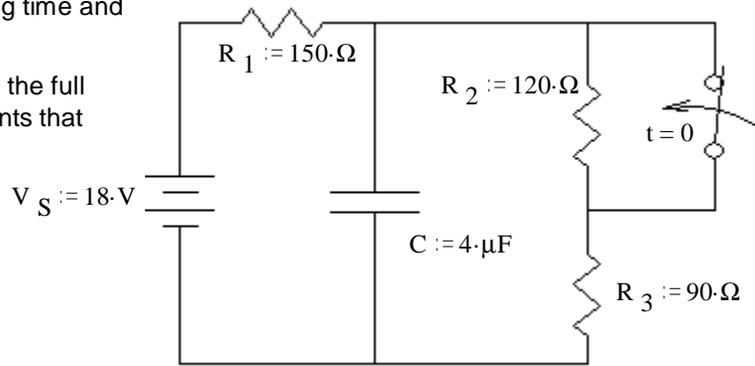


ECE 2210/00 Exam 2 given: Spring 15 (The space between problems has been removed.)

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

a) Find the initial and final conditions and write the full expression for $v_C(t)$, including all the constants that you find.



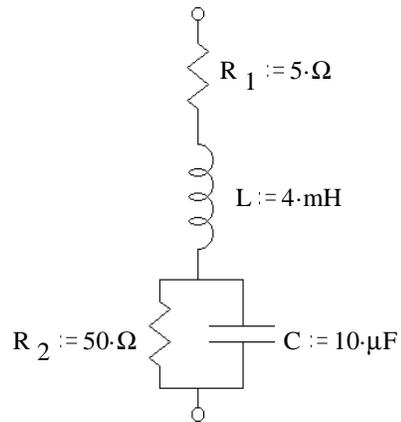
b) What is v_C when $t = 1.2\tau$? $v_C(1.2\tau) = ?$

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

2. (19 pts) Find Z_{eq} in simple polar form (give me numbers).

For partial credit, you must show work and/or intermediate results.

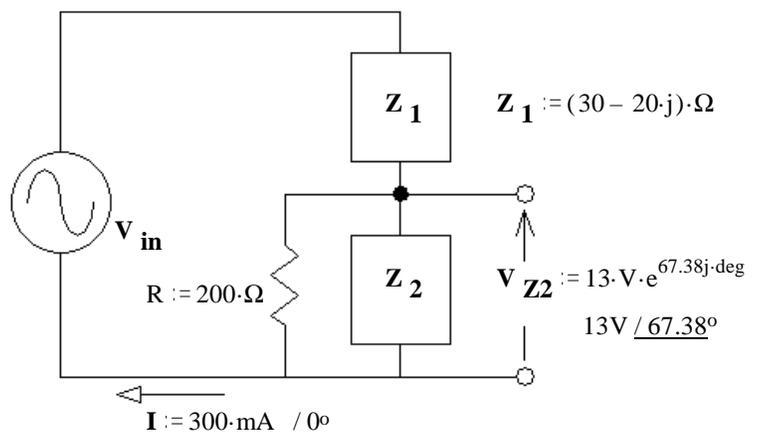
$f := 636.62 \cdot \text{Hz}$



3. (25 pts)

a) Find V_{in} .

b) Find Z_2 in polar form.



c) Circle 1:

- i) The source current leads the source voltage
- ii) The source voltage leads the source current

d) By how much? I.E. what is the phase angle between the voltage and current?

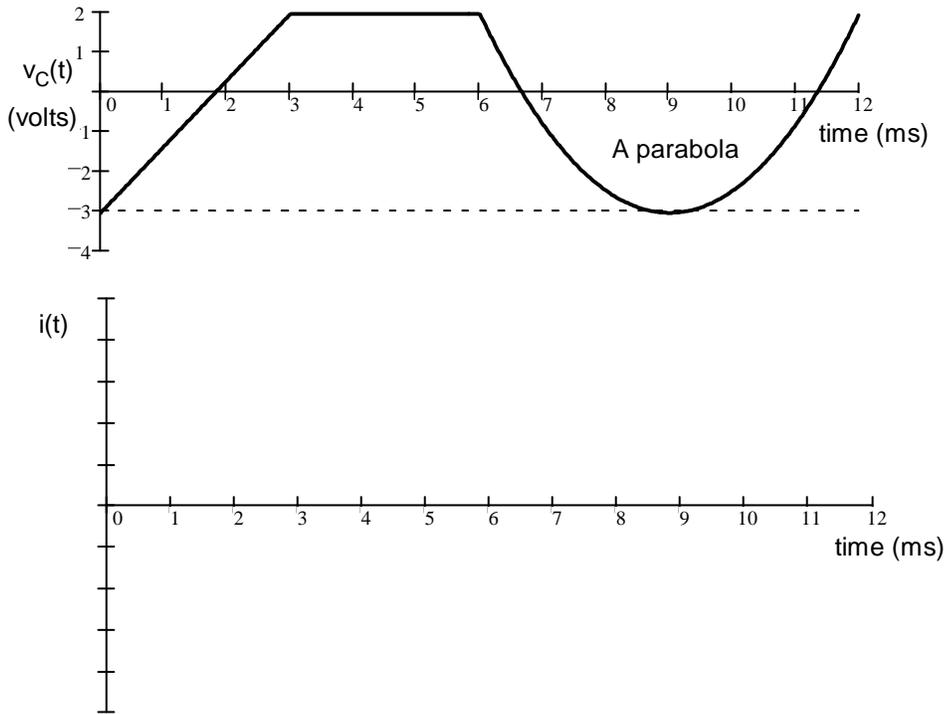
ECE 2210/00 Exam 2 Spring 15 p2

4. (21 pts) The current through a $6\ \mu\text{F}$ 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, 3, 6, 9 and 12ms, 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!** $C := 6\ \mu\text{F}$



Answers

1. a) $6.75\cdot\text{V} + 3.75\cdot\text{V}\cdot e^{-\frac{t}{225\cdot\mu\text{s}}}$
 b) $7.88\cdot\text{V}$ c) $10.5\cdot\text{V} - 2.62\cdot\text{V}\cdot e^{-\frac{t'}{350\cdot\mu\text{s}}}$
2. $15.5\ \Omega / -14.9^\circ$
3. a) $15.2\text{V} / 23.2^\circ$ b) $46.2 / 79.7^\circ\ \Omega$
 c) ii) d) 23.2-deg

