Power Factor and Efficiency in AC Circuits (44:30)

Define power factor and identify the methods of calculating power factor. Identify the upper and lower limits of power factor and what these limits imply.

Define efficiency and identify the method of calculating efficiency. Identify the theoretical upper limit of efficiency.

Identify the method of calculating the total efficiency of a multistage system with individual efficiency ratings.

Identify the similarities between power factor and efficiency. Draw a diagram how these properties influence the amount of apparent power input that yields useable real power output.

Given a system known to consume 1kVA of apparent power with a lagging power factor of .9 and an efficiency of 90% determine the real electric power input, the reactive power input, and the real power output of this system.

Given a system known to consume 1kVA of apparent power with a lagging power factor of .9 and an efficiency of 95% determine the real electric power input, the reactive power input, and the real power output of this system.

Given a system known to consume 1kVA of apparent power with a lagging power factor of .95 and an efficiency of 90% determine the real electric power input, the reactive power input, and the real power output of this system.

Given a system known to consume 2MVA of apparent power with a lagging power factor of .80 and an efficiency of 75% determine the real electric power input, the reactive power input, and the real power output of this system.

Given a system known to produce 2hp of useable power with a lagging power factor of .84, a first stage efficiency of 75% and a second stage efficiency of 85% determine the apparent power input, the real power input, the reactive power input, the losses in stage 1, the usable power output of stage 1 and the losses in stage 2.

Given a system known to produce 400W of useable power from 600VA of apparent power and +250VAR of reactive power determine the power factor, efficiency, real power input, and losses.

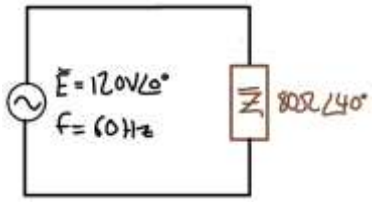
Given this circuit determine the voltage across each element, the current through each element, the apparent, real, and reactive power for each element, source current and the total apparent, real, and reactive power for the complete circuit.

Determine the power factor for the above complete circuit.

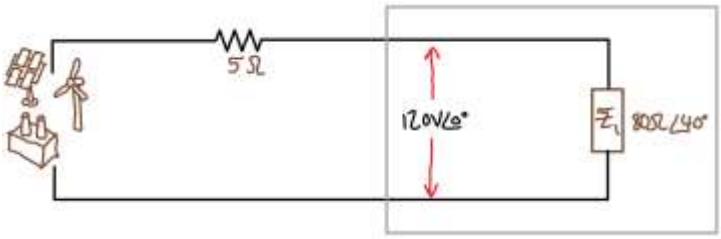
Determine the power factor for the individual elements inside the above circuit.

Determine the efficiency and losses of the above system if element 1 is a transmission line and element 2 is a motor performing some task.

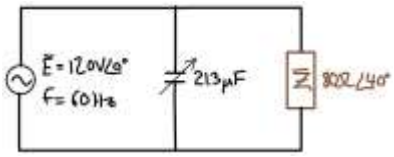
Given this circuit determine the voltage, current, apparent, real, reactive power, and power factor for the electrical load in the present configuration.



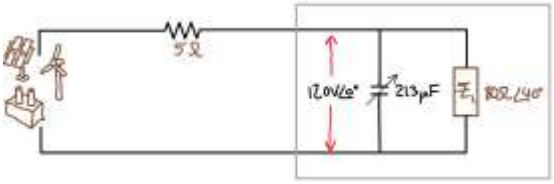
Determine the efficiency of the complete system given the transmission line is modeled as a 5Ω resistor.



Given this circuit determine the voltage, current, apparent, real, reactive power, and power factor for each element and the complete circuit.



Determine the efficiency of the power factor corrected complete system given the transmission line is modeled as a 5Ω resistor.



Compare and contrast non-power factor corrected systems with power factor corrected systems. Discuss how power factor correction can increase efficiency.