Capitulo 25

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25,2

a) $I = \frac{420C}{90min} \cdot \frac{1min}{60s} = 0.0875 C/s$

b) $I = nqAv \Rightarrow v = \frac{I}{nqA} = \frac{0.0875}{(5.8 \times 10^{25})(1.6 \times 10^{-19})[\pi (1.3 \times 10^{-3})^2]} = 1,74 \times 10^{-6} m/s$

$v = 1.78 \times 10^{-4} m/s$

25,3

a) $Q = (5)(1) = 5C$

$e = \frac{Q}{e} = \frac{5}{1.6 \times 10^{-19}} = 3.125 \times 10^{4}$

$e^- = 3.12 \times 10^{19}$

b) $J = \frac{I}{A} = \frac{5}{\pi \left(\frac{2.05 \times 10^{-3}}{2}\right)^2} = 1514859.6$

$J = 1.5 \times 10^{4} A/m^2$

c) $J = nqv_d = v_d = \frac{J}{nq} = \frac{1.5 \times 10^{4}}{(8.5 \times 10^{28})(1.6 \times 10^{-19})} = 1.11 \times 10^{-4}$

$1.11 \times 10^{-4} mm/s$

d) La densidad de corriente y la velocidad cambia mien el numero de electrones por el tiempo sigue igual

25.4

a) $I = JA = (3.20 \times 10^4)\left(\left[\pi\left[\frac{2.02 \times 10^{-3}}{2}\right]^2\right]\right) = 2.61\ A$

b) $J = n_q v_d$

$$v_d = \frac{J}{n_q} = \frac{3.20 \times 10^4}{(8.5 \times 10^{28})(1.1 \times 1019)} = 2.35 \times 10^{-4}\ m/s$$

25.7

a)

$$I = \frac{dQ}{dt} \rightarrow dQ = I\,dt \rightarrow Q = \int I\,dt \rightarrow \int_0^8 (55 - 0.65t^2)\,dt$$

$$Q = \left[5t - \frac{0.65}{3}t^3\right]\Big|_1^4 = 329.06\ C$$

b)

$$I = \frac{Q}{t} \rightarrow I = \frac{329\ C}{8} = 41.12\ A$$

25.15

a) $\rho = \frac{E}{J} \rightarrow E = \rho J \rightarrow \rho(t) = \rho_0[1 + \alpha(T - T_0)]$

$$E = \rho_0[1 + 0.0045(120 - 20)]\left[\frac{12.5}{\pi(0.0005)^2}\right] = 1.21\ V/m$$

b) $R = \frac{\rho l}{A} = \frac{(7.61 \times 10^{-4})(10.190)}{\pi(0.0009)^2} = 0.0145\ \Omega$

c) $V = BL = (1.21)(0.15) = 0.182\ V$

2.14

a) $R = \frac{5.60 \times 10^{-4}}{120} = 4.67 \times 10^{-4}\ \Omega$

b) $R = (5.60 \times 10^{-9})(120) = 6.72 \times 10^{-4}\ \Omega$

25.21

a) $I = 5A \rightarrow I = \frac{E}{\rho} A \quad \frac{0.4\,m}{2.44 \times 10^{-8}} \left[\pi \left(\frac{0.844 \times 10^{-3}}{2} \right)^2 \right]$

$I = 11.18A$

b) $x = 6.4\,m$

$V = Et \rightarrow (0.47)(6.4)$

$V = 3.14V$

c) $R = \frac{V}{I} = \frac{3.14}{11.18} = 0.2827\ \Omega$

25.27

a) No hay corriente ya que es un voltimetro ideal por su resistencia infinita

b) $V_{ab} = 5.0V$

c) 5.0V ya que no hay caida de voltaje debido a la falta de corriente