TUGAS I
MATAKULIAH ANALISA ALIRAN DAYA

2.7. Two impedances, $Z_1 = 0.8 + j5.6\ \Omega$ and $Z_2 = 8 - j16\ \Omega$, and a single-phase motor are connected in parallel across a 200-V rms, 60-Hz supply as shown in Figure 8. The motor draws 5 kVA at 0.8 power factor lagging.

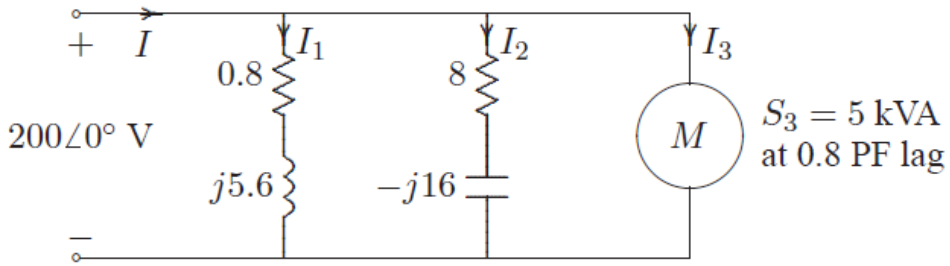

FIGURE 8
Circuit for Problem 2.7.

(a) Find the complex powers S_1, S_2 for the two impedances, and S_3 for the motor.
(b) Determine the total power taken from the supply, the supply current, and the overall power factor.
(c) A capacitor is connected in parallel with the loads. Find the kvar and the capacitance in μF to improve the overall power factor to unity. What is the new line current?

2.8. Two single-phase ideal voltage sources are connected by a line of impedance of $0.7 + j2.4\ \Omega$ as shown in Figure 9. $V_1 = 500\angle 16.26°$ V and $V_2 = 585\angle 0°$ V. Find the complex power for each machine and determine whether they are delivering or receiving real and reactive power. Also, find the real and the reactive power loss in the line.

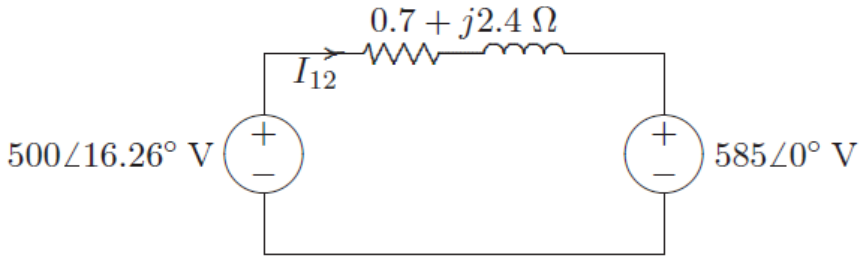

FIGURE 9
Circuit for Problem 2.8.

2.15. Three loads are connected in parallel across a 12.47 kV three-phase supply.

Load 1: Inductive load, 60 kW and 660 kvar.
Load 2: Capacitive load, 240 kW at 0.8 power factor.
Load 3: Resistive load of 60 kW.

(a) Find the total complex power, power factor, and the supply current.
(b) A Y-connected capacitor bank is connected in parallel with the loads. Find the total kvar and the capacitance per phase in μF to improve the overall power factor to 0.8 lagging. What is the new line current?

2.16. A balanced Δ-connected load consisting of a pure resistances of 18 Ω per phase is in parallel with a purely resistive balanced Y-connected load of 12 Ω per phase as shown in Figure 15. The combination is connected to a three-phase balanced supply of 346.41-V rms (line-to-line) via a three-phase line having an inductive reactance of $j3$ Ω per phase. Taking the phase voltage V_{an} as reference, determine
(a) The current, real power, and reactive power drawn from the supply.
(b) The line-to-neutral and the line-to-line voltage of phase a at the combined load terminals.

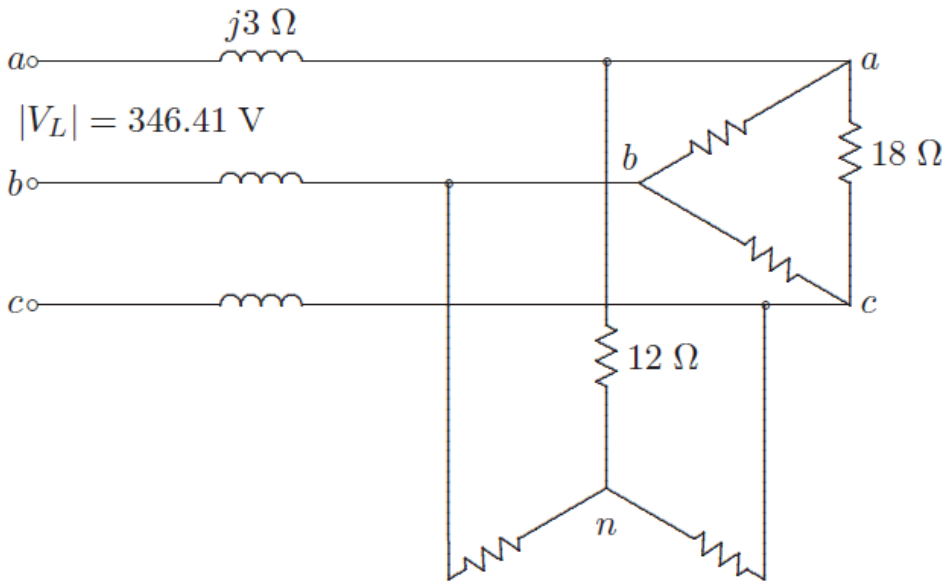

FIGURE 15
Circuit for Problem 2.16.