HT6

P.1

$R = 20\ \Omega$
$t = 10\ min.$
$\Delta V = 30\ V.$

$\Delta V = IR$

$I = \frac{\Delta V}{R} = \frac{30}{20} = 1.5\ A.$

$I = \frac{\Delta Q}{\Delta t}$

$\Delta Q = I \Delta t = (1.5)(600)$

$\Delta Q = 900\ C.$

$\#e^- = \frac{\Delta Q}{e} = \frac{900}{1.6 * 10^{-19}} = 5.625 * 10^{21}\ e^-$

$\#e^- = 5.6 * 10^{21}\ e^-$

P.2

$L = 2\ m$
$\emptyset = 1 * 10^{-3}\ m$
$R = 0.45\ \Omega$

$R = \frac{\rho L}{A} \Rightarrow \frac{AR}{L} = \rho$

$\rho = \frac{((1 * 10^{-3}/2)^2 \pi)(0.45)}{2} = 1.7671 * 10^{-7}\ \Omega m$

$\rho = 1.8 * 10^{-7}\ \Omega m.$

P.3

$n = 8.49 * 10^{28}\ e/m^3$
$I = 1.00\ A$
$A = 0.40\ cm^2$

$I = nqv_d A.$

$v_d = \frac{I}{neA} = \frac{1}{(8.49 * 10^{28})(1.6 * 10^{-19})(4 * 10^{-5})}$

$v_d = 1.84 * 10^{-6}\ m/s \Rightarrow v_d = -1.84 * 10^{-6}\ m/s$

$v_d = -1.84 * 10^{-6}\ m/s.$

P.4

$P = 7.5\ W.$
$\Delta V = 125\ V.$
$\alpha = 4.5 * 10^{-3}$
$T = 7T_o = 7(20°C)$

$I_{op} = \frac{P}{\Delta V} = \frac{7.5}{125} = 0.06\ A$

$R_{op} = \frac{\Delta V}{I} = 2083.33\ \Omega.$

$R_{op} = R_o[1 + \alpha(T_{op} - T_o)]$

$R_o = 1352\ \Omega.$

$R_o = \frac{2083.33}{(1 + 4.5 * 10^{-3}(140 - 20))} = 1352\ \Omega$

P. 5

$R = \frac{\rho l}{\pi r^2}$

$m_1 = m_2$

$\rho V_1 = \rho V_2 / 2$

$\pi r^2 \ell = A_2 \frac{\ell}{4}$

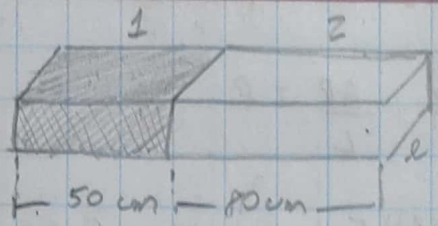
$A_2 = 4\pi r^2$

$R_2 = \frac{\rho \cdot \ell / 4}{4\pi r^2} = \frac{\rho \ell}{16 \pi r^2}$

$R_2 = \frac{R}{16}$

$R_2 = \frac{R}{16}$

P. 6



$l = 4 mm$

$\rho_1 = 4 * 10^{-8} \Omega \cdot m$

$\rho_2 = 6 * 10^{-8} \Omega \cdot m$

$R_1 = \frac{\rho_1 l}{A_1} = \frac{(4*10^{-8})(0.5)}{(4*10^{-3})^2} = 1.25 * 10^{-3} \Omega$

$R_2 = \frac{\rho_2 l}{A} = \frac{(6*10^{-8})(0.8)}{(4*10^{-3})^2} = 3 * 10^{-3} \Omega$

$R_T = (1.25 + 3) * 10^{-3} = 4.25 * 10^{-3} \Omega$

$R_T = 4.25 m\Omega$

P. 7

$\Delta V = 9 V$

$\rho_1 = 4 * 10^{-8} \Omega \cdot m$

$\rho_2 = 6 * 10^{-8} \Omega \cdot m$

$R_T = 4.25 * 10^{-3} \Omega$

$I = \frac{\Delta V}{R}$

$I = \frac{9}{4.25 * 10^{-3}} = 2117.6 A$

$I = 2118 A.$