A:

【1】	【2】	【3】0.51	【4】0.85
【5】0.34	【6】1.25 s	【7】0.1	【8】20 V
【9】$\varepsilon_0\ \Phi_E/dt$	【10】microwave < visible < UV	【11】10μm	【12】
【13】0.2μm	【14】4×10^{-31} m	【15】h/*p*	

【1】: All physical laws have the same form in all inertial frames.

【2】: The speed of light in free space is the same in all inertial frames.

【12】: In the limit the results of a new theory correspond to classical physics. For instances, Planck's radiation law reduces to the classical Rayleigh-Jeans formula when h approaches zero. In the special theory of relativity, the Lorentz transformation reduces to the Galilean transformation when v << c.

B:

【1】microwave < visible < UV	【2】10μm	【3】	【4】0.2μm
【5】4×10^{-31} m	【6】h/*p*	【7】	【8】
【9】0.51	【10】0.85	【11】0.34	【12】1.25 s
【13】0.1	【14】20 V	【15】$\varepsilon_0\ \Phi_E/dt$	

【3】: In the limit the results of a new theory correspond to classical physics. For instances, Planck's radiation law reduces to the classical Rayleigh-Jeans formula when h approaches zero. In the special theory of relativity, the Lorentz transformation reduces to the Galilean transformation when v << c.

【7】: All physical laws have the same form in all inertial frames.

【8】: The speed of light in free space is the same in all inertial frames.

Part II

1. (a) $2L$ 。

(b)

$$1=\int_0^L \psi^2 dx = A^2\int_0^L \sin^2\frac{\pi x}{L}dx = \frac{A^2}{2}\int_0^L (1-\cos\frac{2\pi x}{L})dx = \frac{A^2}{2}(x-\frac{L}{2\pi}\sin\frac{2\pi x}{L})\Big|_0^L = \frac{A^2}{2}L$$

$$\therefore A=\sqrt{\frac{2}{L}}$$

(c)

$$P(\frac{L}{4}\to\frac{L}{2})=\int_{L/4}^{L/2}\psi^2 dx=\frac{1}{L}(x-\frac{L}{2\pi}\sin\frac{2\pi x}{L})\Big|_{L/4}^{L/2}=\frac{1}{4}+\frac{1}{2\pi}$$

$= 0.41$ 。

2. (a) $u_{av} = \varepsilon_0 E_0^2/2 = 0.5\text{x}9\text{x}10^{-12}\text{x}(60)^2 = 1.62\text{x}10^{-8}$ (J/m^3) 。

(b) $B_0 = E_0/c = (60/3)\text{x}10^{-8} = 2\text{x}10^{-7}$ (T) and along -z axis 。

(c) $S_{av} = u_{av}c = 1.62\text{x}10^{-8}\text{x}3\text{x}10^8 = 4.86$ (W/m^2) and along -x axis 。

(d) $F_{av}/A = 2S_{av}/c = 2u_{av} = 3.24\text{x}10^{-8}$ N/m^2 。

3. (a) $mv^2/r = ke^2/r^2$ and $mvr = n\hbar$, thus $r = \hbar^2n^2/(mke^2) = r_n$ 。

(b) total energy of electron $E = K + U = mv^2/2 - ke^2/r = -ke^2/2r$,

thus $E_n = -ke^2/2r_n = -mk^2e^4/(2\hbar^2n^2)$ 。

4. (a) $v_0 = v_R = v_C = v_L$ 。

(b) $i_0 = i_R + i_C + i_L$ 。

(c)
$$i_0^2 = i_{0R}^2 + (i_{0L} - i_{0C})^2 = (\frac{v_0}{R})^2 + (\frac{v_0}{X_L} - \frac{v_0}{X_C})^2$$

$$Z = \frac{v_0}{i_0} = \{\frac{1}{R^2} + (\frac{1}{X_L} - \frac{1}{X_C})^2\}^{-1/2}, X_L = \omega L, X_C = \frac{1}{\omega C}$$

(d) when $X_L = X_C$, $Z = Z_{max}$, thus $\omega_0 = (LC)^{-1/2}$ 。