ECE 3364, Dr. Hebert, Fall 2016 HW 03 due 09/15

Problem 1.
Nilsson, 8th edition
Problem 11.6

Problem 2.
Nilsson, 8th edition
Problem 11.9

Problem 3.
Nilsson, 8th edition
Problem 11.12

Problem 4.
Nilsson, 8th edition
Problem 11.15

Problem 5.
Nilsson, 8th edition
Problem 11.19

Problem 6.
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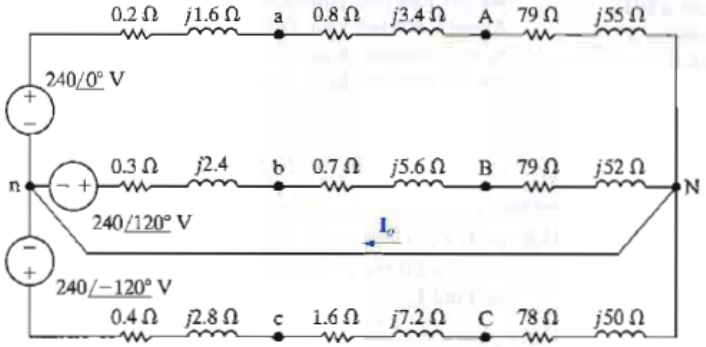
Problem 11.22

11.6 a) Find $\mathbf{I}_o$ in the circuit in Fig. P11.6.
PSPICE b) Find $\mathbf{V}_{AN}$.
c) Find $\mathbf{V}_{AB}$.
d) Is the circuit a balanced or unbalanced three-phase system?

Figure P11.6



11.9 The magnitude of the line voltage at the terminals of a balanced Y-connected load is 12,800 V. The load impedance is $216 + j63\ \Omega/\phi$. The load is fed from a line that has an impedance of $0.25 + j2\ \Omega/\phi$.

a) What is the magnitude of the line current?
b) What is the magnitude of the line voltage at the source?

11.12 A balanced Δ-connected load has an impedance of $360 + j105\ \Omega/\phi$. The load is fed through a line having an impedance of $0.1 + j1\ \Omega/\phi$. The phase voltage at the terminals of the load is 33 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 In a balanced three-phase system, the source is a balanced Y with an abc phase sequence and a line voltage $\mathbf{V}_{ab} = 208/50°$ V. The load is a balanced Y in parallel with a balanced Δ. The phase impedance of the Y is $4 + j3\ \Omega/\phi$ and the phase impedance of the Δ is $3 - j9\ \Omega/\phi$. The line impedance is $1.4 + j0.8\ \Omega/\phi$. Draw the single phase equivalent circuit and use it to calculated the line voltage at the load in the a-phase.

11.19 A three-phase Δ-connected generator has an internal impedance of $0.6 + j4.8\ \Omega/\phi$. When the load is removed from the generator, the magnitude of the terminal voltage is 34,500 V. The generator feeds a Δ-connected load through a transmission line with an impedance of $0.8 + j6.4\ \Omega/\phi$. The per-phase impedance of the load is $2877 - j864\ \Omega$.

a) Construct a single-phase equivalent circuit.
b) Calculate the magnitude of the line current.
c) Calculate the magnitude of the line voltage at the terminals of the load.
d) Calculate the magnitude of the line voltage at the terminals of the source.
e) Calculate the magnitude of the phase current in the load.
f) Calculate the magnitude of the phase current in the source.

11.22 A balanced three-phase source is supplying 90 kVA at 0.8 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 60 kW. Find the per-phase impedance of **Load 2 if** the line voltage is 415.69 V and the impedance components are in series.