

$$\textcircled{4} \text{ a) } I = n_e e v_d A \Rightarrow 2.5 = \frac{8.5 \times 10^{28} (1.6 \times 10^{-19})}{V_d} \left[ \pi (1.0013 - 1.0007)^2 \right]$$

$$\boxed{V_d = 1.625 \times 10^{-4} \text{ m/s}}$$

$$\text{b) } J = \frac{I}{A} \Rightarrow n_e e v_d$$

$$J = 8.5 \times 10^{28} (1.6 \times 10^{-19}) (1.625 \times 10^{-4})$$

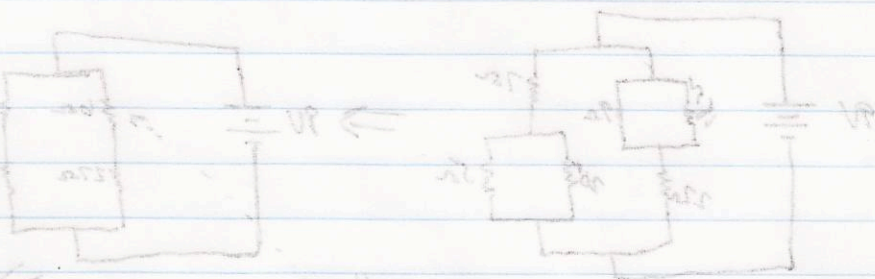
$$\boxed{J = 2.21 \times 10^6 \text{ A/m}^2}$$

$$\text{c) } J = \sigma E$$

$$2.21 \times 10^6 = (6.0 \times 10^7) E$$

$$\boxed{E = 0.368 \text{ N/C}}$$

$$\text{p) } E = \frac{V}{L} \Rightarrow V = E L = (0.368 \text{ N/C}) (0.02 \text{ m}) = 7.36 \times 10^{-3} \text{ V}$$



$$\text{c) } R = \left( \frac{1}{\frac{1}{2} + \frac{1}{1}} \right) = 0.67 \Omega$$