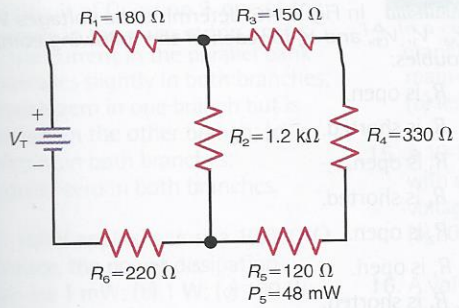
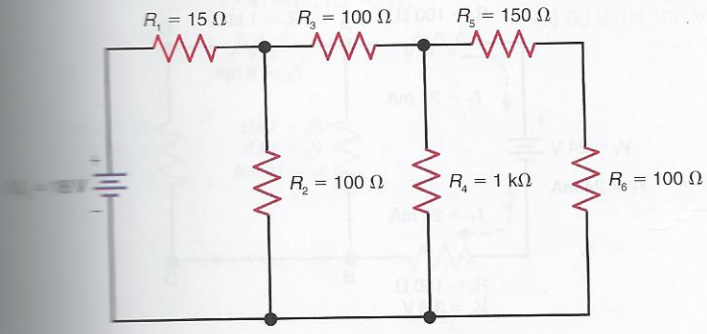
6–31 In Fig. 6–41, solve for R_T, I_T, V_T, V_1, V_2, V_3, V_4, V_5, V_6, I_2, I_3, I_4, and I_5.

Figure 6–41



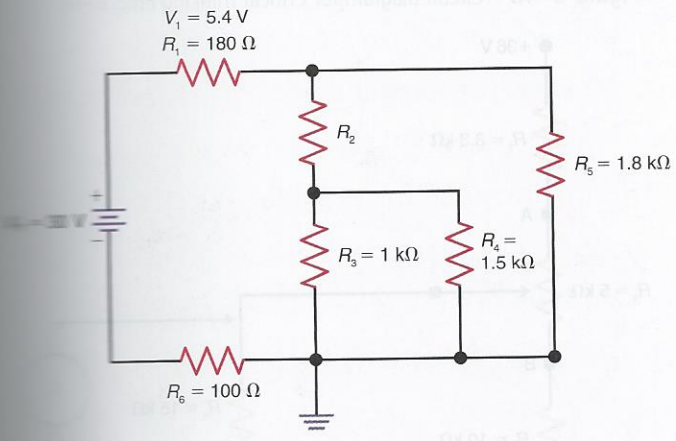
6–32 In Fig. 6–42, solve for R_T, I_T, V_1, V_2, V_3, V_4, V_5, V_6, I_1, I_2, I_3, I_4, I_5, and I_6.

Figure 6–42



6–33 In Fig. 6–43, solve for I_T, R_T, R_2, V_2, V_3, V_4, V_5, V_6, I_2, I_3, I_4, I_5, and I_6.

Figure 6–43



SECTION 6–6 THE WHEATSTONE BRIDGE

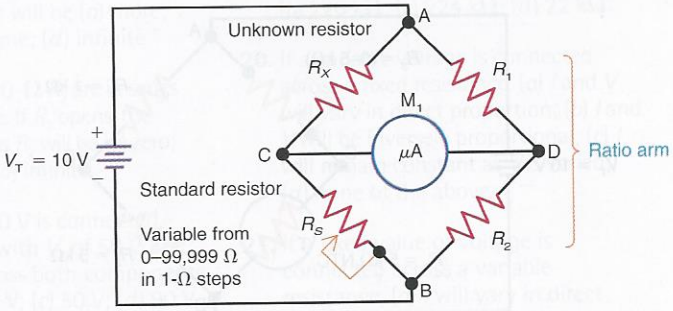
Problems 34–38 refer to Fig. 6–44.

6–34 In Fig. 6–44,

a. How much current flows through M_1 when the Wheatstone bridge is balanced?

b. How much voltage exists between points C and D when the bridge is balanced?

Figure 6–44



6–35 In Fig. 6–44, assume that the bridge is balanced when $R_1 = 1\ \text{k}\Omega$, $R_2 = 5\ \text{k}\Omega$, and $R_S = 34{,}080\ \Omega$. Determine

a. the value of the unknown resistor, R_X.

b. the voltages V_{CB} and V_{DB}.

c. the total current, I_T, flowing to and from the voltage source, V_T.

6–36 In reference to Prob. 6–35, which direction (C to D or D to C) will electrons flow through M_1 if

a. R_S is reduced in value?

b. R_S is increased in value?

6–37 In Fig. 6–44, calculate the maximum unknown resistor, $R_{X(max)}$, that can be measured for the following ratio arm values:

a. $\frac{R_1}{R_2} = \frac{1}{1000}$

b. $\frac{R_1}{R_2} = \frac{1}{100}$

c. $\frac{R_1}{R_2} = \frac{1}{10}$

d. $\frac{R_1}{R_2} = \frac{1}{1}$

e. $\frac{R_1}{R_2} = \frac{10}{1}$

f. $\frac{R_1}{R_2} = \frac{100}{1}$

6–38 Assume that the same unknown resistor, R_X, is measured using different ratio arm fractions in Fig. 6–44. In each case, the standard resistor, R_S, is adjusted to provide the balanced condition. The values for each measurement are

a. $R_S = 123\ \Omega$ and $\frac{R_1}{R_2} = \frac{1}{1}$.

b. $R_S = 1232\ \Omega$ and $\frac{R_1}{R_2} = \frac{1}{10}$.

c. $R_S = 12{,}317\ \Omega$ and $\frac{R_1}{R_2} = \frac{1}{100}$.

Calculate the value of the unknown resistor, R_X, for each measurement. Which ratio arm fraction provides the greatest accuracy?