ECE 2210 Homework #20

c

Note: In the following problems, you may assume voltages and currents are RMS unless stated otherwise or given as a function of time.

1. Read the section on AC power in your book (section 6.2, p 288 in the textbook).

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

3. The complex power consumed by a load is $620\ \underline{/29^o}$ 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.

4. In the circuit shown, the voltmeter measures 120V, the ammeter measures 6.3A and 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?

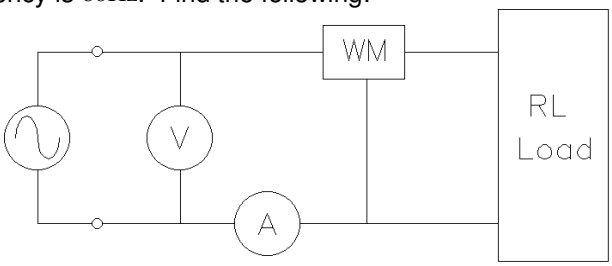
   c) Real power.

   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.



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

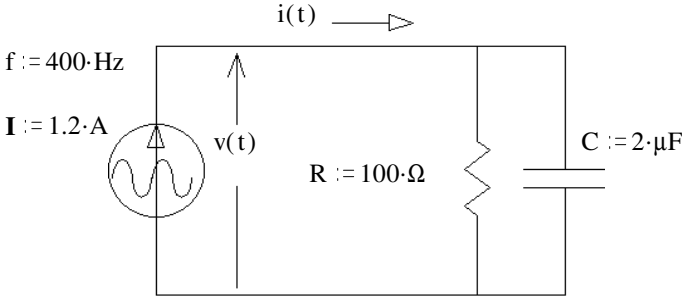
   a) The complex power.

   b) Real power.

   c) Reactive power.

   d) Apparent power.

   e) Draw a power phasor diagram.



Answers

2. $pf := 0.623$

3. a) $620\cdot VA$

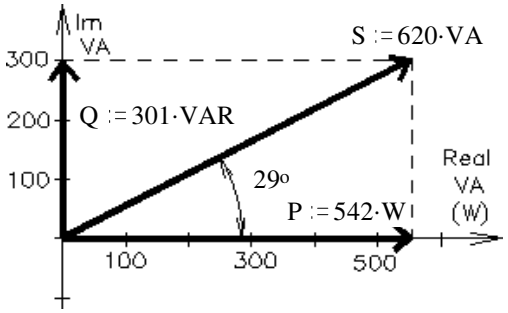
   b) $542\cdot W$

   c) $301\cdot VAR$

   d) 0.875

   e) lagging

   f) ------->



4. a) 0.741

   b) lagging

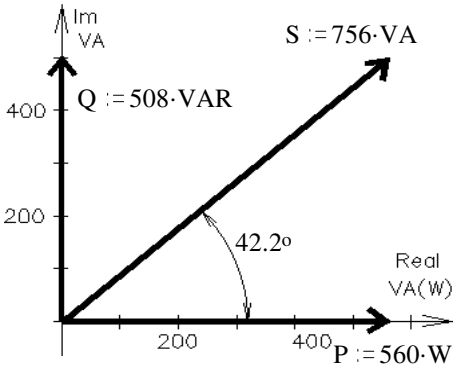
   c) $560\cdot W$

   d) $756\cdot VA$

   e) $508\cdot VAR$

   f) ------->

   g) $93.6\cdot\mu F$ capacitor in parallel with load



5. a) $(115 - 57.8\cdot j)\cdot VA$

   b) $115\cdot W$

   c) $-57.8\cdot VAR$

   d) $128.7\cdot VA$

   e) ------->