1. An inductive load consisting of R and X in series feeding from a 2400-V rms supply absorbs 288 kW at a lagging power factor of 0.8. Determine R and X .

2. Two loads connected in parallel are supplied from a single-phase 240-V rms source. The two loads draw a total real power of 400 kW at a power factor of 0.8 lagging. One of the loads draws 120 kW at a power factor of 0.96 leading. Find the complex power of the other load.

3. Two impedances, Z1 = 0.8 + j 5.6 **Ω** and Z2 = 8 − j 16 **Ω**, 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.

(a) Find the complex powers S1 , S2 for the two impedances, and S3 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?

4. Two single-phase ideal voltage sources are connected by a line of impedance of

0.7 + j 2.4 **Ω** as shown in Figure 9. V1 = 5006 16.26◦ V and V2 = 5856 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.

5. A 4157-V rms three-phase supply is applied to a balanced Y-connected three- phase load consisting of three identical impedances of 486 36.87◦ **Ω**. Taking the phase to neutral voltage Van as reference, calculate

(a) The phasor currents in each line.

(b) The total active and reactive power supplied to the load.

6. A balanced delta connected load of 15 + j 18 **Ω** per phase is connected at the end of a three-phase line as shown in Figure 12. The line impedance is 1 + j 2 **Ω** per phase. The line is supplied from a three-phase source with a line-to-line voltage of

207.85 V rms. Taking Van as reference, determine the following:

(a) Current in phase a.

(b) Total complex power supplied from the source.

(c) Magnitude of the line-to-line voltage at the load terminal.