EE 313 –Design Problem Last names between A-H
Fall 2010
Due Tuesday, November 23rd.
Accepted without penalty by November 30th.

A balanced, three-phase, Y-connected source has a line voltage of 440 Vrms. The source frequency is 60 Hz. The balanced, three-phase loads have the following characteristics:

Z_{y1}: P_1 = 15 kW and Q_1 = +18 kVAR
$Z_{\Delta 2}$: $|\mathbf{S}_2|$=21 kVA and PF_2 = 0.500 lagging
$Z_{\Delta 3}$: PF_3 = 0.2 lagging and I_{p3} = 25 A rms
Z_{y4}: $1.67\angle 60^{o}\ \Omega$

1. Determine the phasor value of each impedance and the current for each load.

2. Determine the total line current, $\mathbf{I}_{aA}$.

3. Determine the total complex power, average power, and reactive power delivered by the source to the loads.

4. What is the power factor of the three loads combined?

5. It is necessary to add a parallel load in the Δ configuration to the circuit to minimize the magnitude of the line current. The line voltage and total average power delivered by the source may not change. What are the impedance and the component value of this load?

6. What is the power factor of the additional load?

7. What is the power factor of the four loads combined?