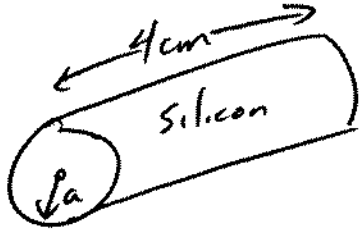


2.3 A bar of silicon is 4 cm long with a circular cross section. If the resistance of the bar is 240Ω at room temperature, what is the cross-sectional radius of the bar?



$$R_{\text{bar}} = 240 \Omega$$

$$A = \pi a^2$$

$$(2.1) R = \rho \frac{l}{A}$$

$$\rho_{\text{silicon}} = 6.4 \times 10^2 \Omega \cdot \text{m} \quad (\text{Table 2.1})$$

$$240 \Omega = 6.4 \times 10^2 \frac{4 \times 10^{-2}}{\pi a^2}$$

$$a^2 = \frac{6.4 \times 10^2 (4 \times 10^{-2})}{\pi (240)} = 0.033953 \text{ m}^2$$

$$a = 0.1842635 \text{ m}$$

$$\underline{\underline{a = 18.43 \text{ cm} = 184.3 \text{ mm}}}$$