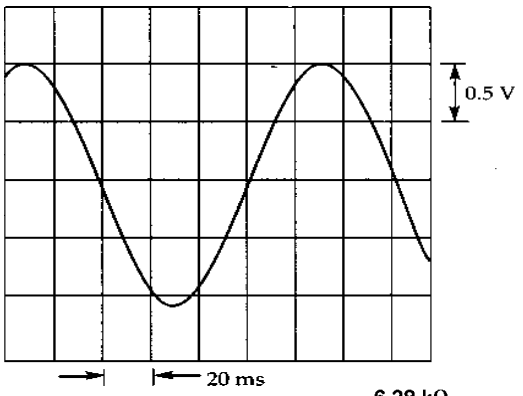
EE1050/60 Exam 2 given: Fall 00

(The space between problems has been removed.)

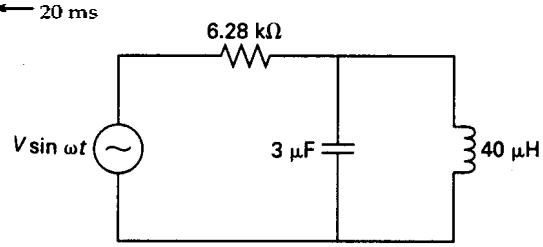
1. (20 pts) The following questions are similar to what you might see on the FE exam. You should be able to answer each of these in 2 minutes or less.

a) The following sinusoid is displayed on an oscilloscope. The RMS voltage and radian frequency are most nearly



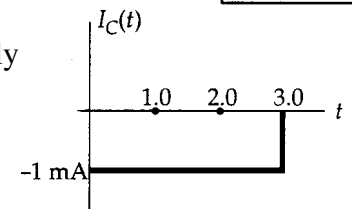
A) 1, 8.33
B) 0.7071, 53.36
C) 1.4142, 52.36
D) 2, 8.33

b) What is the resonant frequency of the circuit shown?



A) 15 kHz
B) 29 kHz
C) 46 kHz
D) 91 kHz

c) A 100 μF capacitor has $I_C(t)$. The capacitor voltage $V_C(t)$ at t = 2.5 seconds (V(0) = 1.0 V) is most nearly

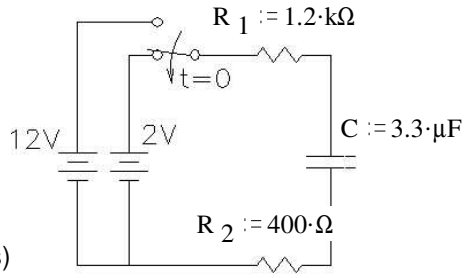


A) -24
B) -25
C) 25
D) 26

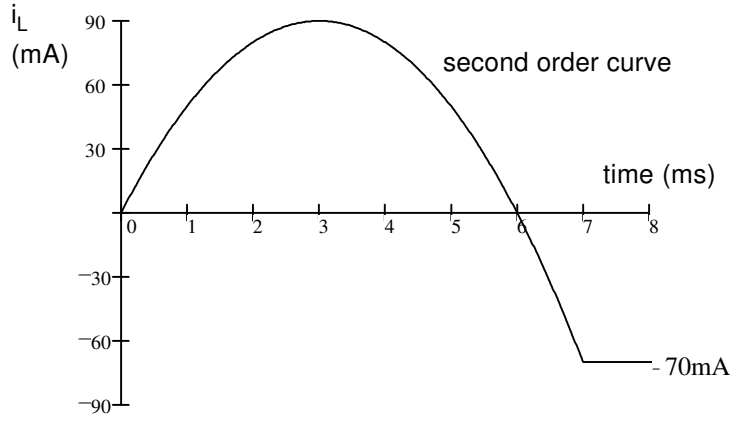
d) A 10-microfarad capacitor has been charged to a potential of 150 volts. A resistor of 25 Ω is then connected across the capacitor through a switch. When the switch has been closed for 10 time constants the total energy dissipated by the resistor is most nearly

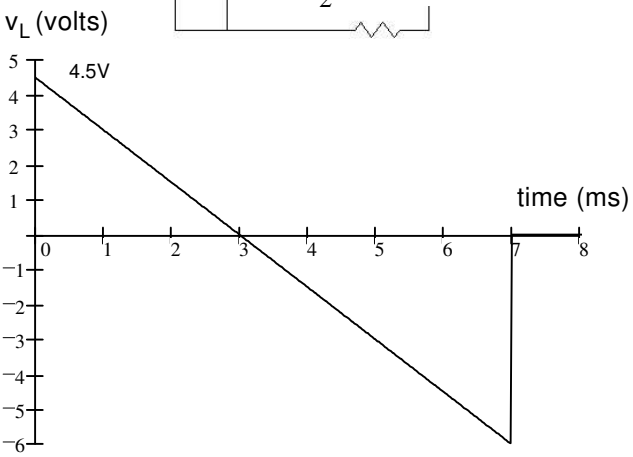
A) 1.0×10^{-7} joules
B) 1.1×10^{-1} joules
C) 9.0×10^{1} joules
D) 9.0×10^{3} joules

2. (16 pts) The switch has been in the upper position for a long time and is switched down at time t = 0.
At what time is v_C = 4 V?



3. (13 pts) The graphs below show the current and voltage of an inductor. What is the value of the inductor?





WARNING: pass over this problem if you don't immediately know what to do. It isn't worth that many points.

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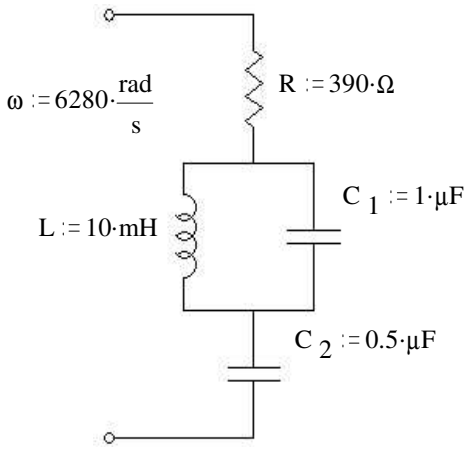
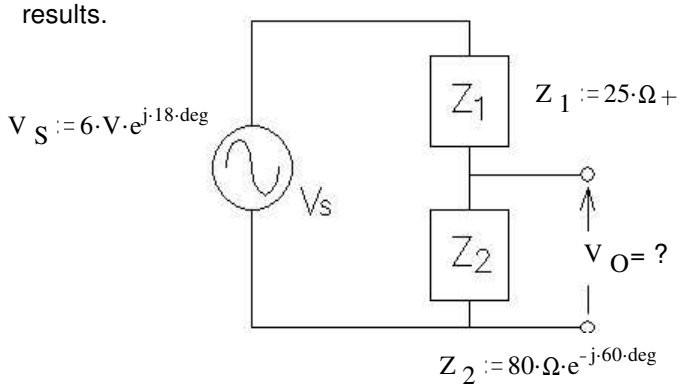
4 (3 pts) Why are RMS values used? That is, what type of calculations are easier to make with RMS values instead of peak or peak-to peak? (Note: One or two words will do, as long as they' re the right words.)

5. (12 pts) Find Zeq, express in standard rectangular form:
For partial credit, you must show work and/or intermediate results.

Z_{eq} = _____ + _____ j

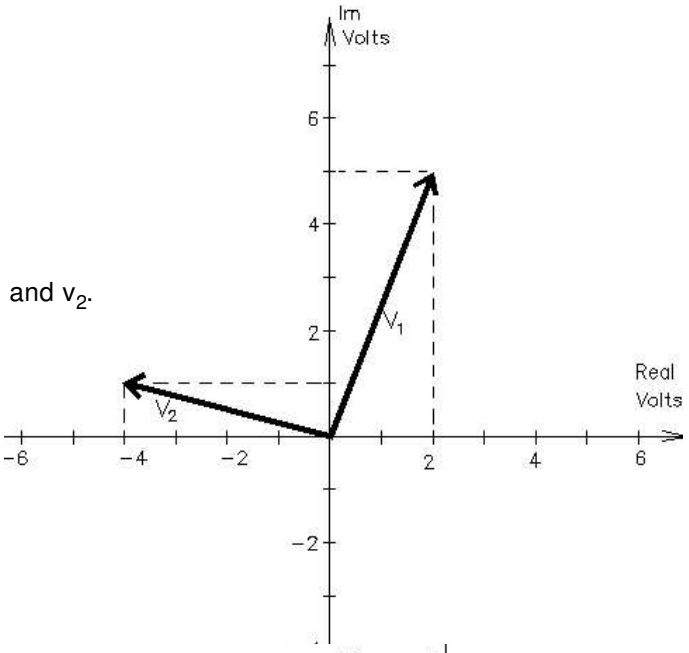


6. (20 pts) Find V_O in the circuit below. Express it as a magnitude and phase angle (the way V_S is expressed).
For partial credit, you must show work and/or intermediate results.



7. (18 pts) The two phasors shown represent two voltages, v_1 and v_2.
   a) Draw the phasor representation for $v_3 = v_1 + v_2$
   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.

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



Answers

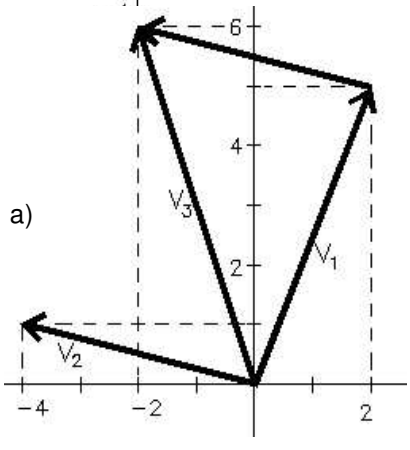
1. a) B b) A c) A d) B 2. 8.5 ms 3. 75mH

4. power calculations 5. 390Ω - 215jΩ

6. 6.53V /-14.2º 7. b) 6.32V c) 108º

d) $v_3(t) = 6.32 \cdot V \cdot \cos(377 \cdot t + 108.4 \cdot deg)$

7. a)



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