

EE1050/60 Exam 2 given: Spring 01 (The space between problems has been removed.)

1. (8 pts) The following questions are similar to what you might see on the FE exam. You should be able to answer each of these in 2 minutes or less.

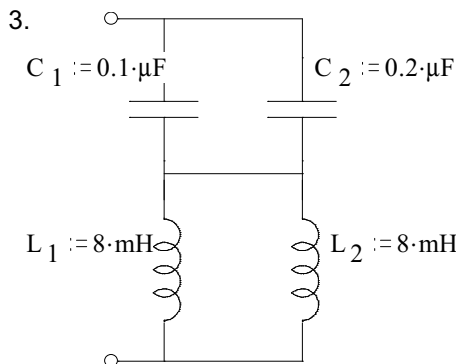
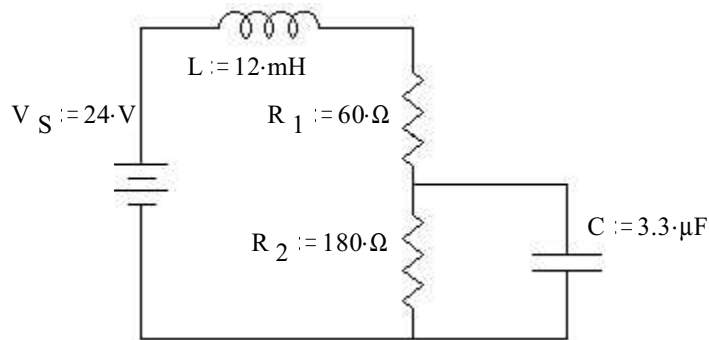
a) A voltage $v = 15 \cos 1500t$ volts is connected in series with a 40-ohm resistor and an RMS ammeter. The ammeter indication will be most nearly:

- (A) 0.27 A
- (B) 0.38 A
- (C) 424 A
- (D) 600 A
- (E) 250 A

b) $(2 + j) \cdot (3 - j4)$ is most nearly:

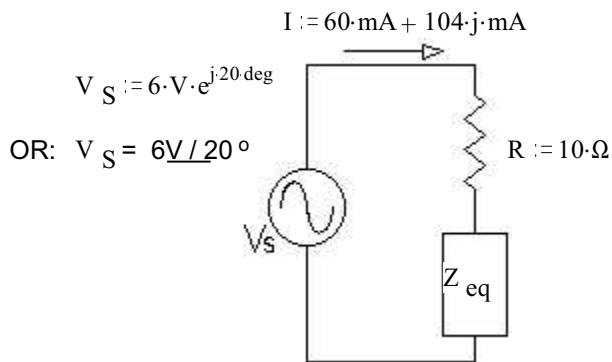
- (A) $7.3 \angle 33.7^\circ$
- (B) $7.3 \angle 74.1^\circ$
- (C) $11.2 \angle -68.2^\circ$
- (D) $11.2 \angle -26.6^\circ$
- (E) $12.2 \angle 34^\circ$

2. (12 pts) Find the stored energy in each capacitor and/or inductor under steady-state conditions.



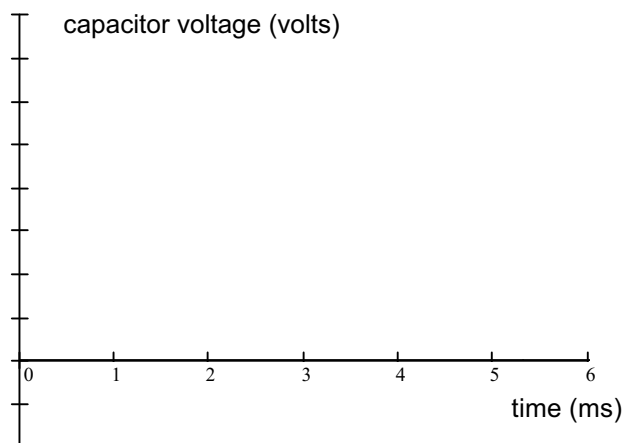
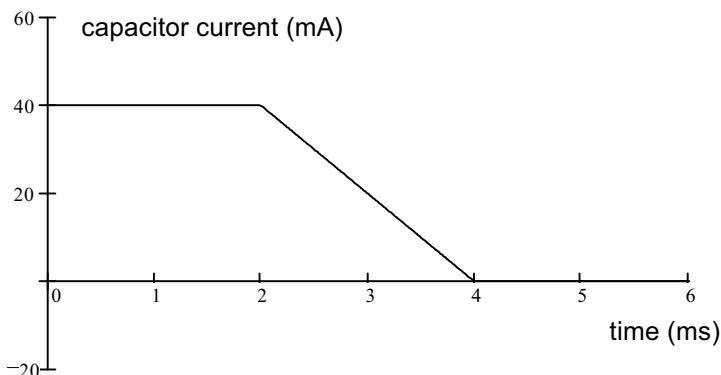
(9 pts) Find the resonant frequency (or frequencies) of the circuit at left (in cycles/sec or Hz).

4. (13 pts) Find Z_{eq} in the circuit at right. Express in simplest polar or rectangular form.



5. (18 pts) The graph below shows the current through a 20 μ F capacitor. Make an accurate drawing of the capacitor voltage. Make reasonable assumptions where necessary. $v_c(0) = 0$. Label your graph (numbers).

Note: You will be graded on the accuracy of your plot at 0, 2, 4, and 6 ms, so calculate those values and plot them carefully. Between those points your plot must simply be the correct shape.

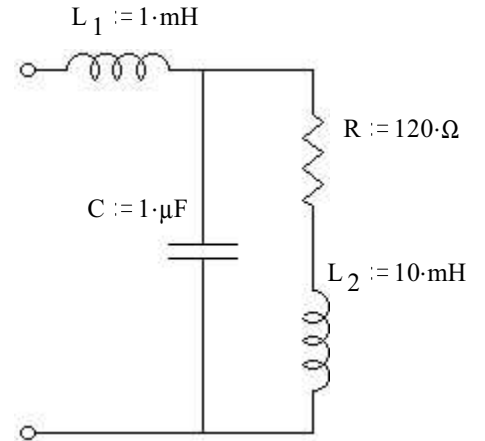


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6. (3 pts) Why are RMS values used? That is, what type of calculations are easier to make with RMS values instead of peak or peak-to-peak? (Note: One or two words will do, as long as they're the right words.)

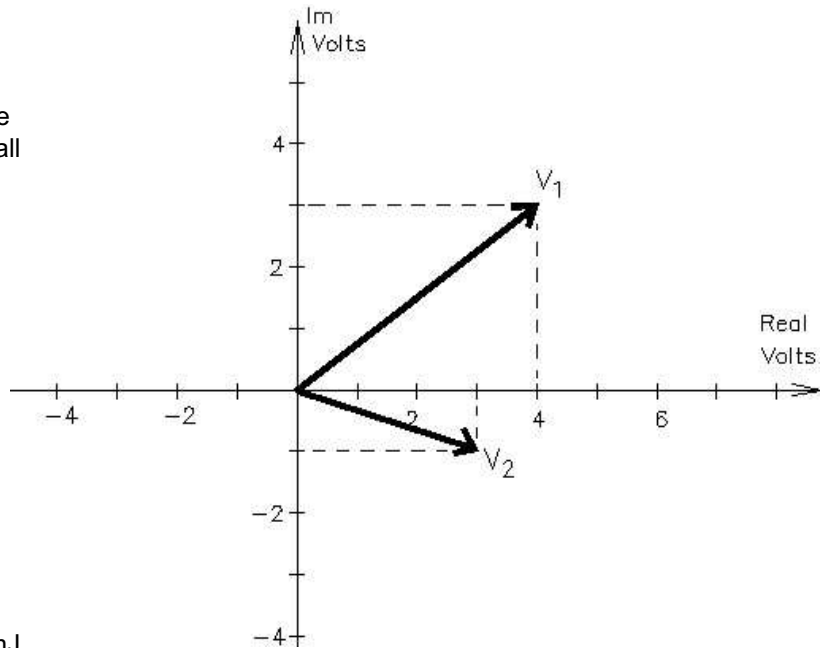
7. (19 pts) Find Z_{eq} , express in standard rectangular form:
For partial credit, you must show work and/or intermediate results.

$Z_{eq} = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}j$ $f := 2.5 \cdot \text{kHz}$



8. (18 pts) The two phasors shown represent two voltages, v_1 and v_2 .
a) Draw the phasor representation for $v_3 = v_1 - v_2$, Notice that's **MINUS**.
b) Find the magnitude of v_3 .
c) Find the phase angle of v_3 .
d) Write an expression for $v_3(t)$ assuming that the magnitudes above are peak values. Include all the numbers that you can.

$\omega := 377 \frac{\text{rad}}{\text{s}}$

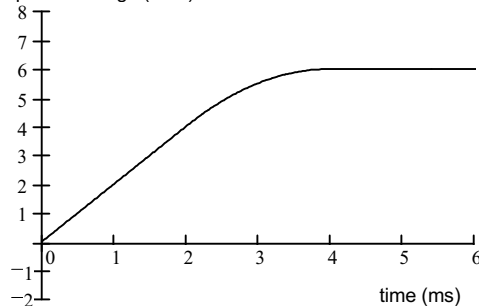


Answers

1. a) A b) D 2. $W_C = 0.535 \text{mJ}$ $W_L = 0.06 \text{mJ}$

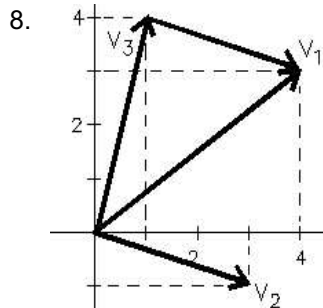
3. 4.59kHz 4. $28.3\Omega - 32.1j\Omega = 42.8\Omega / -48.7^\circ$

5. capacitor voltage (volts)



6. power calculations

7. $21.03\Omega - 64.32j\Omega$



b) 4.12V c) 76°

d) $v_3(t) = 4.12 \cdot V \cdot \cos(377 \cdot t + 76 \cdot \text{deg})$