Ch 09 solutions

22| $I_{ave} = \Delta q / \Delta t \Rightarrow \Delta q = I_{ave}\,\Delta t = 25\cdot10^{-6}(60) = \boxed{1.5\,mC}$

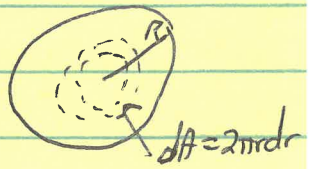
$\Rightarrow$ # of electrons $= \frac{1.5\cdot10^{-3}\,C}{1.60\cdot10^{-19}C} = \boxed{9.37\cdot10^{15}}$

26| $q(t) = \int_0^q dq = \int_0^t I(t)dt = \int_0^t I_m \sin(2\pi[60Hz]t)\,dq$

$\Rightarrow q(t) = \frac{I_m}{2\pi\,60s^{-1}}\left(1-\cos(2\pi[60Hz]t)\right)$

32| $I = \int dI = \int J\,dA = \int_0^R Cr^2 2\pi r\,dr = 2\pi C R^4/4$

$= \boxed{1.6\cdot10^{-9}\,A}$



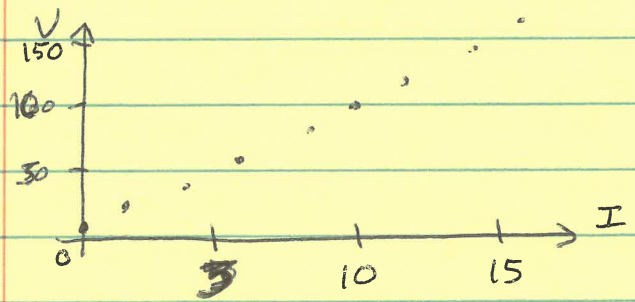
34| $I = V/R = 3/3.6 = \boxed{830\,mA}$

40| $R = \rho L/A \Rightarrow A = \rho\frac{L}{R} = \frac{0.0312\,m^2}{0.0132\,m^2} = \pi r^2 \Rightarrow \boxed{r = 6.48\,cm}$

46| Pure carbon actually has a negative α ($-0.0005\,°C^{-1}$), so "increase" factor is less than one: $\frac{R_{55°C}}{R_{-10°C}} = \frac{R_0(1-0.0005(65°C))}{R_0} = \boxed{0.97}$

52| $R = \frac{V}{I} = \boxed{40\Omega}$

54| R is slope $\simeq \boxed{10\Omega}$



56| $P = I^2R \Rightarrow I = \sqrt{P/R} = 3.5\,mA$ $\quad V = IR = (3.5\,mA)(20k\Omega) = \boxed{70.7V}$

60| $I\Delta t = 100\,A\cdot hr$ $\quad I = \frac{P}{V} = \frac{100\,A\cdot hr}{\Delta t} \Rightarrow \Delta t = 100\,A\cdot hr\,\frac{12V}{80w} = \boxed{15\,hr}$