# ECE 3600 Homework # 3B

a

1. Compute the power factor for an inductive load consisting of $L := 20 \cdot mH$ and $R := 6 \cdot \Omega$ in series. $\omega := 377 \cdot \frac{rad}{s}$

2. The complex power consumed by a load is $620 \angle 29^{o}$ VA. Find:

   a) Apparent power (as always, give the correct units).

   b) Real power.

   c) Reactive power.

   d) Power factor.

   e) Is the power factor leading or lagging?

   f) Draw a phasor diagram.

3. In the circuit shown, the voltmeter measures 120V and the ammeter measures 6.3A (recall that AC meters read RMS). The wattmeter measures 560W. The load consists of a resistor and an inductor. The frequency is 60Hz. Find the following:

   a) Power factor

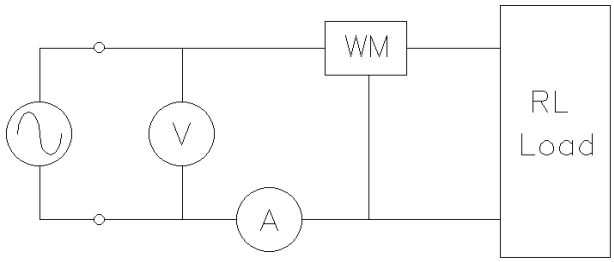
   b) Leading or lagging?

   c) Real power.

   d) Apparent power.

   e) Reactive power.

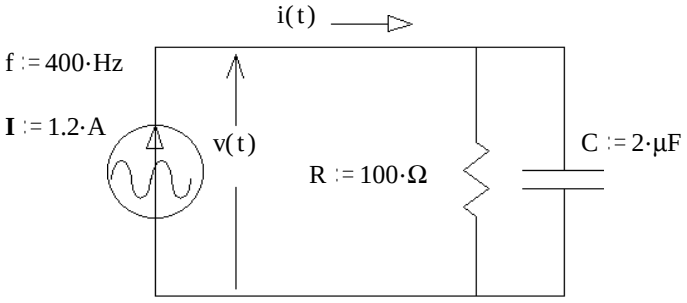
   f) Draw a phasor diagram.




   g) The load is in a box which cannot be opened. Add another component to the circuit above to correct the power factor (make pf = 1). Draw the correct component in the correct place and find its value. This component should not affect the real power consumption of the load.

4. For the circuit shown, find the following: (as always, give the correct units)

   a) The complex power.




   b) Real power.

   c) Reactive power.

   d) Apparent power.

   e) Draw a power phasor diagram.

5. A load draws $12\text{kVA}$ at $0.8$ pf, lagging when hooked to $480\text{V}$. A capacitance is hooked in parallel with the load and the power factor is corrected to $0.9$, lagging.

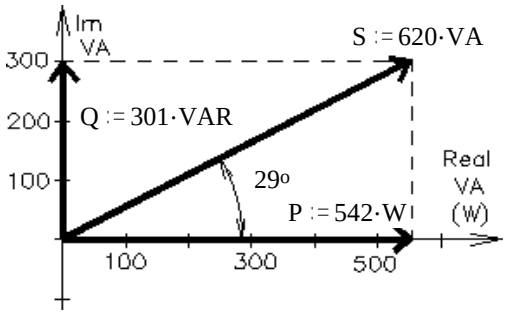
   a) Find the reactive power (VAR) of the capacitor. Draw a phasor diagram as part of the solution.

   b) Find the value of the capacitor assuming $f = 60\text{Hz}$.

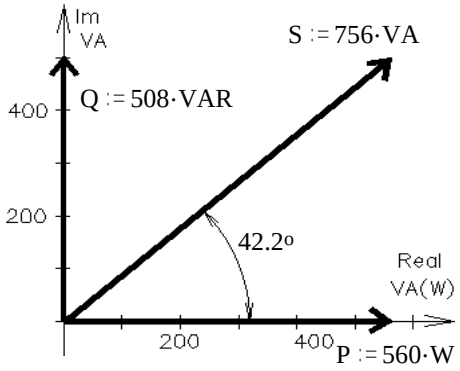
**Answers**

1. $pf := 0.623$

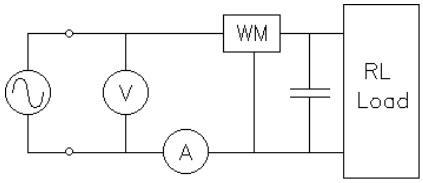
2. a) $620 \cdot VA$
   b) $542 \cdot W$
   c) $301 \cdot VAR$
   d) $0.875$
   e) lagging
   f) ------->



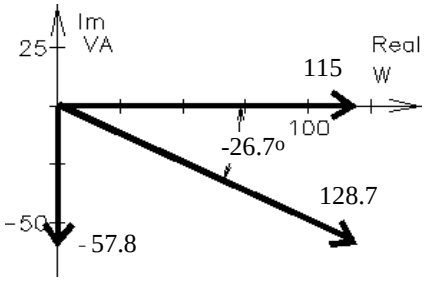

3. a) $0.741$
   b) lagging
   c) $560 \cdot W$
   d) $756 \cdot VA$
   e) $508 \cdot VAR$
   f) ------->
   g) $93.6 \cdot \mu F$




Draw a capacitor in parallel with load




4. a) $(115 - 57.8 \cdot j) \cdot VA$
   b) $115 \cdot W$
   c) $-57.8 \cdot VAR$
   d) $128.7 \cdot VA$
   e) ------->




5. a) $-2.55 \cdot kVA$
   b) $29.4 \cdot \mu F$