18.42 In this problem we are asked to determine the magnetic field required to produce a Hall voltage of -3.5 x 10<sup>-7</sup> V, given that  $\sigma = 1.2 \times 10^7 (\Omega \text{-m})^{-1}$ ,  $\mu_e = 0.0050 \text{ m}^2/\text{V-s}$ ,  $I_x = 40 \text{ A}$ , and d = 35 mm. Combining Equations 18.18 and 18.20b, and after solving for  $B_z$ , we get

$$B_z = \frac{\left| V_{\rm H} \right| \sigma d}{I_x \mu_e}$$

$$= \frac{\left(\left|-3.5 \times 10^{-7} \text{ V}\right|\right) \left[1.2 \times 10^{7} (\Omega - \text{m})^{-1}\right] (35 \times 10^{-3} \text{ m})}{(40 \text{ A})(0.0050 \text{ m}^{2}/\text{V-s})}$$

= 0.74 tesla

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