# Electrical Power Engineering Fundamentals

Departamento de Ingeniería Eléctrica. Universidad Carlos III de Madrid

Module 4. Three-phase AC Systems. Week 11

**Exercise 1.** The following circuit shows a balanced three-phase load connected to an ideal balanced three-phase voltage source. (A, B, C) is a direct sequence. Find the values R and X from the load, knowing the following measures: W1 = 63094W; W2 = 16906W; V = 400 V

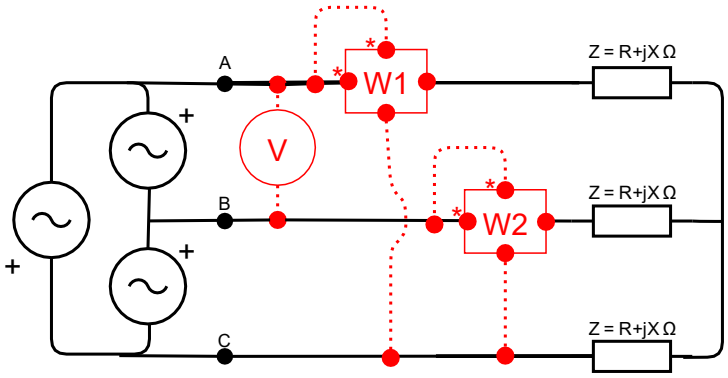


Figure 1 Three-phase AC system 1

**Solution:** R=1; X=1

**Exercise 2.** The following circuit shows 2 balanced three-phase loads connected to an ideal balanced three-phase voltage source. (A, B, C) is a direct sequence. The following measures are known: W1 = 6154.7 W; W2 = 3845.3W; and V = 400V. The frequency is f=50Hz.

a) Find the value of the impedance Z1.
b) Find the power consumed by the load 2.
c) In the circuit, we want to connect a balanced three-phase capacitor bank in parallel to minimize the current measured by the ammeter. Find the value of the phase-connected capacitor at Δ and Y connections.

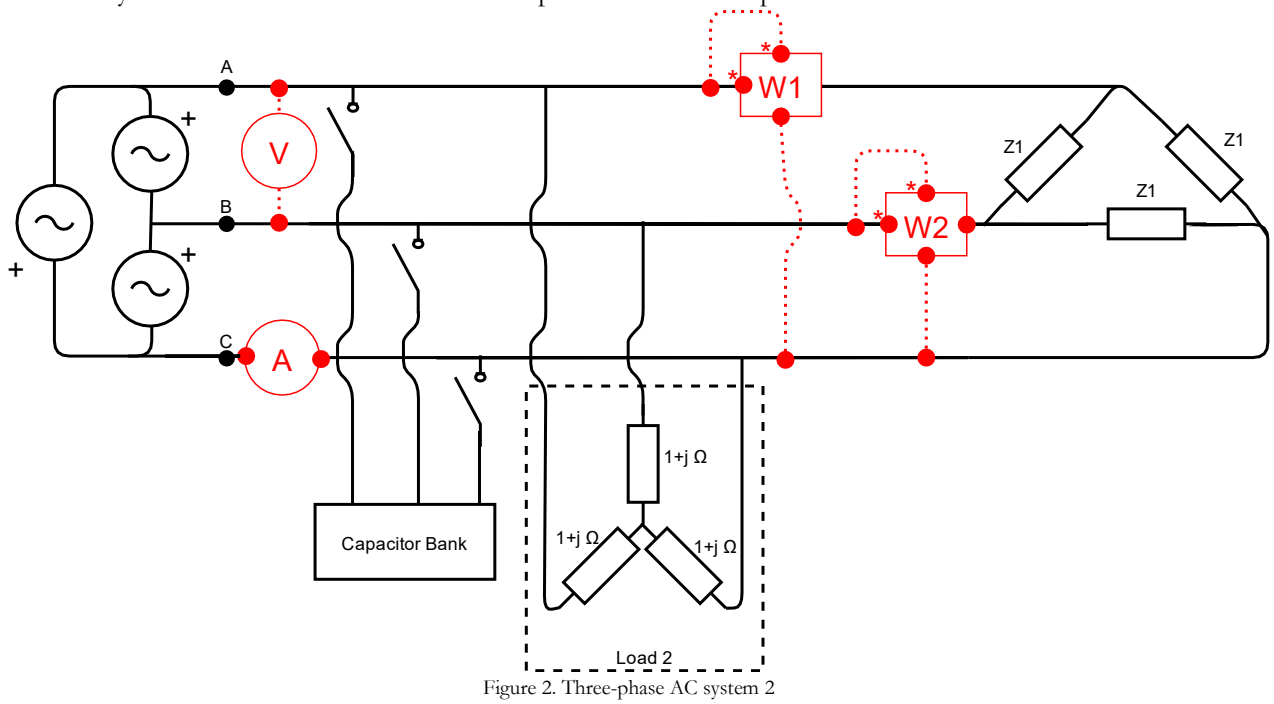


Figure 2. Three-phase AC system 2

**Solution:** a) Z1 = 41.4 + 16.55j Ω; $S_{L2}$ = 80000+80000j VA; c) $C^Y$ = 1.67 mF; $C^\Delta$ = 0.557 mF



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**Exercise 3.** The following circuit shows a balanced three-phase AC system. (A, B, C) is a direct sequence. The following measures are known: W1 = 12309.4 W; W2 = 7690.6W; and V1 = 400V.

a) Find the value of the impedance ZL.
b) Find the current measured by the ammeter A and voltage measured by the voltmeter V2.

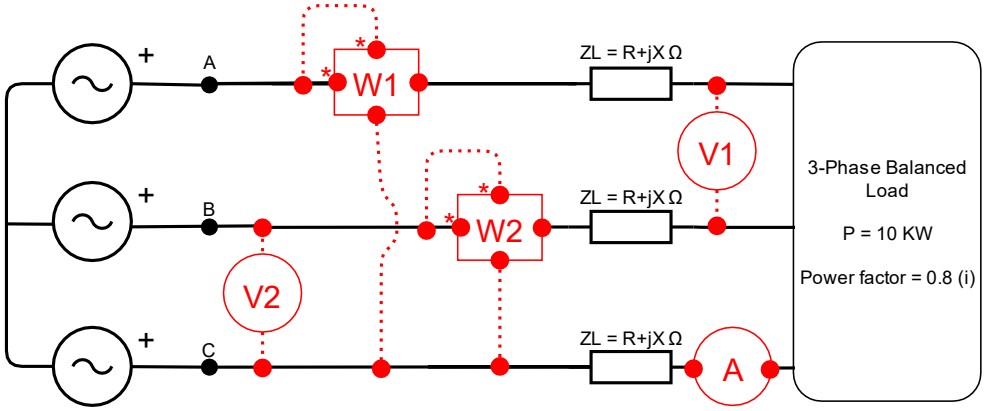


Figure 3. Three-phase AC system 3

**Solution: a)** ZL = 10.24 + 0.512j **Ω**; b) A = 18.04 A; V2 = 689.4V



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