Homework 6

topic: Current and Ohms Law

Giancoli Chapter 25:
Question 1
Problems 1, 8

Review Question:
Giancoli Chapter 21, Problem 11

This homework is due Friday Jul 16 by noon in the locker.

Q1 $I = \frac{dQ}{dt}$ $I = \frac{\Delta Q}{\Delta t}$ $I \Delta t = \Delta Q$

A·h : amount of charge available

P 25-1 $I = \frac{\Delta Q}{\Delta t}$ $\Delta Q = \Delta t I$ $1e^- = 1.6 \times 10^{-19} C$

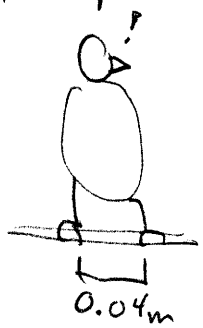
$= (1s)(1.30A)$

$= 1.30 C$

$\# e^- = \frac{\Delta Q}{1.6 \times 10^{-19} C} = 8.13 \times 10^{-18}$ electrons per second

P25-8 given $I = 3100 A$

$\frac{R}{l} = 2.5 \times 10^{-5} \frac{\Omega}{m}$



$R = \frac{R}{l} \cdot l$

$= 2.5 \times 10^{-5} \frac{\Omega}{m} (0.04 m)$

$V = IR$

$= (3100A)(2.5 \times 10^{-5} \frac{\Omega}{m})(0.04 m)$

$V = 3.1 \times 10^{-3} V$

Review

21-11

$Q_1 + Q_2 = Q_T$

$Q_1 = Q_T - Q_2$

$F = \frac{k Q_1 Q_2}{r^2} = \frac{k (Q_T - Q_2) Q_2}{r^2}$

a) Force maximal when $(Q_T - Q_2) Q_2 = Q_T Q_2 - Q_2^2$ is maximal

I'm guessing $Q_2 = \frac{Q_T}{2}$, and I can take derivative - set equal to zero:

$Q_T - 2Q_2 = 0$

$Q_2 = \frac{Q_T}{2}$ ✓ $\quad Q_1 = \frac{Q_T}{2}$

b) if $Q_2 = 0$, $Q_1 = Q_T$, $F = 0$ (minimum)