

EE 313 – Spring 2007
Problem Set 4

1. A source has a magnitude of 120 Vrms. It is connected to two loads. Load 1 absorbs 15 kW at a PF=0.5 lagging. Load 2 absorbs 20kVAR at a PF=0.254 lagging.
 - a. Find the load currents and the impedances for each load.
 - b. Find the total source current.
 - c. Find the complex power delivered by the source.
 - d. Find the power factor of the two loads combined.
 - e. A corrective load needs to be added such that the power factor of the three loads combined is PF=0.95 lagging. Design this load assuming that the average power delivered by the source and the source voltage may not change.
2. A source has a magnitude of 220 Vrms. It is connected to four loads. Load 1 absorbs $10\angle 25^\circ$ kVA. Load 2 absorbs 2 kW at a PF=0.8 lagging. Load 3 absorbs 3 kW and 8kVAR. Load 4 draws a current with a magnitude of 30 Arms and absorbs 4 kVAR.
 - a. Find the currents and the impedances for each load.
 - b. Find the total source current.
 - c. Find the average and reactive power delivered by the source.
 - d. Find the power factor of the four loads combined.
 - e. A corrective load needs to be added such that the source current is minimized. Design this load assuming that the average power delivered by the source and the source voltage may not change.
3. A source provides a current of magnitude 300 Arms to 2 loads. The two loads combined absorb 12 kW at a PF=0.47 lagging. The first load absorbs 4 kW at a PF=0.3 lagging. What is the impedance of the second load?
4. A balanced, three-phase, Y-connected source has a line voltage magnitude of 208 Vrms. It is connected to a single Y-connected load. The total average power absorbed by the load is 48 kW at a power factor of 0.715 lagging.
 - a. What are the phase voltages and the line voltages?
 - b. What are the line currents?
 - c. What is the per phase impedance?
 - d. What is the total complex power delivered by the source?