

11. We use $v_d = J/ne = i/Ane$. Thus,

$$\begin{aligned} t &= \frac{L}{v_d} = \frac{L}{i/Ane} = \frac{LANe}{i} \\ &= \frac{(0.85 \text{ m})(0.21 \times 10^{-4} \text{ m}^2)(8.47 \times 10^{28} / \text{m}^3)(1.60 \times 10^{-19} \text{ C})}{300 \text{ A}} \\ &= 8.1 \times 10^2 \text{ s} = 13 \text{ min} . \end{aligned}$$