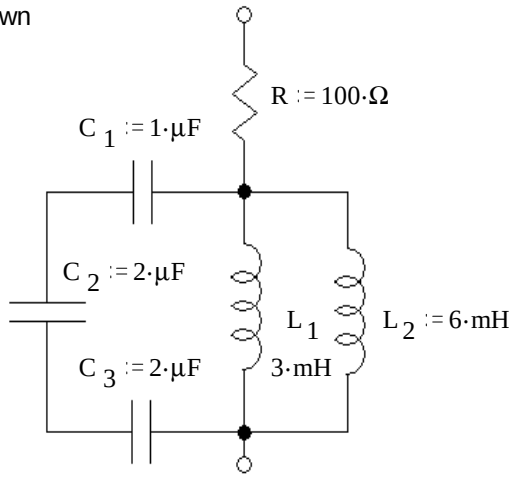
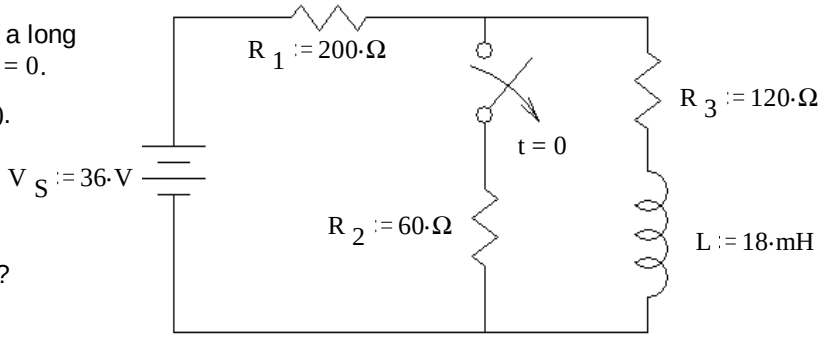
ECE 2210/00 Exam 2 given: Fall 10

(The space between problems has been removed.)

1. (11 pts) Find the resonant frequency (or frequencies) of the circuit shown (in cycles/sec or Hz).



2. (26 pts) The switch has been closed for a long time and is opened (as shown) at time $t = 0$.



   a) Find the complete expression for $i_L(t)$.

   b) Find i_L at time $t = 1.5\tau$. $i_L(1.5\cdot\tau) = ?$

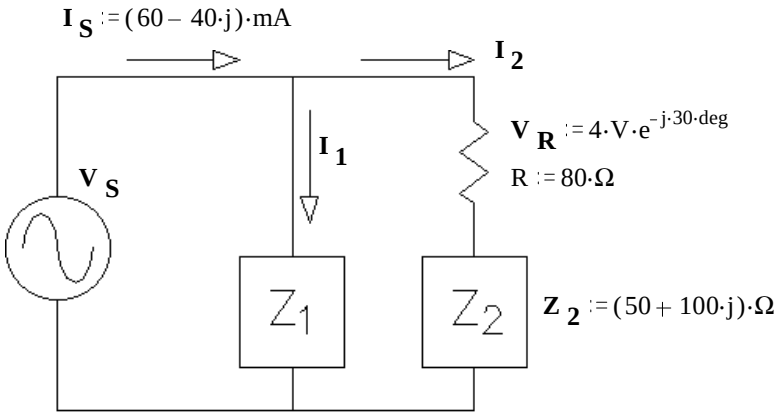
   c) At time $t = 1.5\tau$ the switch is closed again. Will the time constant be different now? If yes, find the new time constant.

3. (25 pts) For partial credit, you must show work and/or intermediate results.

   a) Find $\mathbf{I_2}$

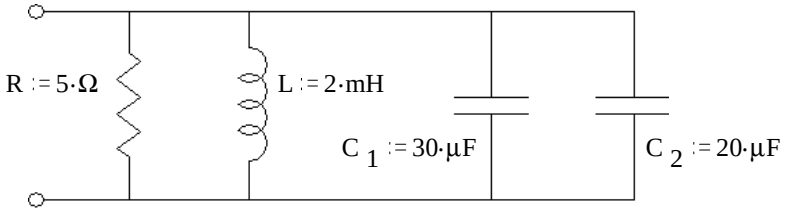
   b) Find $\mathbf{V_S}$

   c) Find $\mathbf{I_1}$ in polar form.



4. (20 pts) Find $\mathbf{Z_{eq}}$ in simple polar form (give me numbers & units).

   f := 220·Hz



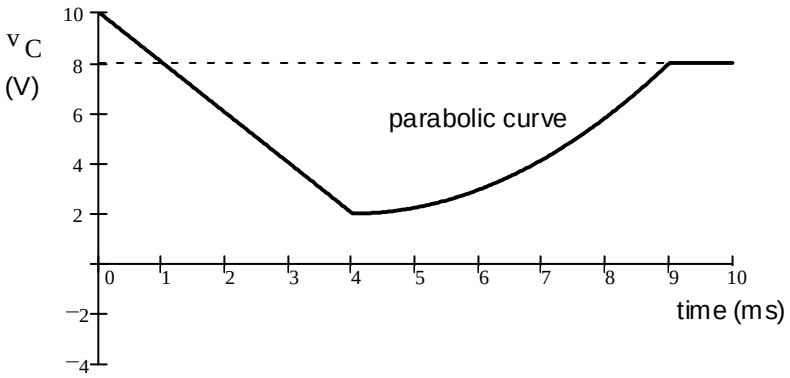
5. 18 pts) The voltage across a capacitor is shown below. Make an accurate drawing of the capacitor current. Make reasonable assumptions where necessary. Label your graph.

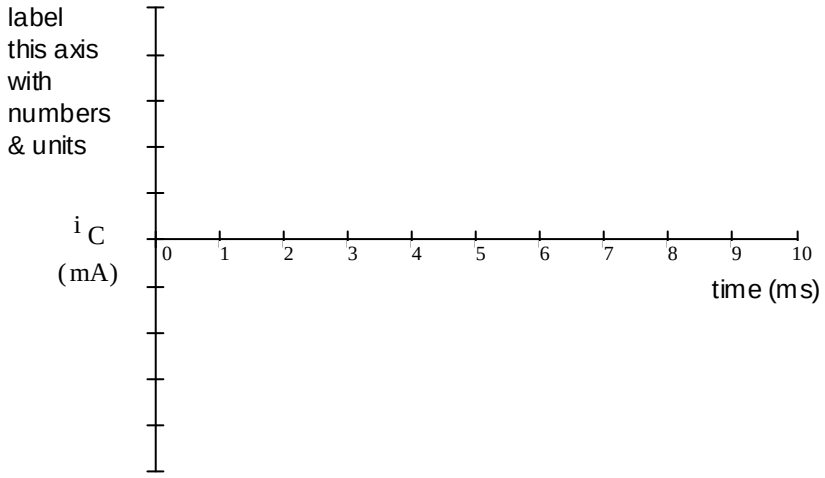
   Note: You will be graded on the accuracy of your plot at $0, 4, 9$ and 10 ms, so calculate those values and plot or label them carefully. Between those points your plot must simply be the correct shape.

   You **MUST SHOW** how you calculate your values starting from the original relationships between voltage and current.

   That is: **Start** with the **interger** and/or **differential** equations for the capacitor!

$C := 3 \cdot \mu F$





Answers

1. $5033 \cdot Hz$ 2. a) $112.5 \cdot mA - 62.5 \cdot mA \cdot e^{\frac{-t}{56.25 \cdot \mu s}}$ b) $98.6 \cdot mA$ c) $108.3 \cdot \mu s$

3. a) $50mA \angle -30^o$ b) $(8.13 + 1.08 \cdot j) \cdot V$ c) $22.4mA \angle -41.9^o$

4. $2.82\Omega \angle 55.6^o$

5. 0 - 4ms: flat at -6mA

   4ms - 9ms: ramps up from 0 to 7.2mA

   Beyond 9ms: flat at 0A