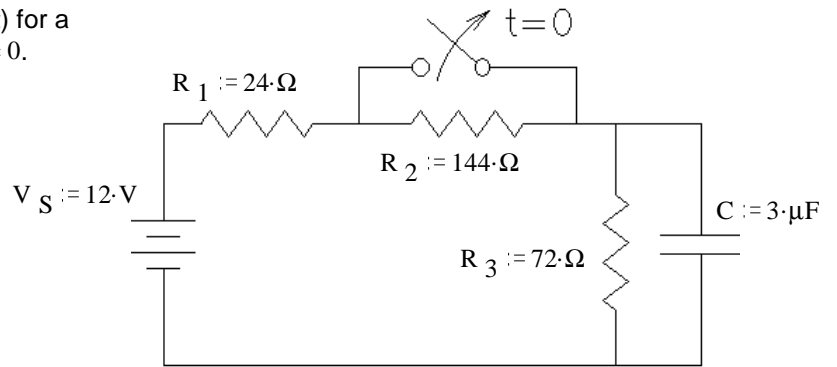


ECE 2210/00 Exam 2 given: Spring 19

(The space between problems has been removed.)

1. (34 pts) The switch has been closed (making contact) for a long time and is switched open (as shown) at time $t = 0$.

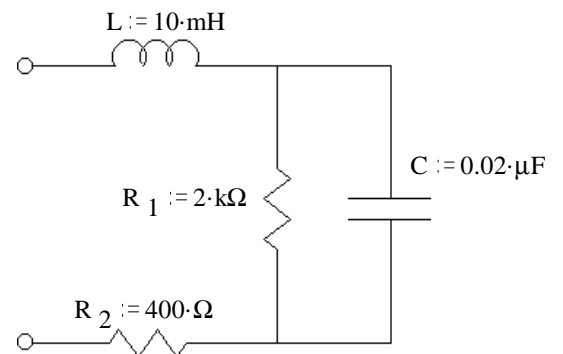
a) Find the complete expression for $v_C(t)$.



b) What is v_C when $t = 1.5\tau$? $v_C(1.5\tau) = ?$

c) At time $t = 1.5\tau$ the switch is closed again. Find the complete expression for $v_C(t')$, where t' starts at $t = 1.5\tau$. Be sure to clearly show the time constant.

2. (20 pts) Find Z_{in} in simple polar form (give me numbers). For partial credit, you must show work and/or intermediate results. $f := 3\text{-kHz}$



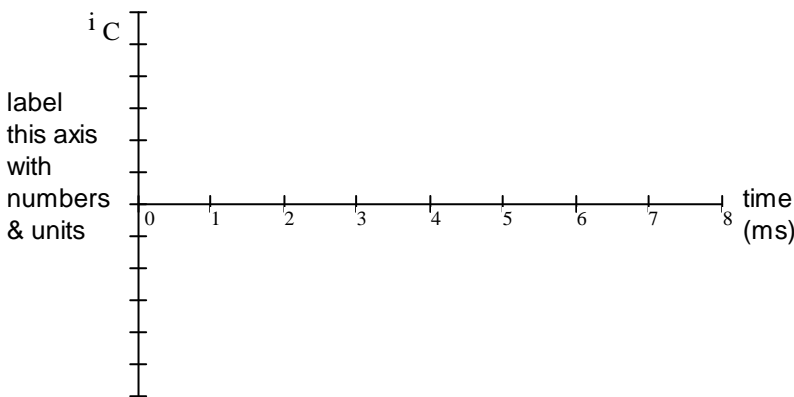
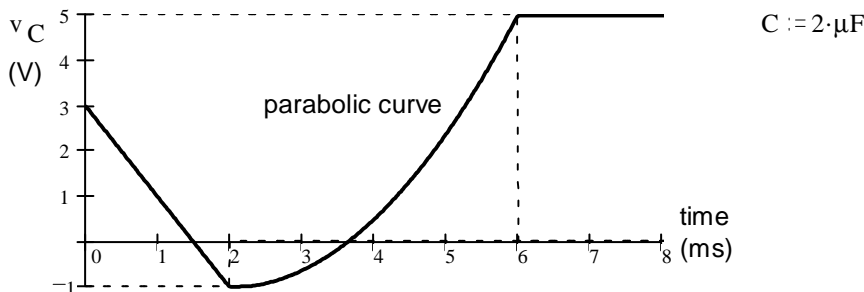
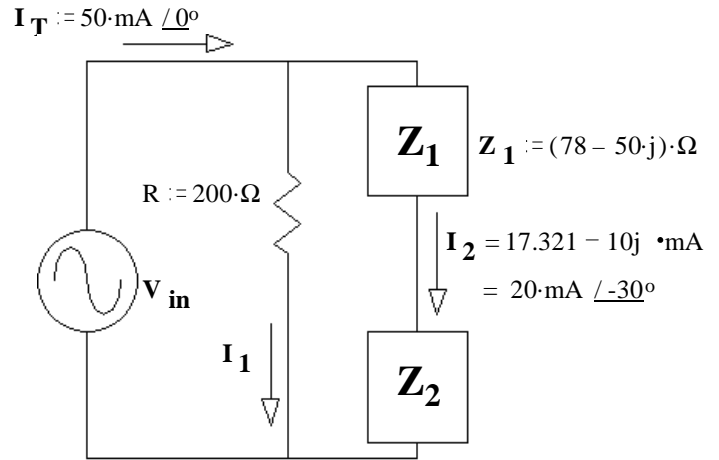
3. (26 pts) a) Find I_1

b) Find V_{in} in polar form.

c) Find Z_2

d) Circle 1: i) The source current leads the source voltage ii) The source voltage leads the source current
 e) By how much? I.E. what is the phase angle between the voltage and current?

4. 20 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, 2, 6 and 8 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!**



Answers

1. a) $3.6 \cdot V + 5.4 \cdot V \cdot e^{-\frac{t}{151 \mu s}}$ b) $4.8 \cdot V$ c) $9 \cdot V - 4.2 \cdot V \cdot e^{-\frac{t}{54 \mu s}}$

2. $1845 \Omega / -24.8^\circ$ 3. a) $34.175 \text{mA} / 17.01^\circ$ b) $6.84 \text{V} / 17.01^\circ$

c) $338 \Omega / +62.7^\circ$ d) ii)

e) $17.01 \cdot \text{deg}$

