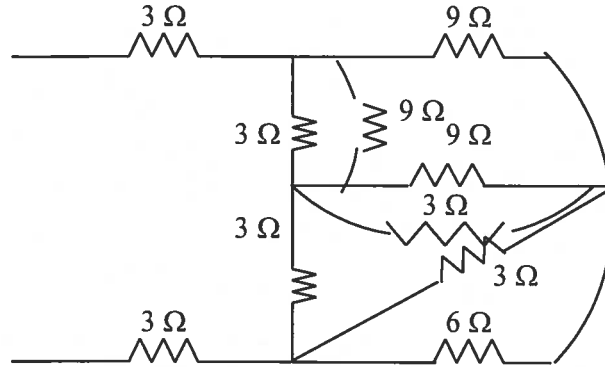
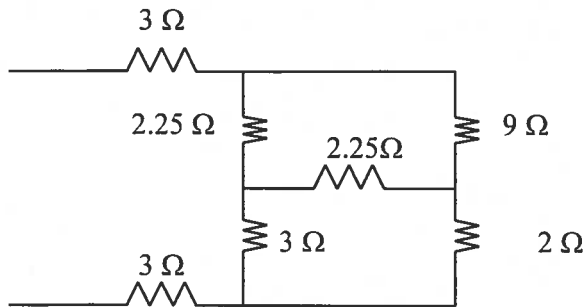


Chapter 2, Solution 52

Converting the wye-subnetwork to delta-subnetwork, we obtain the circuit below.



$3//1 = 3 \times 1/4 = 0.75$, $2//1 = 2 \times 1/3 = 0.6667$. Combining these resistances leads to the circuit below.

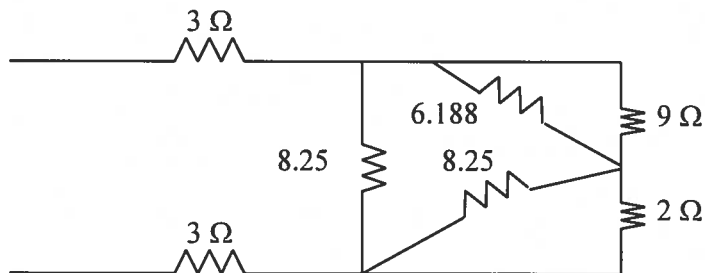


We now convert the wye-subnetwork to the delta-subnetwork.

$$R_a = [(2.25 \times 3 + 2.25 \times 3 + 2.25 \times 2.25)/3] = 6.188 \Omega$$

$$R_b = R_c = 18.562/2.25 = 8.25 \Omega$$

This leads to the circuit below.

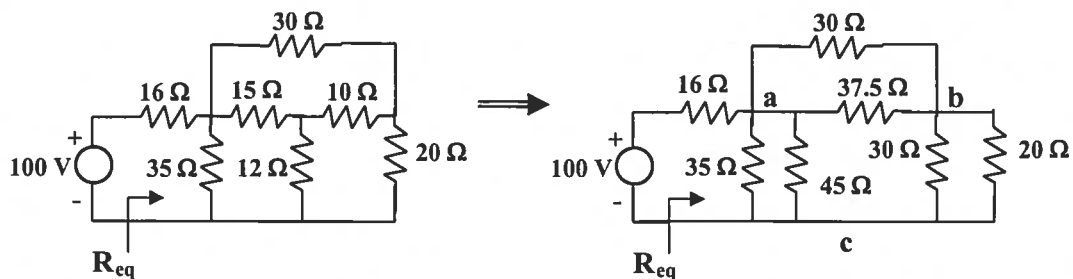


$$R = 9 \parallel (6.188 + 8.25) \parallel 2 = 3.667 + 1.6098 = 5.277$$

$$R_{eq} = 3 + 3 + 8.25 \parallel 5.277 = \mathbf{9.218 \Omega}.$$

Chapter 2, Solution 56

We need to find R_{eq} and apply voltage division. We first transform the Y network to Δ .



$$R_{ab} = \frac{15 \times 10 + 10 \times 12 + 12 \times 15}{12} = \frac{450}{12} = 37.5 \Omega$$

$$R_{ac} = 450 / (10) = 45 \Omega, R_{bc} = 450 / (15) = 30 \Omega$$

Combining the resistors in parallel,

$$30 \parallel 20 = (600/50) = 12 \Omega,$$

$$37.5 \parallel 30 = (37.5 \times 30 / 67.5) = 16.667 \Omega$$

$$35 \parallel 45 = (35 \times 45 / 80) = 19.688 \Omega$$

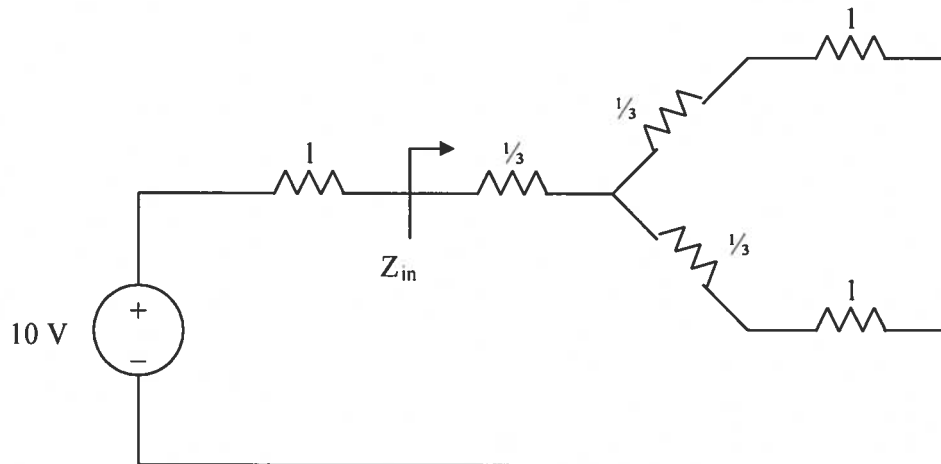
$$R_{eq} = 19.688 \parallel (12 + 16.667) = 11.672 \Omega$$

By voltage division,

$$v = \frac{11.672}{11.672 + 16} 100 = \underline{\underline{42.18 \text{ V}}}$$

Chapter 2, Solution 72

Converting the delta subnetwork into wye gives the circuit below.

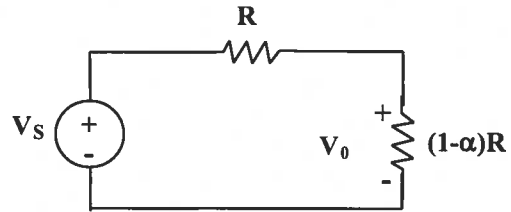


$$Z_{in} = \frac{1}{3} + (1 + \frac{1}{3}) // (1 + \frac{1}{3}) = \frac{1}{3} + \frac{1}{2} (\frac{4}{3}) = 1 \Omega$$

$$V_o = \frac{Z_{in}}{1 + Z_{in}} (10) = \frac{1}{1 + 1} (10) = \underline{5 \text{ V}}$$

Chapter 2, Solution 78

The equivalent circuit is shown below:

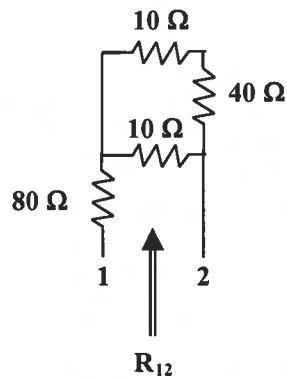


$$V_0 = \frac{(1-\alpha)R}{R + (1-\alpha)R} V_S = \frac{1-\alpha}{2-\alpha} V_S$$

$$\frac{V_0}{V_S} = \frac{1-\alpha}{2-\alpha}$$

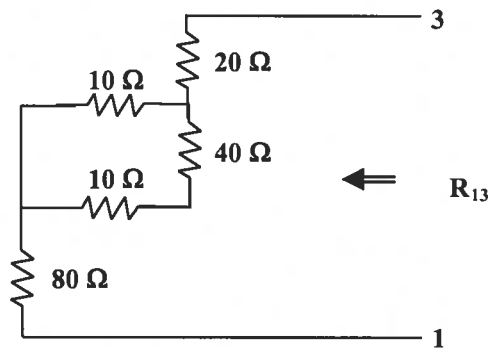
Chapter 2, Solution 82

(a)



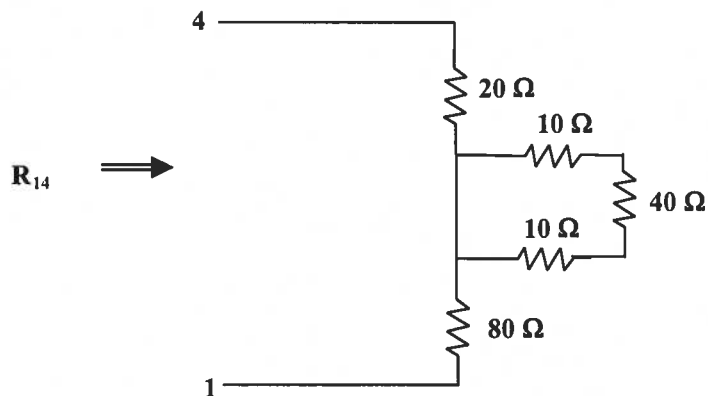
$$R_{12} = 80 + 10 \parallel (10 + 40) = 80 + \frac{50}{6} = 88.33 \Omega$$

(b)



$$R_{13} = 80 + 10 \parallel (10 + 40) + 20 = 100 + 10 \parallel 50 = 108.33 \Omega$$

(c)



$$R_{14} = 80 + 0 \parallel (10 + 40 + 10) + 20 = 80 + 0 + 20 = 100 \Omega$$