18.25 For this problem we are to determine the electrical conductivity of and *n*-type semiconductor, given that $n = 5 \times 10^{17} \text{ m}^{-3}$ and the electron drift velocity is 350 m/s in an electric field of 1000 V/m. The conductivity of this material may be computed using Equation 18.16. But before this is possible, it is necessary to calculate the value of μ_{ρ} from Equation 18.7. Thus, the electron mobility is equal to

$$\mu_e = \frac{v_d}{E}$$

$$=\frac{350 \text{ m/s}}{1000 \text{ V/m}}=0.35 \text{ m}^2/\text{V-s}$$

Thus, from Equation 18.16, the conductivity is

$$\sigma = n | e | \mu_e$$

$$= (5 \times 10^{17} \text{ m}^{-3})(1.602 \times 10^{-19} \text{ C})(0.35 \text{ m}^2/\text{V}-\text{s})$$

 $= 0.028 (\Omega - m)^{-1}$

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