5-6) $\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mE_k}} = \frac{hc}{\sqrt{2mc^2 E_k}}$

USE $hc = 1240 \text{ eV}\cdot\text{nm}$

$mc^2 = 939.6 \text{ MeV}$ $\quad E_k = 0.02 \text{ eV}$

$$\therefore \lambda = \frac{1240}{[2\times 939.6\times 10^6\times 0.02]^{1/2}}\cdot\text{nm} = \underline{\underline{0.202 \text{ nm}}}$$

5-7) a)  $n\cdot\left(\frac{\lambda}{2}\right) = L$ $\quad\therefore \lambda = \frac{2L}{n}$

b) $E = \frac{p^2}{2m} = \frac{1}{2m}\left(\frac{h}{\lambda}\right)^2 = \frac{1}{2m}\left(\frac{hn}{2L}\right)^2$

$$\therefore E = \frac{(hc)^2 n^2}{8mc^2L^2}$$

$$E_1 = \frac{(1240 \text{ eV nm})^2\cdot 1}{8\times 939\times 10^6 \text{ eV}\cdot(0.01 \text{ nm})^2} = \underline{\underline{2.05 \text{ eV}}}$$

$$E_2 = 4E_1 = \underline{\underline{8.20 \text{ eV}}}$$

6-19) a)

$$E_1 = \frac{(hc)^2}{8(mc^2)L^2}$$

a) ELEKTRON $\quad E_1 = \frac{(1240 \text{ MeV fm})^2}{8\times 0.511 \text{ MeV}\cdot(10 \text{ fm})^2} = 3.76\cdot 10^3 \text{ MeV}$

b) PROTON $\quad E_1 = \frac{(1240 \text{ MeV fm})^2}{8\times 935 \text{ MeV }(10 \text{ fm})^2} = 2.05 \text{ MeV}$

c) $\Delta E = 3E_1$ $\quad \Delta E^{elek} = 1.13\times 10^4 \text{ MeV}$

$\Delta E^{p} = 6.15 \text{ MeV}$