CH11 PROBLEMS

-

11.14 A balanced Δ-connected load has an impedance of $864 - j252\ \Omega/\phi$. The load is fed through a line having an impedance of $0.5 + j4\ \Omega/\phi$. The phase voltage at the terminals of the load is 69 kV. The phase sequence is positive. Use $\mathbf{V}_{AB}$ as the reference.

a) Calculate the three phase currents of the load.

b) Calculate the three line currents.

c) Calculate the three line voltages at the sending end of the line.

11.15 A balanced Y-connected load having an impedance of $72 + j21\ \Omega/\phi$ is connected in parallel with a balanced Δ-connected load having an impedance of $150\angle 0^\circ\ \Omega/\phi$. The paralleled loads are fed from a line having an impedance of $j1\ \Omega/\phi$. The magnitude of the line-to-neutral voltage of the Y-load is 7650 V.

a) Calculate the magnitude of the current in the line feeding the loads.

b) Calculate the magnitude of the phase current in the Δ-connected load.

c) Calculate the magnitude of the phase current in the Y-connected load.

d) Calculate the magnitude of the line voltage at the sending end of the line.

11.23 A balanced three-phase source is supplying 60 kVA at 0.6 lagging to two balanced Y-connected parallel loads. The distribution line connecting the source to the load has negligible impedance. Load 1 is purely resistive and absorbs 30 kW. Find the per-phase impedance of Load 2 if the line voltage is $120\sqrt{3}$ V and the impedance components are in series.

11.30 The line-to-neutral voltage at the terminals of the balanced three-phase load in the circuit shown in Fig. P11.30 is 1200 V. At this voltage, the load is absorbing 500 kVA at 0.96 pf lag.

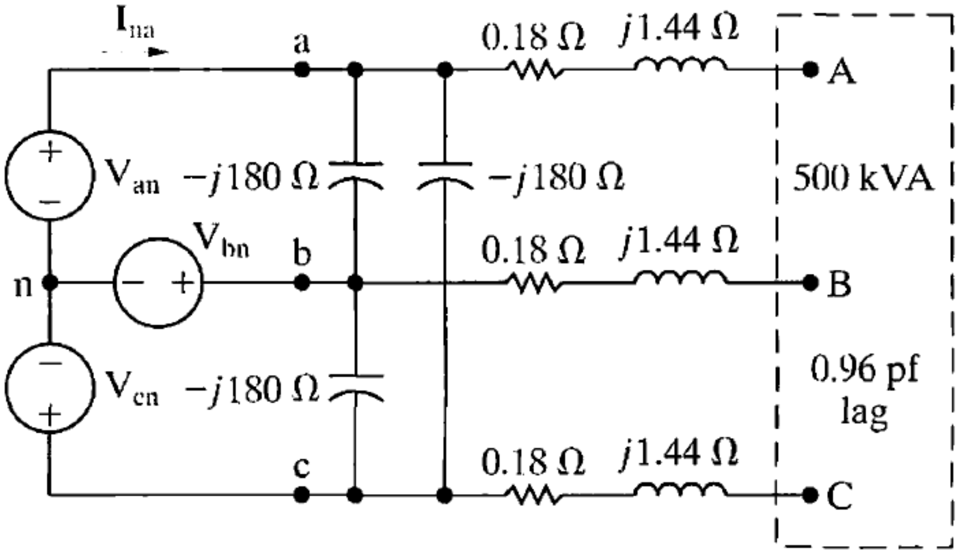
a) Use $\mathbf{V}_{AN}$ as the reference and express $\mathbf{I}_{na}$ in polar form.

b) Calculate the complex power associated with the ideal three-phase source.

c) Check that the total average power delivered equals the total average power absorbed.

d) Check that the total magnetizing reactive power delivered equals the total magnetizing reactive power absorbed.

Figure P11.30



11.46 a) Calculate the reading of each wattmeter in the circuit shown in Fig. P11.46. The value of Z_ϕ is $40\ \angle{-30^\circ}\ \Omega$.

b) Verify that the sum of the wattmeter readings equals the total average power delivered to the Δ-connected load.

Figure P11.46