KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

EE 306 – Term 191

HW # 1: Three-Phase Circuits
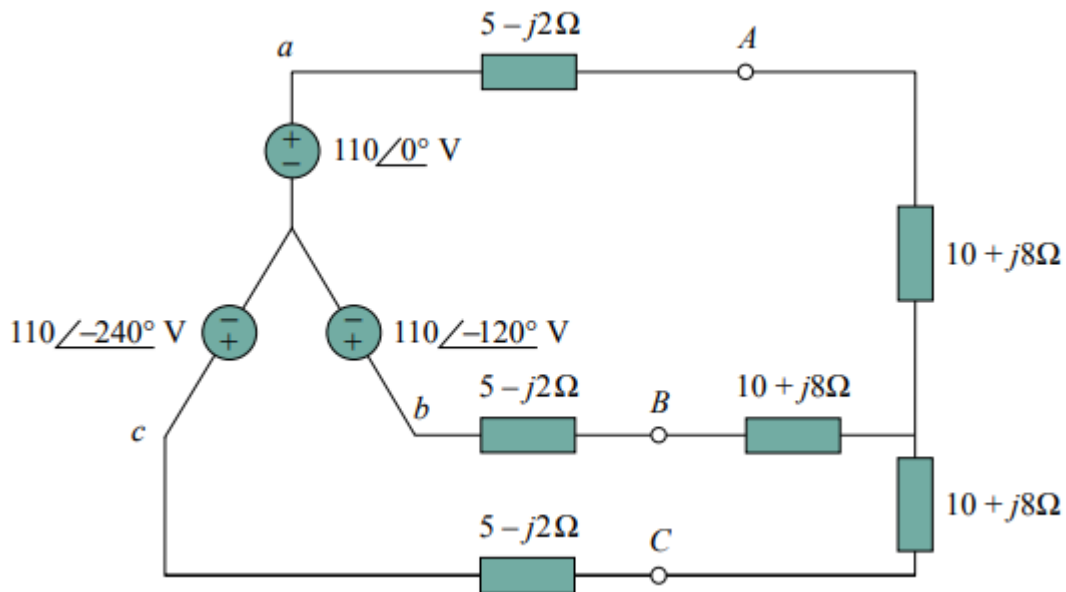
Due Date: (Sep. 16th, 2019)

Problem # 1:

Determine the phase sequence of the set of voltages

$$v_{an} = 200\cos(\omega t + 10°)$$

$$v_{bn} = 200\cos(\omega t - 110°) , \quad v_{cn} = 200\cos(\omega t - 230°)$$

Problem # 2:

Calculate the line currents in the three-wire Y-Y system shown below.

Problem # 3:

A balanced *abc*-sequence Y-connected source with $V_{an} = 100\underline{/10°}$ V is connected to a Δ-connected balanced load $(8 + j4)$ Ω per phase.

Calculate the phase and line currents at the load side.

Problem # 4:

Three impedances of $4 + j3$ Ω are Δ-connected and tied to a three-phase 208-V power line.

Find I_ϕ, I_L, P, Q, S, and the power factor of this load.

Problem # 5:

Figure below shows a one-line diagram of a simple power system containing a single 480 V generator and three loads. Assume that the transmission lines in this power system are lossless, and answer the following questions.

(a) Assume that Load 1 is Y-connected. What are the phase voltage and currents in that load?

(b) Assume that Load 2 is Δ-connected. What are the phase voltage and currents in that load?

(c) What real, reactive, and apparent power does the generator supply when the switch is open?

(d) What is the total line current I_L when the switch is open?

(e) What real, reactive, and apparent power does the generator supply when the switch is closed?

(f) What is the total line current I_L when the switch is closed?