

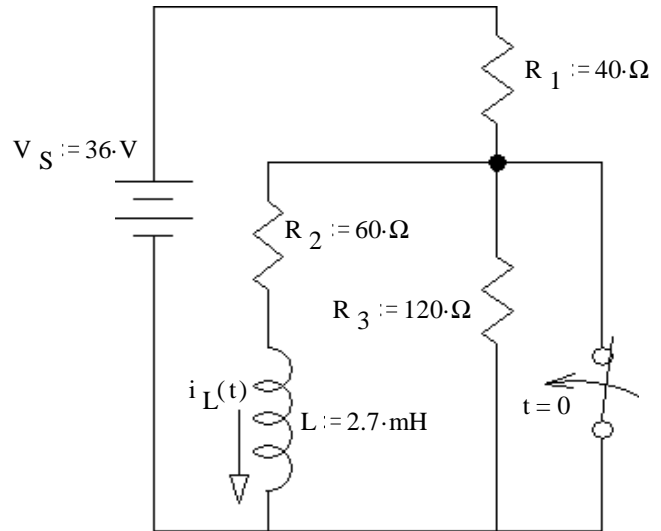
ECE 2210/00 Exam 2 given: Spring 11 (The space between problems has been removed.)

1. (35 pts) The switch has been open for a long time and is closed (as shown) at time $t = 0$.

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

b) Find i_L at time $t = 1.2\tau$. $i_L(1.2\tau) = ?$

c) At time $t = 1.2\tau$ the switch is opened again. Find the complete expression for $i_L(t')$, where t' starts at $t = 1.2\tau$. Be sure to clearly show the time constant.

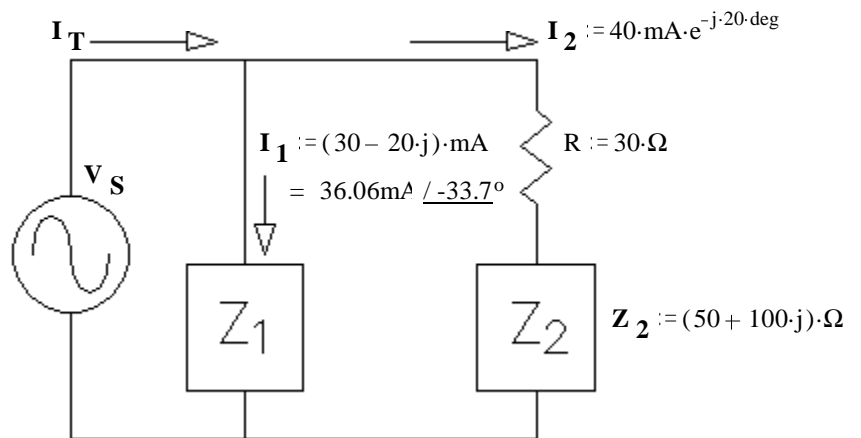


2. (25 pts) For partial credit, you must show work and/or intermediate results.

a) Find V_S in polar form.

b) Find I_T

c) Find Z_1

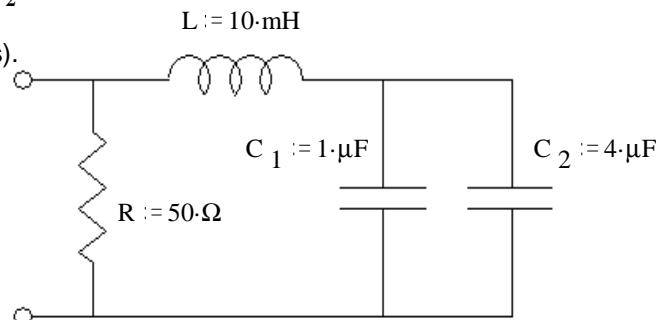


d) Circle 1: i) I_1 lags I_2 ii) I_1 leads I_2

e) By how much? I.E. what is the phase angle between I_1 and I_2 ?

3. (21 pts) Find Z_{eq} in simple polar form (give me numbers & units).

$f := 318.31 \cdot \text{Hz}$



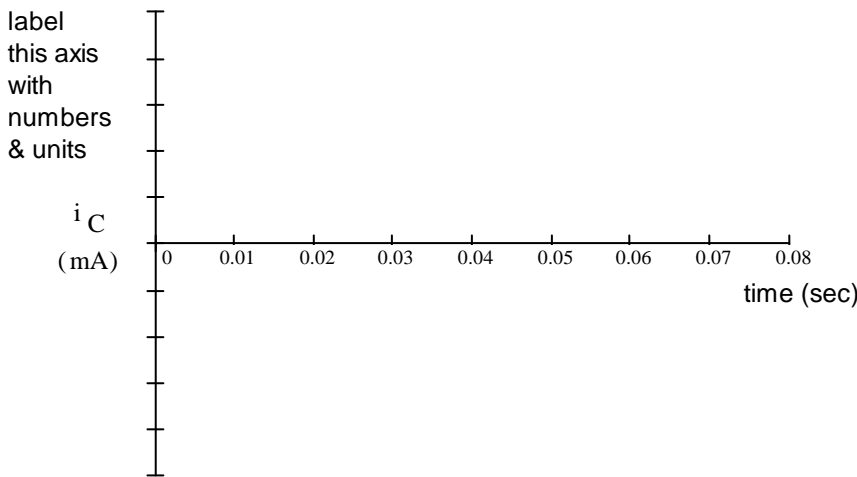
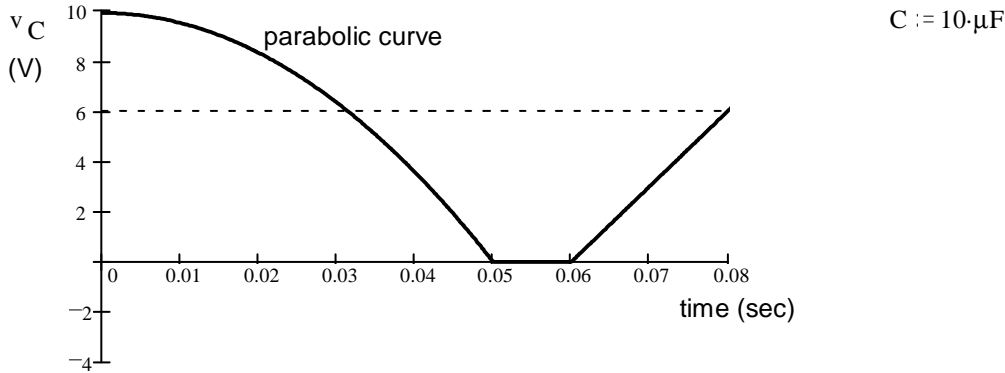
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4. 19 pts) The voltage across a capacitor is shown below. Make an accurate drawing of the capacitor current. Make reasonable assumptions where necessary. Label your graph.

Note: You will be graded on the accuracy of your plot at 0, 0.05, 0.06 and 0.08 sec, 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.

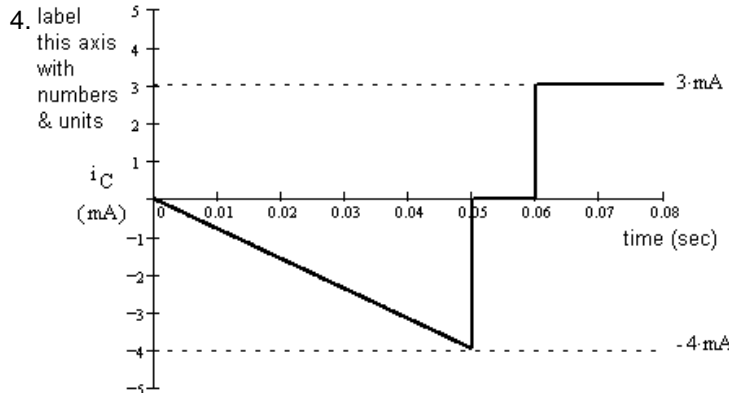
That is: **Start with the interger and/or differential equations for the capacitor!**



Answers

1. a) $300 \cdot \text{mA} \cdot e^{-\frac{t}{45 \cdot \mu\text{s}}}$ b) $90.4 \cdot \text{mA}$ c) $300 \cdot \text{mA} - 209.6 \cdot \text{mA} \cdot e^{-\frac{t}{30 \cdot \mu\text{s}}}$
 2. a) $V_S = 5.122 \text{ V} \angle 31.34^\circ$ b) $I_T = 75.52 \text{ mA} \angle -26.5^\circ$ c) $Z_1 = 142 \Omega \angle 65.0^\circ$ d) i) e) $13.7 \cdot \text{deg}$

3. $42.2 \Omega \angle -32^\circ$



ECE 2210 Exam 2 Arn Stolp

Name _____
 Scores:
 Prob 1 _____ of a possible 35 pts
 Prob 1 _____ of a possible 25 pts
 Prob 1 _____ of a possible 21 pts
 Prob 1 _____ of a possible 19 pts
 Total _____ of a possible 100 pts