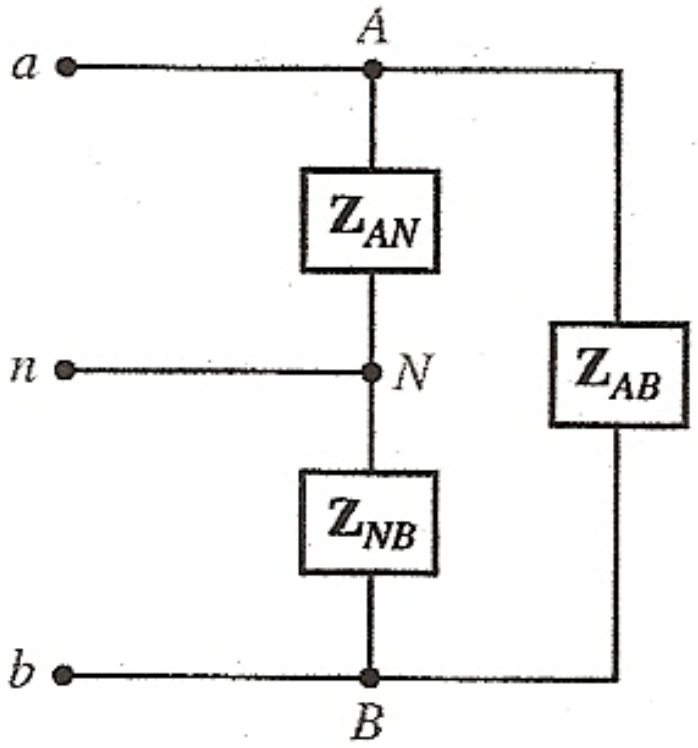
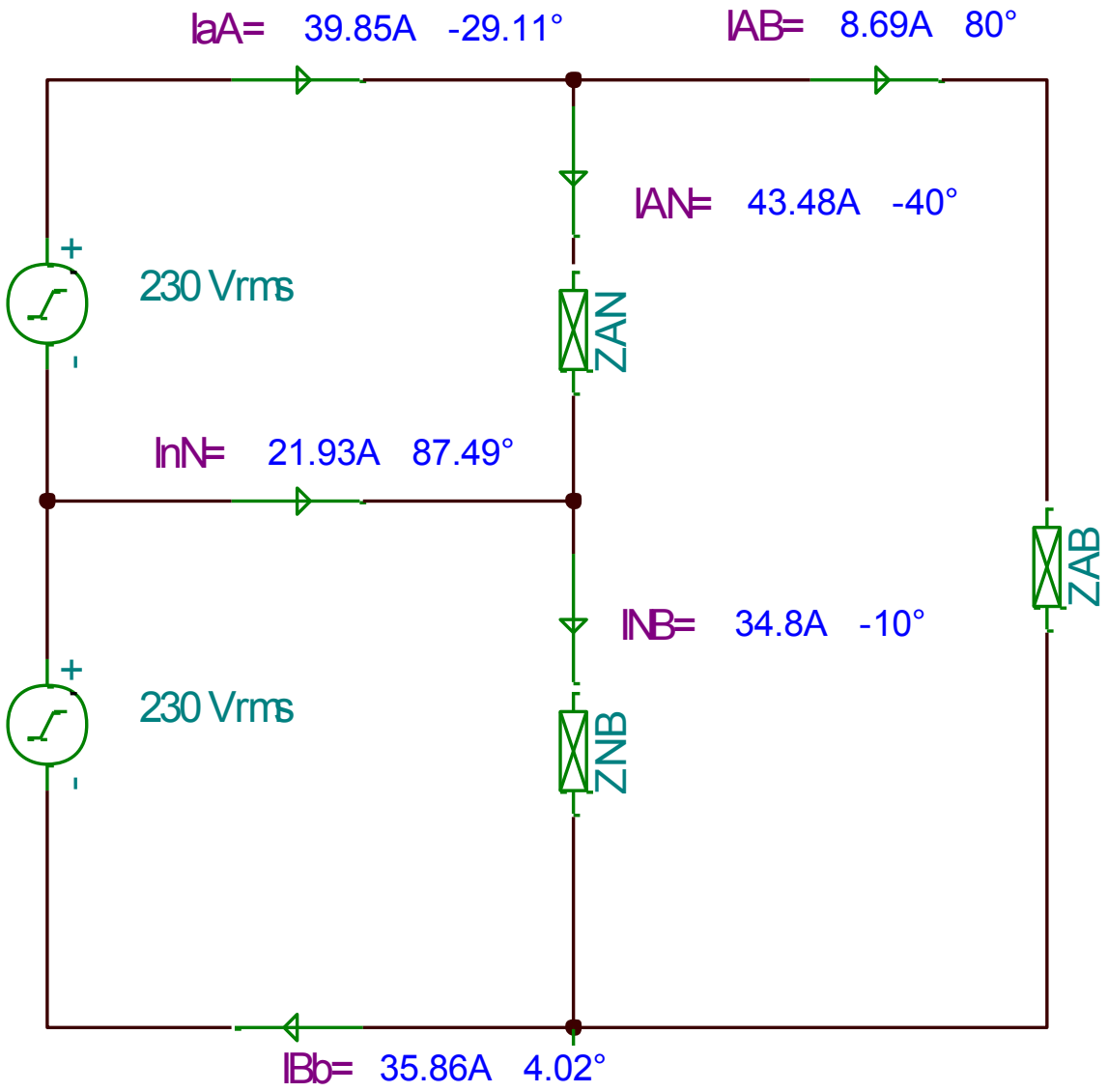
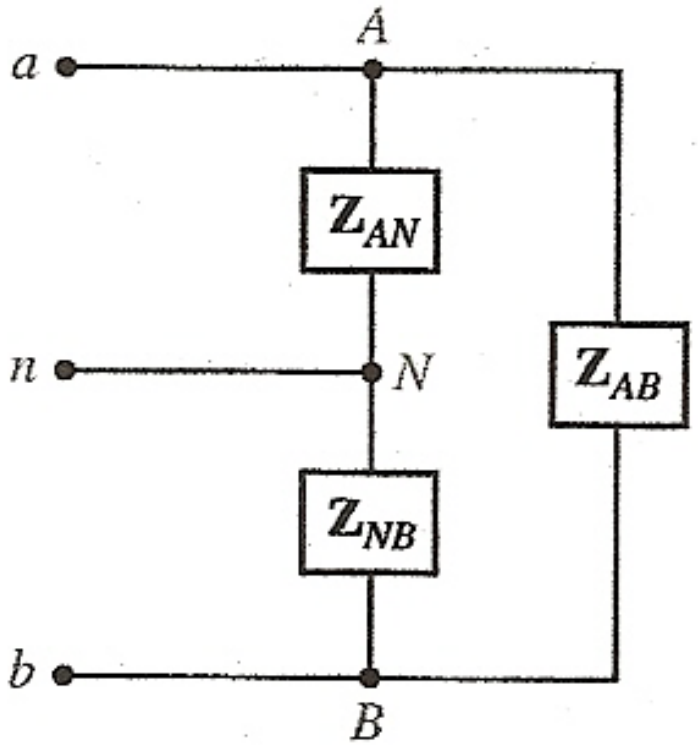
10. The 230/460 V rms 60 Hz three-wire system shown in Fig. 12.29 supplies power to three loads: load *AN* draws a complex power of $10\underline{/40^\circ}$ kVA, load *NB* uses $8\underline{/10^\circ}$ kVA, and load *AB* requires $4\underline{/-80^\circ}$ kVA. Find the two line currents and the neutral current.



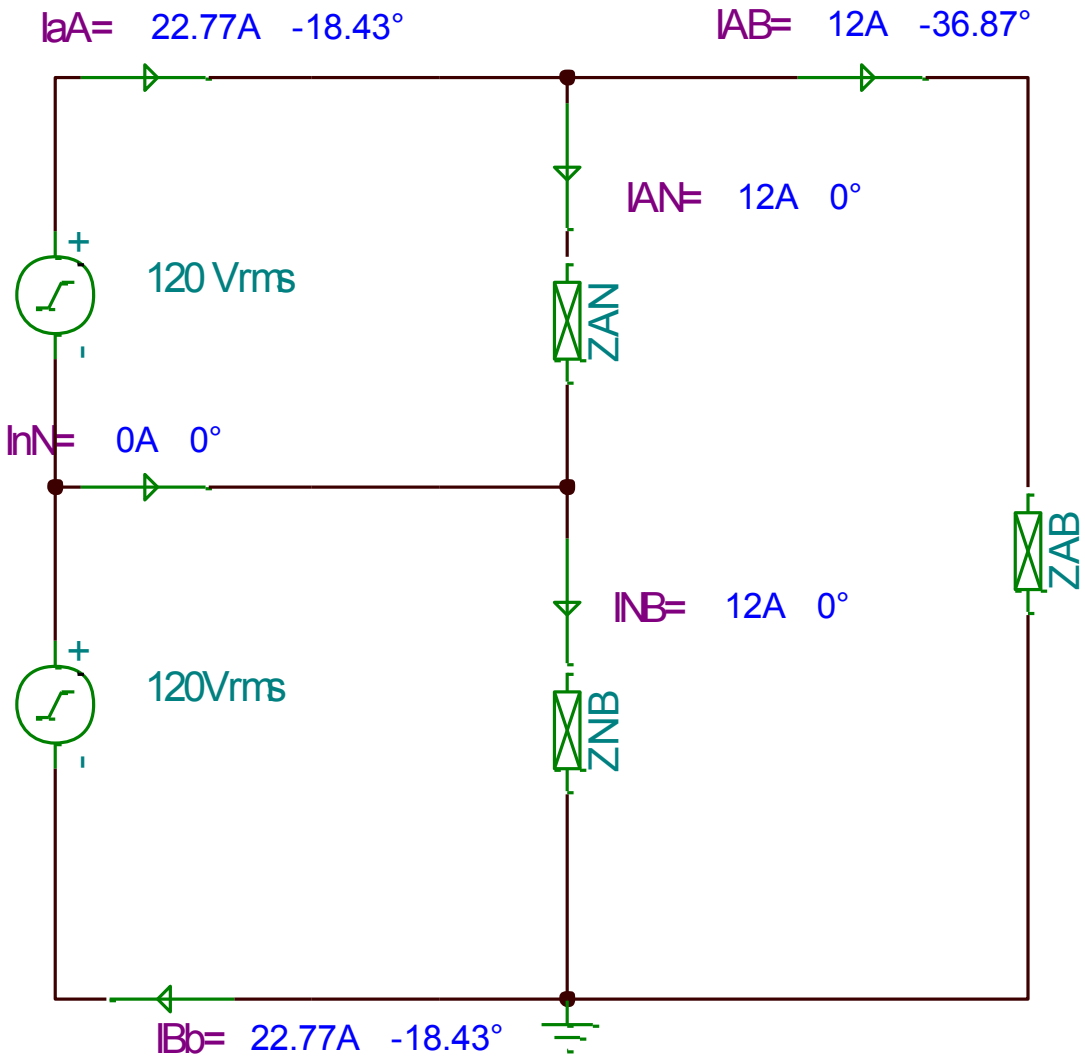
Simulación problema 12.10



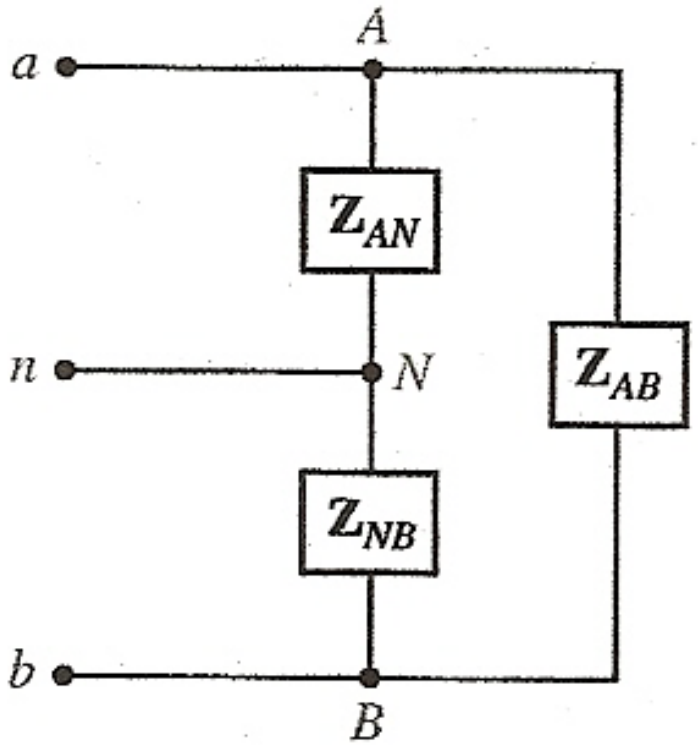
11. A balanced three-wire single-phase system has loads $\mathbf{Z}_{AN} = \mathbf{Z}_{NB} = 10\ \Omega$, and a load $\mathbf{Z}_{AB} = 16 + j12\ \Omega$. The three lines may be assumed to be resistanceless. Let $\mathbf{V}_{an} = \mathbf{V}_{nb} = 120\underline{/0^\circ}$ V. (*a*) Find I_{aA} and I_{nN}. (*b*) The system is unbalanced by connecting another 10 Ω resistance in parallel with $\mathbf{Z}_{AN}$. Find I_{aA}, I_{bB}, and I_{nN}.



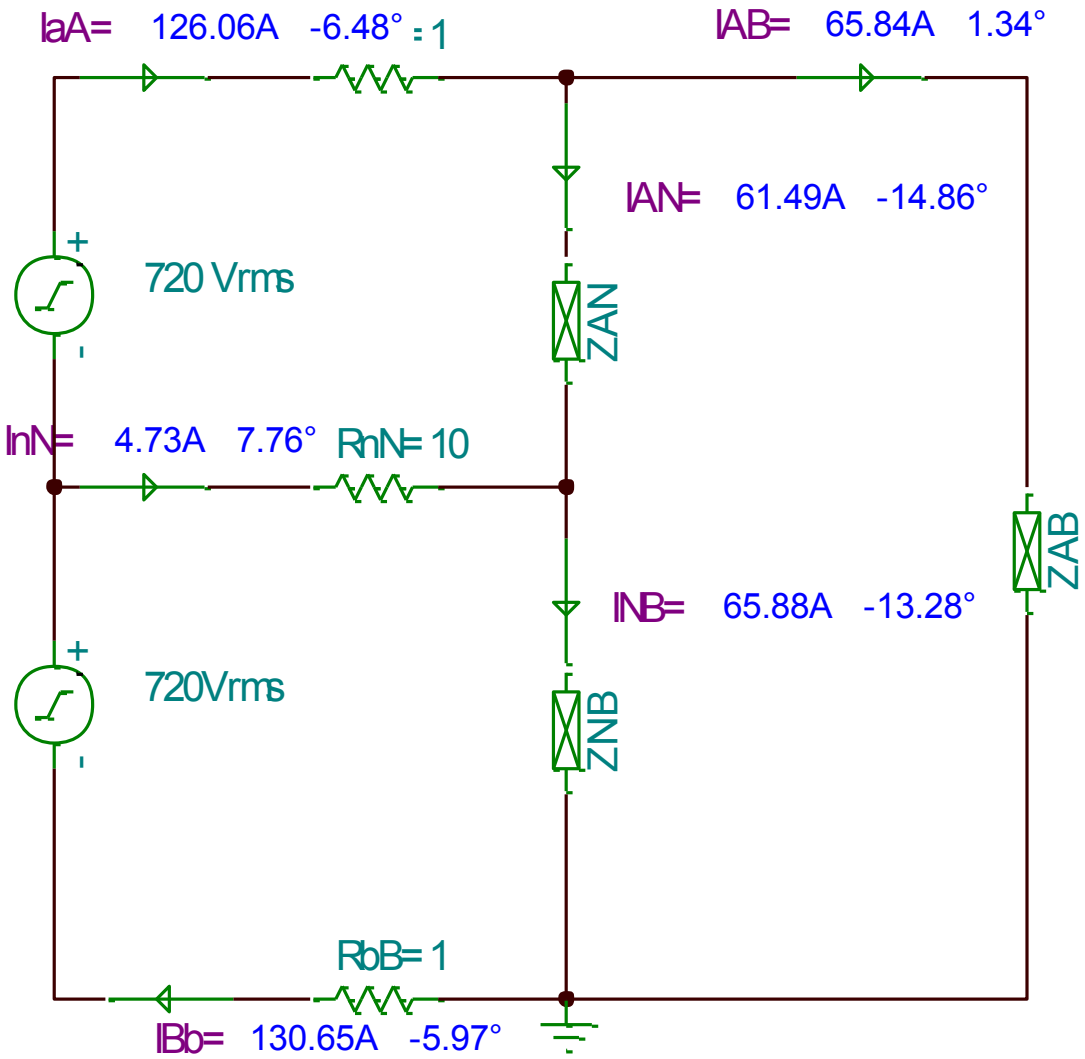
Simulación problema 12.11



12. An inefficient three-wire single-phase system has source voltages of $\mathbf{V}_{an} = \mathbf{V}_{nb} = 720/\underline{0°}$ V, line resistances $R_{aA} = R_{bB} = 1\ \Omega$ with $R_{nN} = 10\ \Omega$, and loads $\mathbf{Z}_{AN} = 10 + j3\ \Omega$, $\mathbf{Z}_{NB} = 8 + j2\ \Omega$, and $\mathbf{Z}_{AB} = 18 + j0\ \Omega$. Find (*a*) $\mathbf{I}_{aA}$; (*b*) $\mathbf{I}_{nN}$; (*c*) $P_{\text{wiring,total}}$; (*d*) $P_{\text{gen.total}}$.



Simulación


IaA= 126.06A -6.48°
1
IAB= 65.84A 1.34°
IAN= 61.49A -14.86°
720 Vrms
ZAN
InN= 4.73A 7.76°
RnN= 10
ZAB
INB= 65.88A -13.28°
720Vrms
ZNB
RbB= 1
IBb= 130.65A -5.97°

15. Figure 12.31 shows a balanced three-phase three-wire system with positive phase sequence. Let $\mathbf{V}_{BC} = 120/\underline{60°}$ V and $R_w = 0.6\ \Omega$. If the total load (including wire resistance) draws 5 kVA at PF = 0.8 lagging, find (*a*) the total power lost in the line resistance, and (*b*) $\mathbf{V}_{an}$.

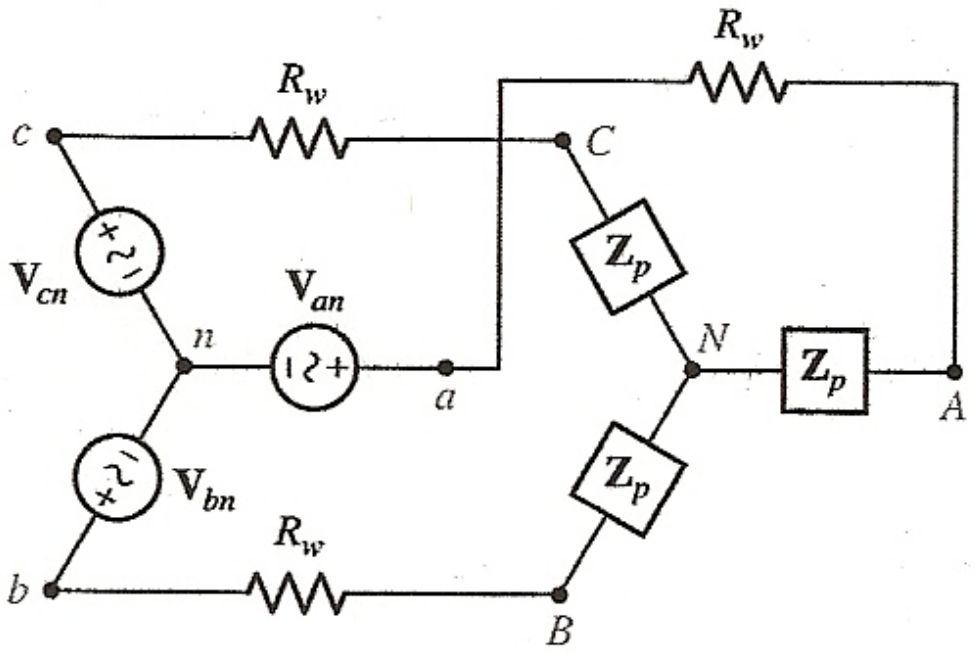
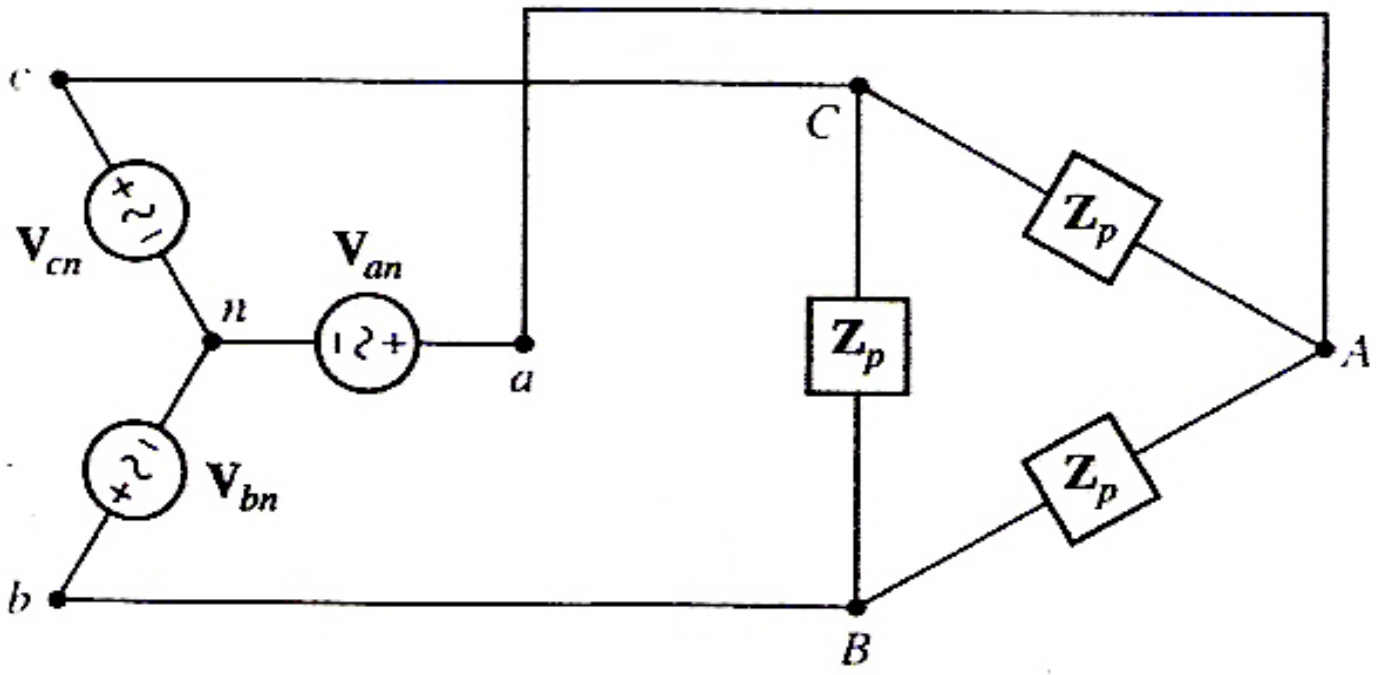


FIGURE 12.31

Conexión estrella delta (Y-Δ)



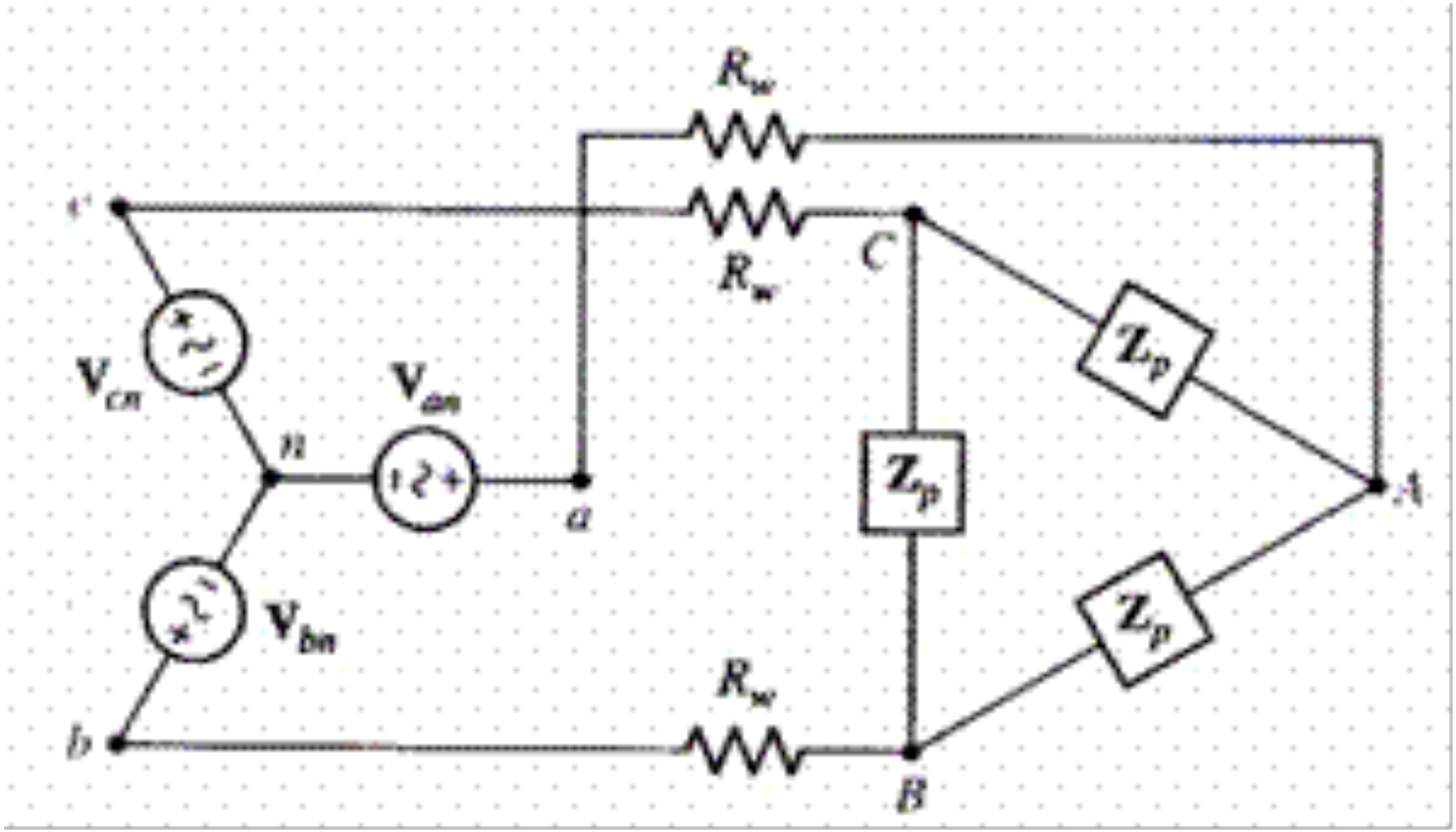
Problema 12.22

La carga conectada en delta (Δ) del circuito de la requiere 15 kVA con un FP retrasado de 0.8. Suponga una secuencia de fase positiva con:

$V_{BC} = 180\angle 30°$ V. Si Rw = 0 Ω, calcule:

a) V_{bc},

b) la potencia compleja total generada por la fuente.



26. The balanced Δ load of Fig. 12.32 requires 15 kVA at a lagging PF of 0.8. Assume (+) phase sequence with $\mathbf{V}_{BC} = 180/\underline{30°}$ V. If $R_w = 0.75\ \Omega$, find (*a*) $\mathbf{V}_{bc}$; (*b*) the total complex power generated by the source.

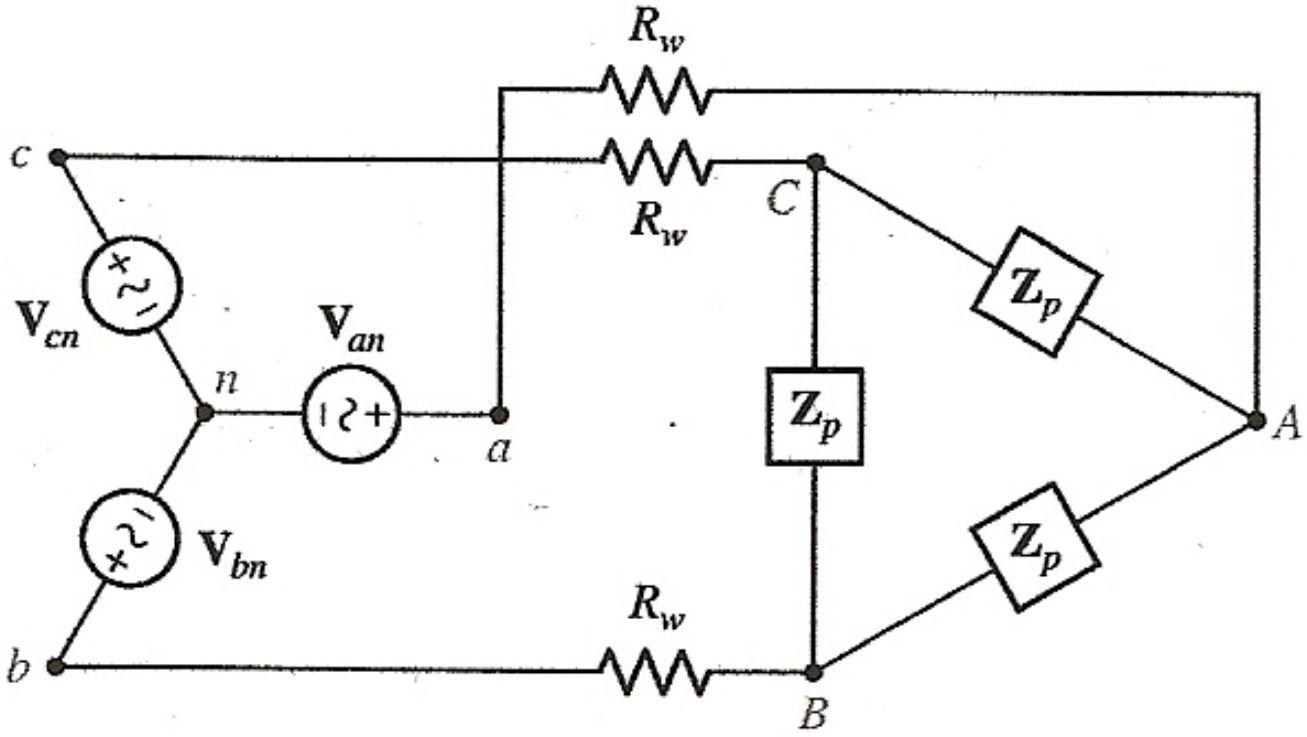


FIGURE 12.32

29. The source in Fig. 12.33 is balanced and exhibits (+) phase sequence. Find (*a*) $\mathbf{I}_{aA}$; (*b*) $\mathbf{I}_{bB}$; (*c*) $\mathbf{I}_{cC}$; (*d*) the total complex power supplied by the source.

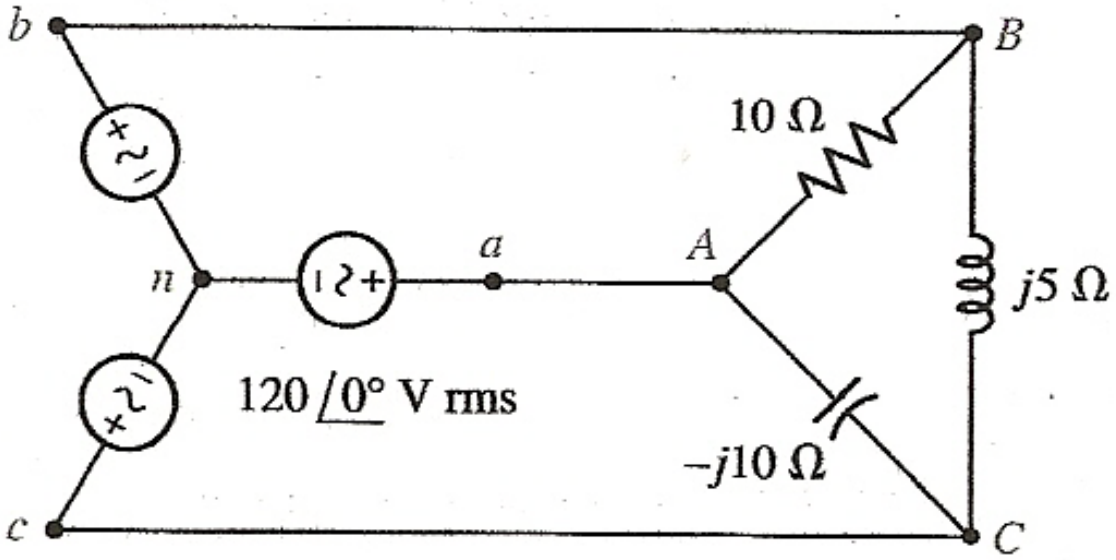
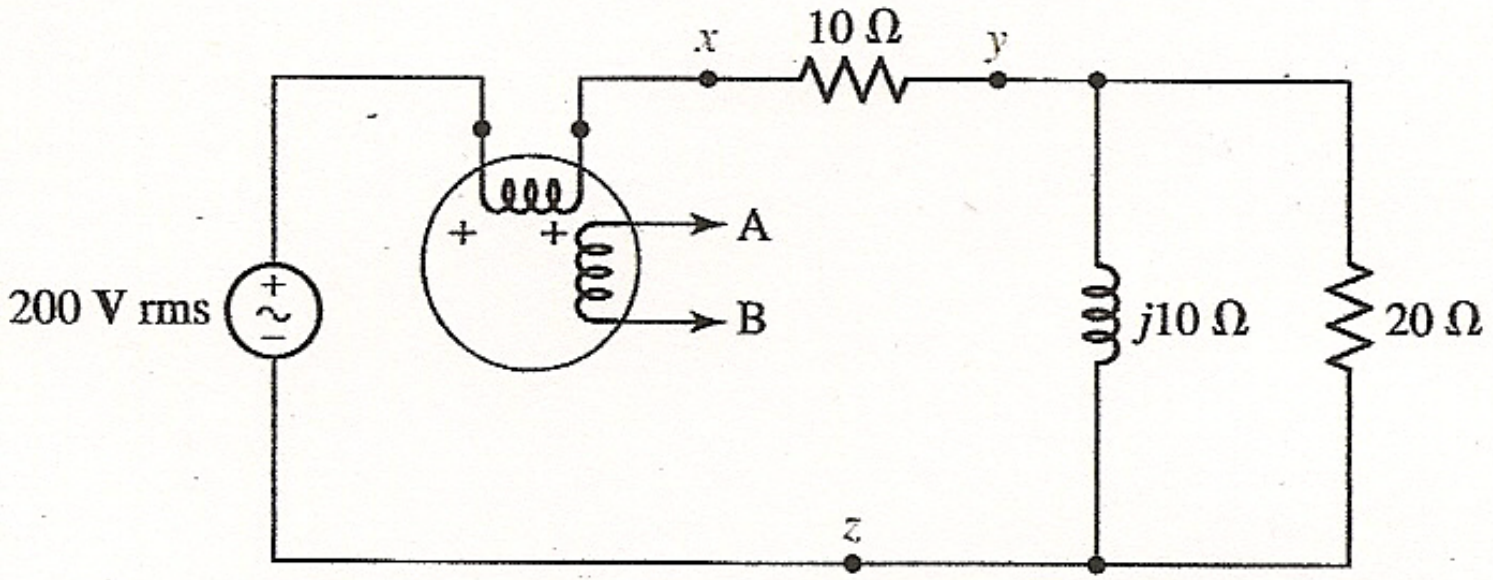


FIGURE 12.33

35. Determine the wattmeter reading (stating whether or not the leads had to be reversed to obtain it) in the circuit of Fig. 12.35 if terminals A and B, respectively, are connected to (a) x and y; (b) x and z; (c) y and z.



■ **FIGURE 12.35**

Ejemplo

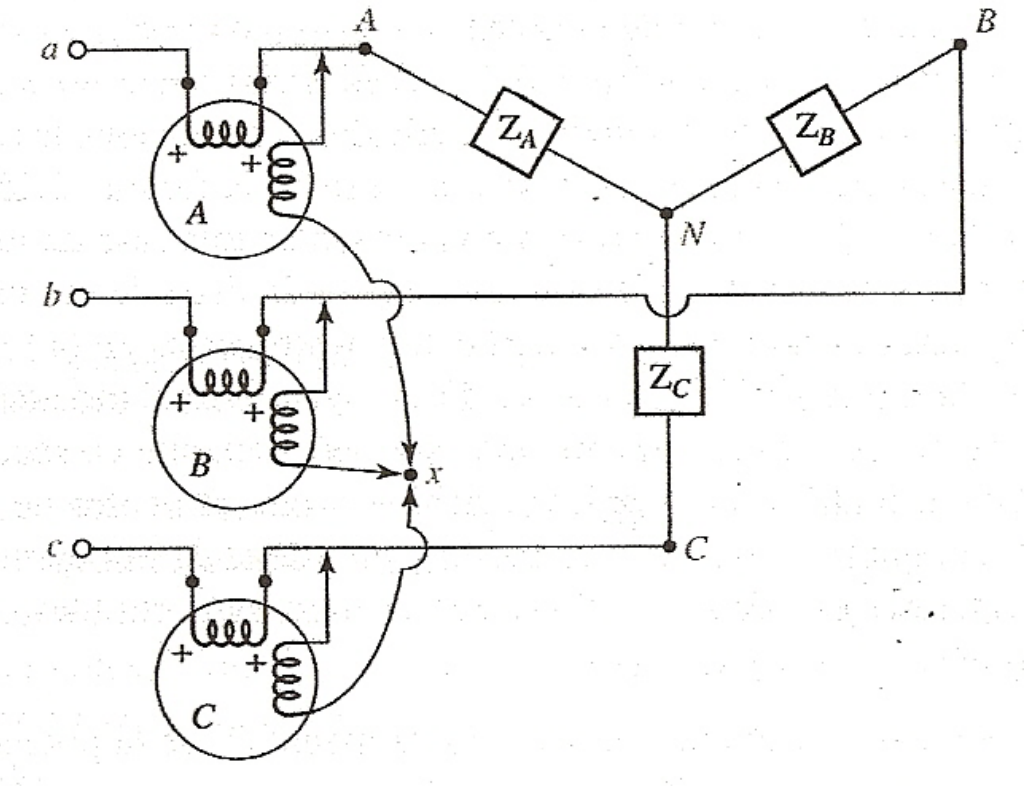
Sean las cargas

$\mathbf{Z}_A = 25\angle 60° \ \Omega$, $\mathbf{Z}_B = 50\angle -60° \ \Omega$, $\mathbf{Z}_C = 50\angle 60° \ \Omega$,

$\mathbf{V}_{AB} = 600\angle 0°$ Vrms

con secuencia de fase positiva (+), y el punto x se ubica en la fase C.

Determine las lecturas de los 3 wattímetros (P_A, $P_{B,}$ P_C).



38. (*a*) Find both wattmeter readings in Fig. 12.38 if $\mathbf{V}_A = 100\underline{/0°}$ V rms, $\mathbf{V}_B = 50\underline{/90°}$ V rms, $\mathbf{Z}_A = 10 - j10\ \Omega$, $\mathbf{Z}_B = 8 + j6\ \Omega$, and $\mathbf{Z}_C = 30 + j10\ \Omega$. (*b*) Is the sum of these readings equal to the total power taken by the three loads? Verify your answer with an appropriate PSpice simulation.

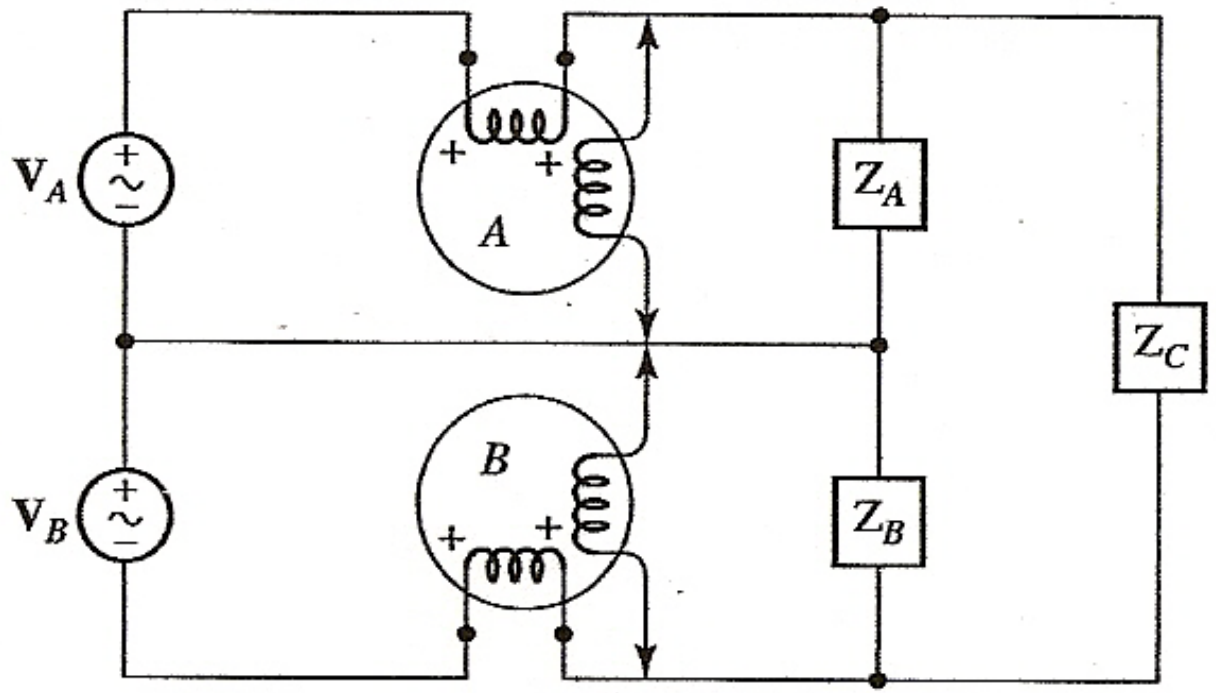


FIGURE 12.38

39. Circuit values for Fig. 12.39 are $\mathbf{V}_{ab} = 200/\underline{0°}$, $\mathbf{V}_{bc} = 200/\underline{120°}$, $\mathbf{V}_{ca} = 200/\underline{240°}$ V rms, $\mathbf{Z}_4 = \mathbf{Z}_5 = \mathbf{Z}_6 = 25/\underline{30°}\ \Omega$, $\mathbf{Z}_1 = \mathbf{Z}_2 = \mathbf{Z}_3 = 50/\underline{-60°}\ \Omega$. Find the reading for each wattmeter.

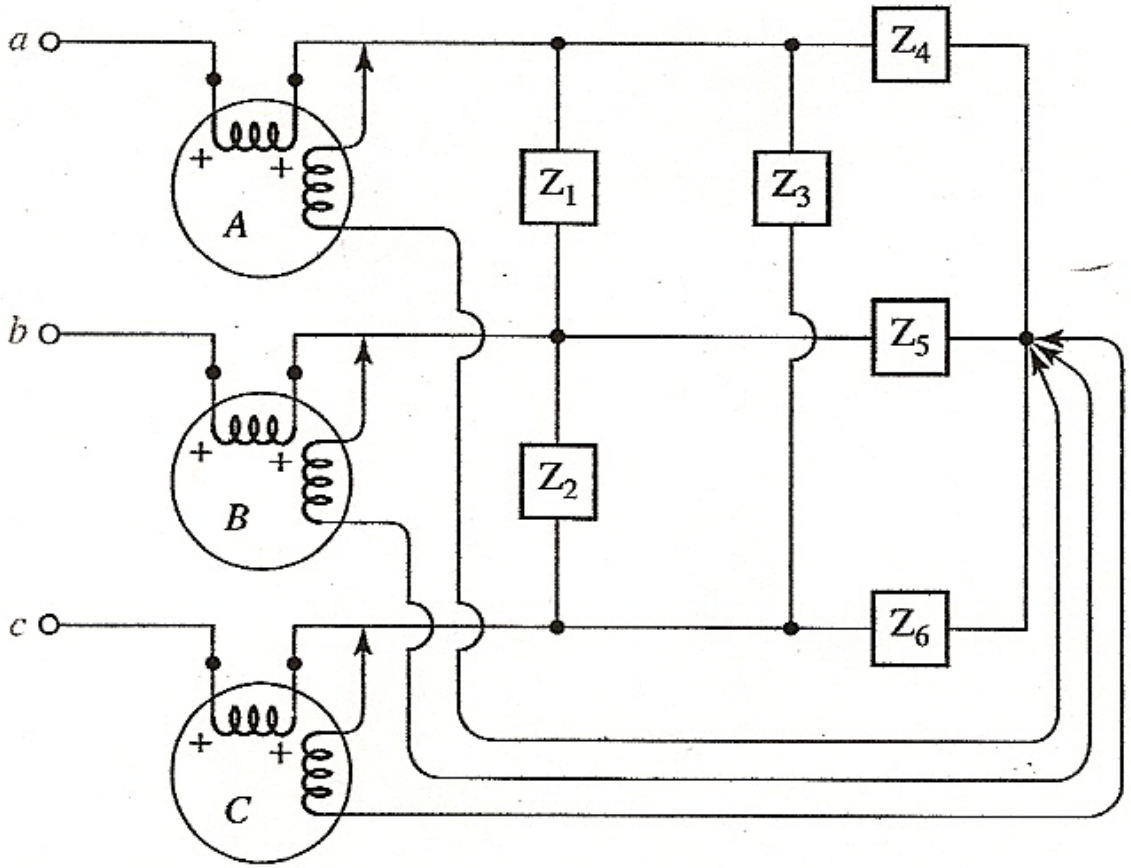


FIGURE 12.39