

ECE 431 homework #1 (Due in class on Monday, February 3, 2020)

Problem 1.1

A balanced, 3-phase, 3-wire, 60Hz, wye-connected source has a line-line voltage of 6600V. It is connected to a three-phase wye-connected load whose per phase impedance is $30 + j30 \Omega$.

- Find the line currents, and the total three-phase complex power drawn by the load.
- If the two-wattmeter method is used, what would each of the meters read?
- Find the line current if a capacitor is connected in parallel to each phase of the load to correct the power factor of the load to 0.9 lagging
- What would the wattmeter readings be after the power factor correction?

Problem 1.2

A wye connected load is tested using the two-wattmeter method yielding the following:

Meter #1: Voltage 460 V, Power 250 W.

Meter #2: Voltage 460 V, Power 300 W.

Assume the load is balanced. Find:

- line current and power factor of the load
- total three-phase real and reactive power consumption
- the per phase load impedance

Problem 1.3

The following three-phase, balanced loads are connected across a single three-phase, wye-connected source (60 Hz and 480 V – line to line). The nature of the three loads are described below:

Load #1: Delta-connected load, with 40A phase current and 0.8 PF lag.

Load #2: Wye-connected load with 30 kW (3-phase) at 0.85 PF lead;

Load #3: Wye-connected load with 30 kVA (3-phase) at 0.8 PF lag;

Calculate the total complex power (3-phase) consumed by the three loads, and the power factor.