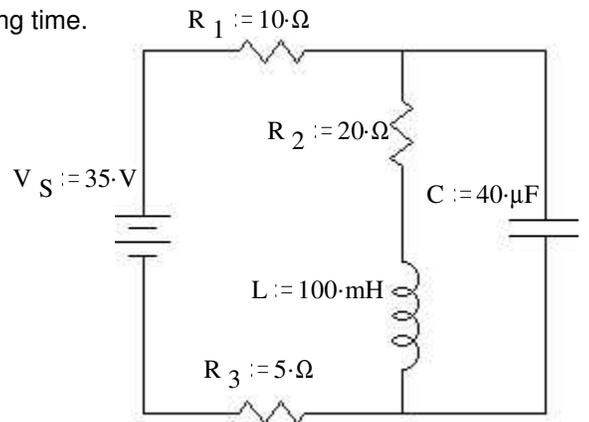


EE1050/60 Exam 2 given: Spring 02 (The space between problems has been removed.)

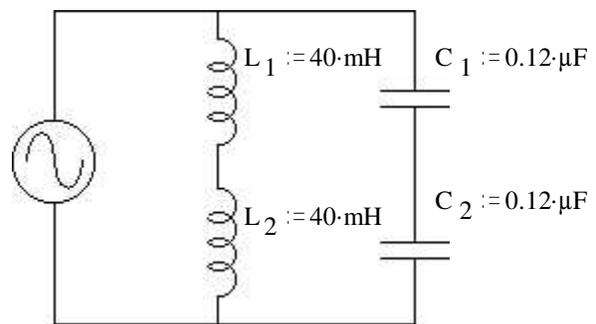
1. (12 pts) The following circuit has been connected as shown for a long time.

Find the energy stored in the capacitor and the inductor.

Also show the values of the voltage(s) and current(s) necessary to answer this question.



2. (9 pts) Find the resonant frequency (or frequencies) of the circuit shown (in cycles/sec or Hz).



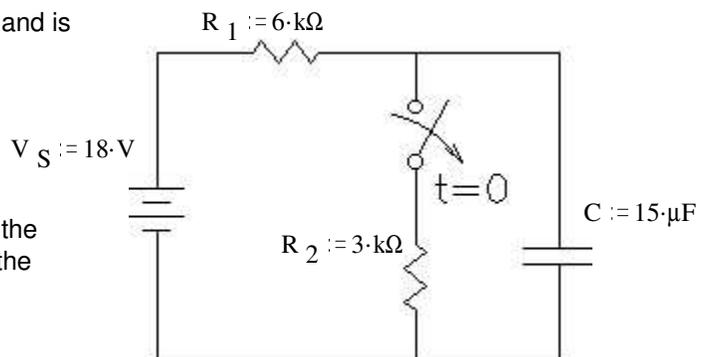
Problem 3 is shown on the next page

4. (26 pts) The switch has been closed for a long time and is opened (as shown) at time $t = 0$.

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

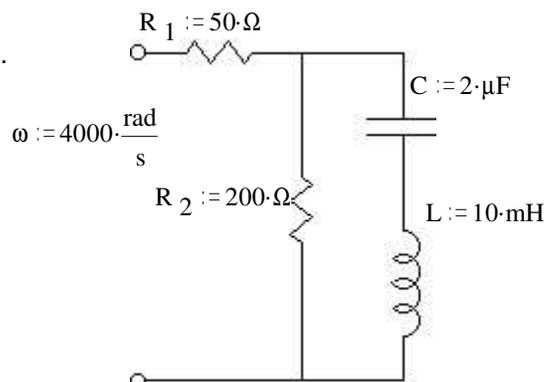
b) What is $v_C(90\text{ms}) = ?$

c) At time $t = 90\text{ms}$ the switch is closed again. Find the complete expression for $v_C(t')$, where t' starts when the switch closes. Be sure to clearly show the time constant.



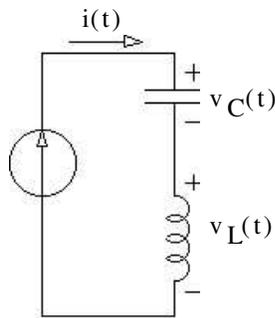
5. (13 pts) Find Z_{eq} , express in standard rectangular form: For partial credit, you must show work and/or intermediate results.

$$Z_{eq} = \text{_____} \Omega + \text{_____} j\Omega$$

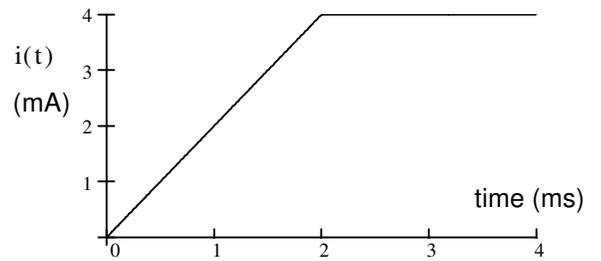


EE1050/60 Exam 2 given: Spring 02 p.2

3. (14 pts) The current $i(t)$ flows through a capacitor and an inductor.



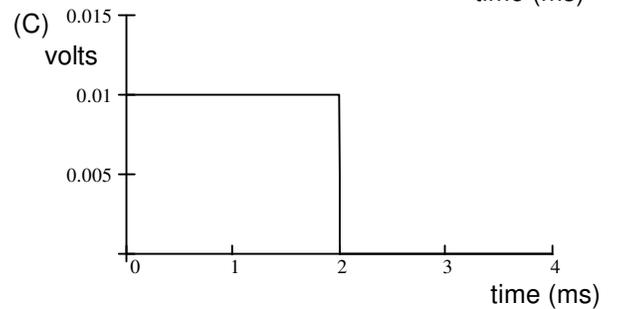
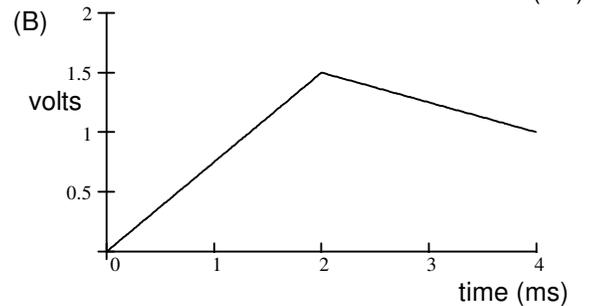
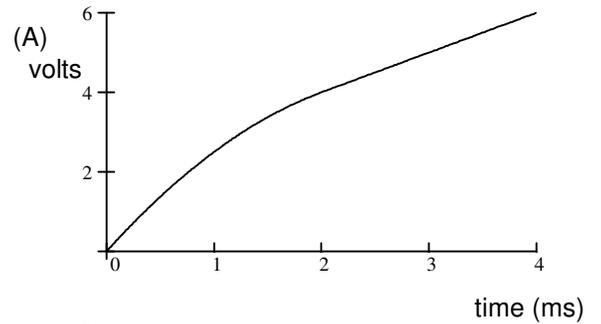
The top graph shown at right is $i(t)$. Select from the other 5 graphs, labeled (A) through (E), to answer the questions a) and c) below.



a) Which (if any) of the voltages shown could possibly be the inductor voltage ($v_L(t)$)?

circle one: A B C D E none

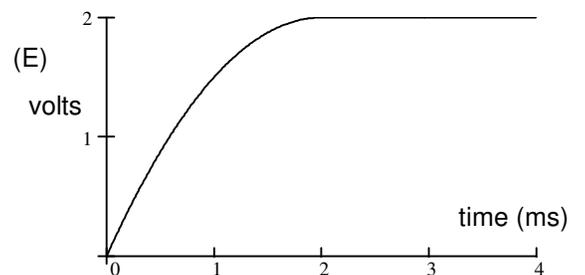
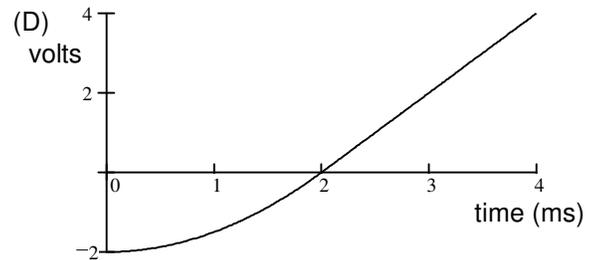
b) Using your answer to a), find the value of L.



c) Which (if any) of the voltages shown could possibly be the capacitor voltage ($v_C(t)$)?

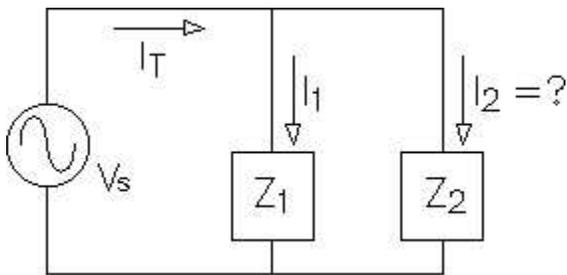
circle one: A B C D E none

d) Using your answer to c), find the value of C.



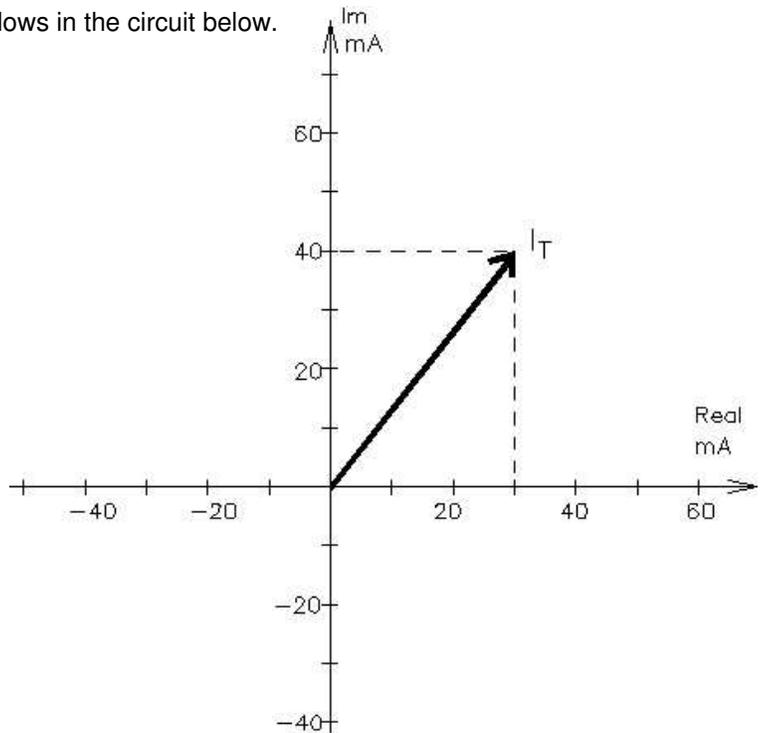
EE1050/60 Exam 2 given: Spring 02 p.3

6. (14 pts) The current shown in the phasor diagram flows in the circuit below.

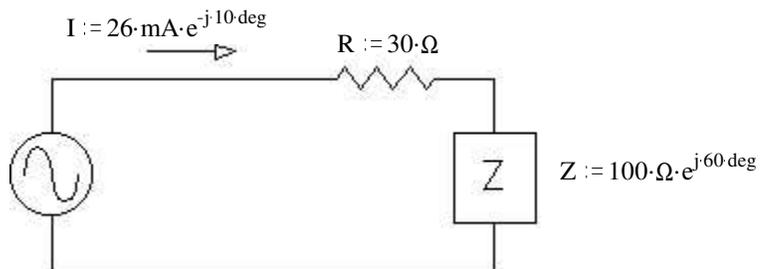


$$i_1(t) = 28.28 \cdot \text{mA} \cdot \cos(\omega t - 45^\circ)$$

- Show I_1 on the phasor diagram.
- Find and show I_2 on the phasor diagram.
- Express $i_2(t)$ as a function of time.



7. (12 pts) Find V_S and express it in a polar form.



Answers

1. cap: 20V, 8mJ ind: 1A, 50mJ

2. 2297Hz

3 a) C b) 5mH c) D d) 2μF

4. a) $18 \cdot V - 12 \cdot V \cdot e^{\frac{t}{90 \text{ms}}}$ b) 13.6V

c) $6 \cdot V + 7.6 \cdot V \cdot e^{\frac{t}{30 \text{ms}}}$

5. $80.6\Omega + 72j\Omega$

6 a) & b) shown at right

c) $i_2(t) = 60.83 \cdot \text{mA} \cdot \cos(\omega t + 80.54^\circ)$

7. 3.07V /37.3°

6. a) & b)

