$

Displacement Current: $i_D = \varepsilon_o \dfrac{\Delta \phi_E}{\Delta t} = \varepsilon_o \cdot \dfrac{1}{\varepsilon_o} A \dfrac{\Delta \sigma}{\Delta t} = \dfrac{\Delta q}{\Delta t}$ $\qquad (\Delta q = A\, \Delta \sigma)$

σ = Charge/ Area on capacitor plate

11-5

SOUND	LIGHT
NO SOUND IN Vacuum	LIGHT TRAVELS IN Vacuum
MECHANICAL WAVE	Electromagnetic Wave
(Displacement/Pressure)	(E, B FIELDS)
Speed in air 340m/s	Speed in air 3 x 10^8m/s
Longitudinal in Gases	Transverse in Gases
FREQUENCY 20Hz < f < 20,000Hz	10^{14}Hz

11-7 Put E = c B

$$\eta_E = \frac{1}{2} \epsilon_0 E^2 = \frac{1}{2} \epsilon_0 C^2 B^2 = \frac{1}{2} \epsilon_0 \cdot \frac{1}{\mu_0 \varepsilon_0} B^2$$

$$= \frac{B^2}{2\mu_0} = \eta_B$$

The two energy densities are equal to one another.

11-9 $\mu_0 \rightarrow \dfrac{Henry}{Meter} \rightarrow \dfrac{L}{m}$

$\epsilon_0 \rightarrow \dfrac{Farad}{Meter} \rightarrow \dfrac{C}{m}$

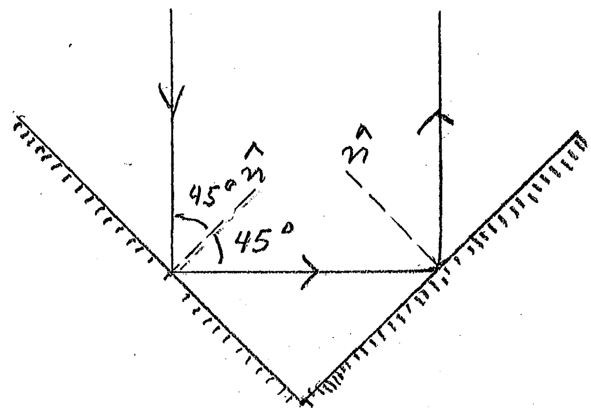
$\dfrac{1}{\sqrt{LC}} \rightarrow \omega \rightarrow rad/\sec \rightarrow T^{-1}$

$\dfrac{1}{\mu_0 \varepsilon_0} \rightarrow \dfrac{m^2}{LC} \rightarrow m^2/\sec^2$ $\qquad$ or $\qquad \dfrac{1}{\sqrt{\mu \varepsilon_0}} \rightarrow = m/\sec \rightarrow Velocity$

11-11 $\lambda = 12 \times 10^{-2}$ m (ANTIN ⟷ ANTIN) $= \frac{\lambda}{2}$

$f = 2.45 \times 10^{9}$ Hz
$V = 2.94 \times 10^{8}$ m/s

11-13 Angle of Reflection =
Angle of Incidence



11-15 $n = \frac{1}{Sin\theta_C}$ .because $n = \frac{Sin\theta_R}{Sin\theta_i}$

Here $\theta_R = \frac{\pi}{2}$, $\theta_i = \theta_C$