12.3 Determine the phase sequence of a balanced three-phase circuit in which $\mathbf{V}_{bn} = 440\angle 130°$ V and $\mathbf{V}_{cn} = 440\angle 10°$ V. Obtain $\mathbf{V}_{an}$.

12.7 Obtain the line currents in the three-phase circuit of Fig. 12.42 on the next page.

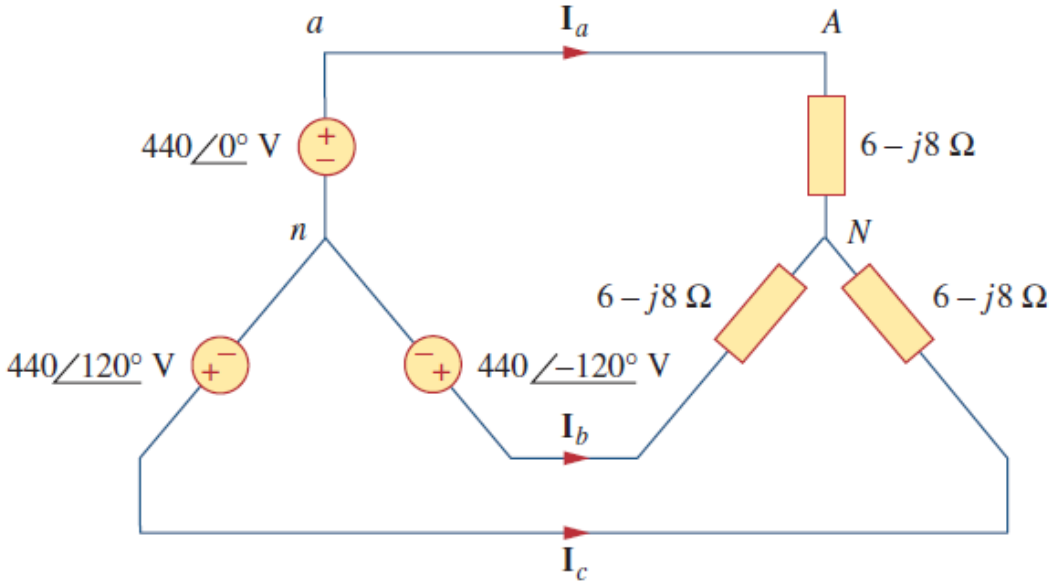

Figure 12.42
For Prob. 12.7.

12.11 In the Y-Δ system shown in Fig. 12.44, the source is a positive sequence with $\mathbf{V}_{an} = 240\angle 0°$ V and phase impedance $\mathbf{Z}_p = 2 - j3\ \Omega$. Calculate the line voltage $\mathbf{V}_L$ and the line current $\mathbf{I}_L$.

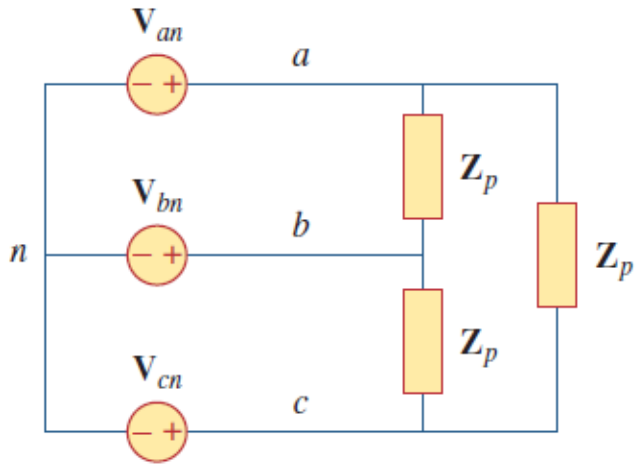

Figure 12.44
For Prob. 12.11.

12.22 Find the line currents $\mathbf{I}_a$, $\mathbf{I}_b$, and $\mathbf{I}_c$ in the three-phase network of Fig. 12.53 below. Take $\mathbf{Z}_\Delta = 12 - j15\ \Omega$, $\mathbf{Z}_Y = 4 + j6\ \Omega$, and $\mathbf{Z}_l = 2\ \Omega$.

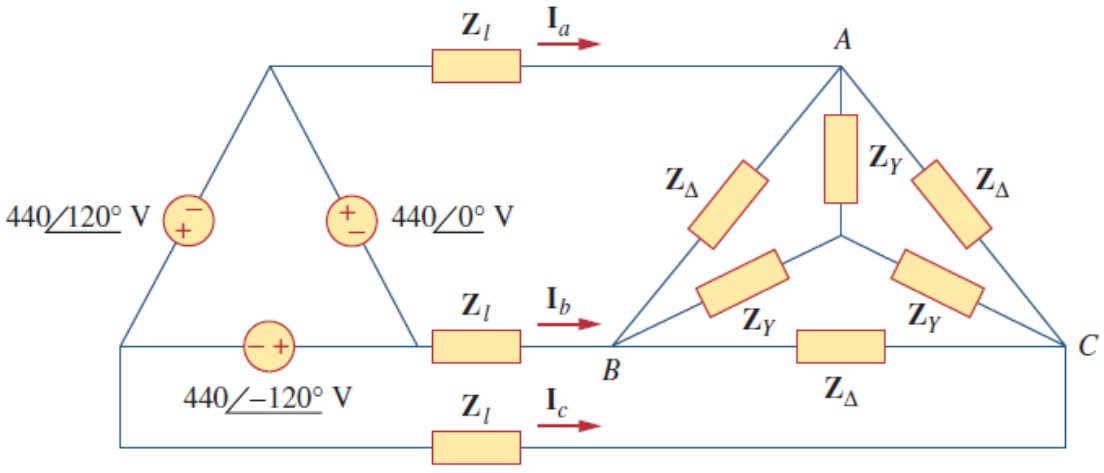

Figure 12.53
For Prob. 12.22.

12.31 A balanced delta-connected load is supplied by a 60-Hz three-phase source with a line voltage of 240 V. Each load phase draws 6 kW at a lagging power factor of 0.8. Find:

(a) the load impedance per phase

(b) the line current

(c) the value of capacitance needed to be connected in parallel with each load phase to minimize the current from the source

12.33 A three-phase source delivers 4.8 kVA to a wye-connected load with a phase voltage of 208 V and a power factor of 0.9 lagging. Calculate the source line current and the source line voltage.

12.55 A three-phase supply, with the line voltage 240 V rms positively phased, has an unbalanced delta-connected load as shown in Fig. 12.62. Find the phase currents and the total complex power.

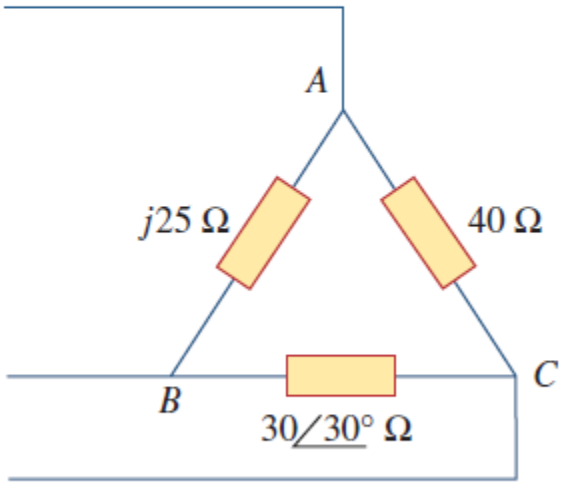

Figure 12.62
For Prob. 12.55.

12.66 A three-phase, four-wire system operating with a 208-V line voltage is shown in Fig. 12.71. The source voltages are balanced. The power absorbed by the resistive wye-connected load is measured by the three-wattmeter method. Calculate:

(a) the voltage to neutral

(b) the currents $\mathbf{I}_1$, $\mathbf{I}_2$, $\mathbf{I}_3$, and $\mathbf{I}_n$

(c) the readings of the wattmeters

(d) the total power absorbed by the load

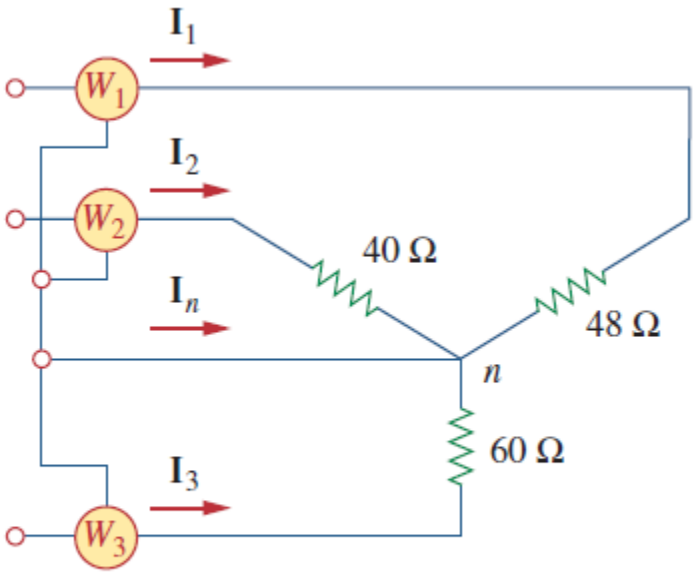

Figure 12.71
For Prob. 12.66.