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SPRING TERM 2010-11

Name:.....

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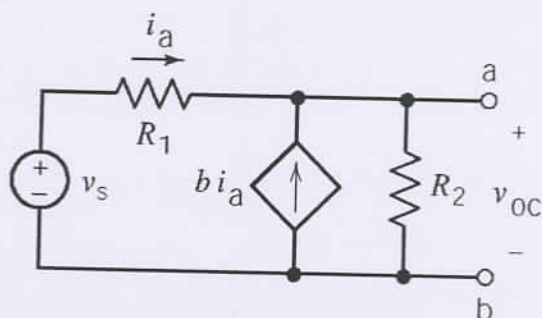
TEST ID: 1000

**(EECE210) ELECTRIC CIRCUITS**

**CLOSED BOOK (1 ½ HRS)**

- Programmable Calculators are not allowed
- Provide your answers on the computer's card only
- Return the computer's card attached to the question sheet
- Mark with a pencil your last name, first name initial (FI) and father's name initial (MI).
- Mark your AUB ID NO. in the box titled "Social Security No."
- The test ID No. is your exam version. Mark it in the box titled ' Test ID'.
- Use pencil for marking your answers
- When using eraser, be sure that you have erased well

1. Find  $V_{Th}$  with respect to the terminals a-b in the circuit shown below when  $v_s = 15\text{ V}$ ,  $R_1 = R_2 = 150\ \Omega$ , and  $b = 1$ .

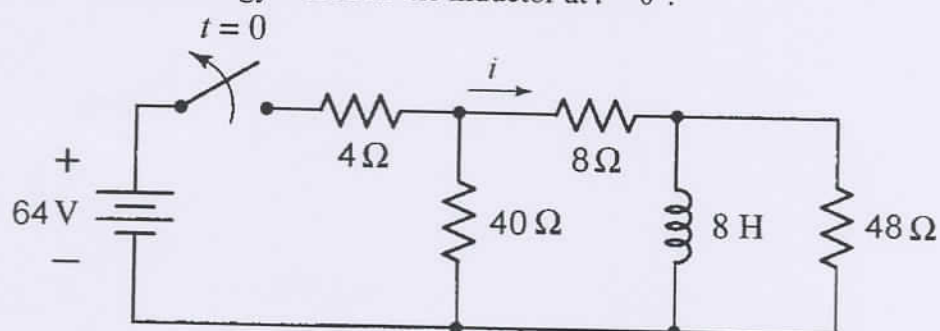


- a) 10 V
- b) 8 V
- c) 12 V
- d) 14 V
- e) None of the above

2. Find  $R_{Th}$  with respect to the terminals a-b for the circuit in problem 1.

- a) 10  $\Omega$
- b) 30  $\Omega$
- c) 50  $\Omega$
- d) 70  $\Omega$
- e) None of the above

3. The switch in the circuit shown below has been closed for a very long time before it opens at  $t = 0$ . Find the energy stored in the inductor at  $t = 0^+$ .

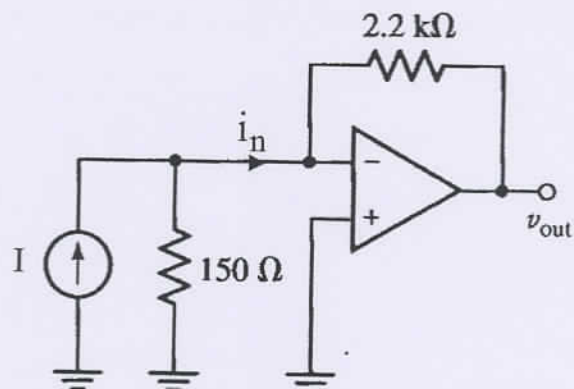


- a) 900 J
- b) 400 J
- c) 200 J
- d) 100 J
- e) None of the above

4. In the circuit of problem 3, Find  $i(t)$  at  $t = 0.333$  s.

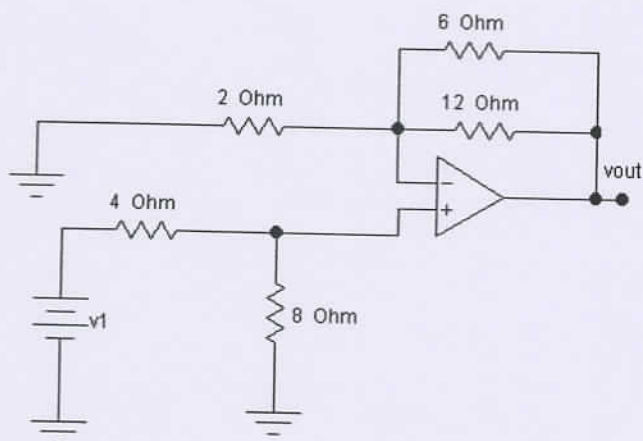
- a) 3.68 A
- b) 0.92 A
- c) 1.84 A
- d) 2.76 A
- e) 5.52 A

5. Consider the figure shown below, determine the output voltage when  $I = 1$  mA



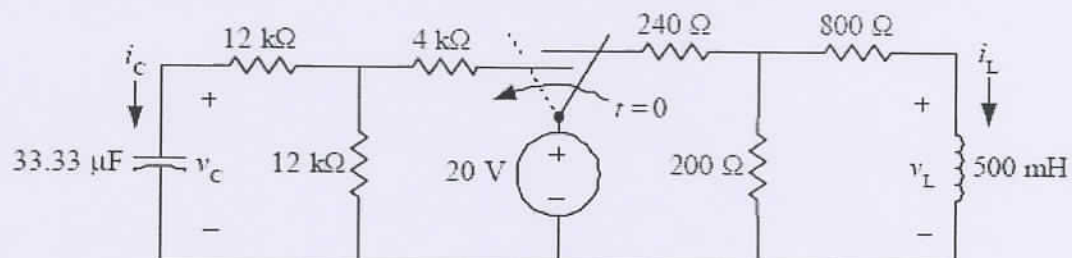
- a) - 2.2 volts
- b) - 4.4 volts
- c) - 6.6 volts
- d) - 8.8 volts
- e) None of the above

6. Consider the Figure shown below, determine the output voltage given that  $v_1 = 1$  volts.



- a)  $v_{\text{out}} = 8$  volts
- b)  $v_{\text{out}} = 6$  volts
- c)  $v_{\text{out}} = 4$  volts
- d)  $v_{\text{out}} = 2$  volts
- e) None of the above

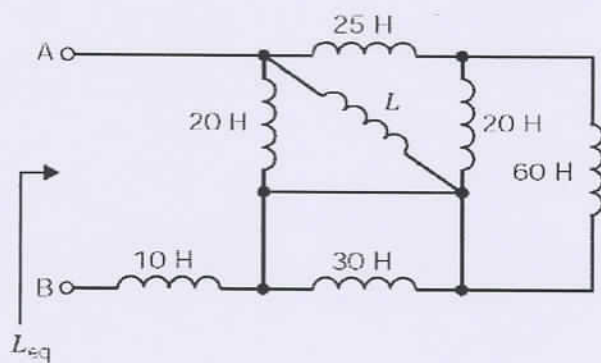
7. For the circuit shown below, the switch has been in its position for a long period of time.



What is the value of the current in the inductor  $i_L$  at  $t = 0^-$ ?

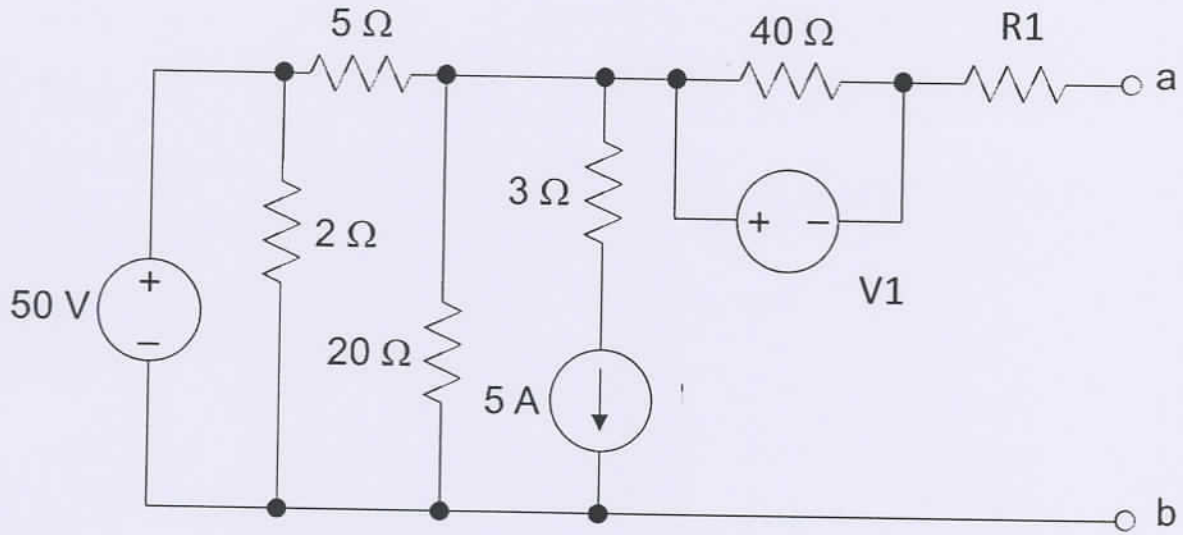
- a) 0 mA
- b) 1 mA
- c) 10 mA
- d) 50 mA
- e) None of the above

8. The figure shown below is equivalent to a single inductor having an equivalent inductance of 15 Henries. Determine  $L$



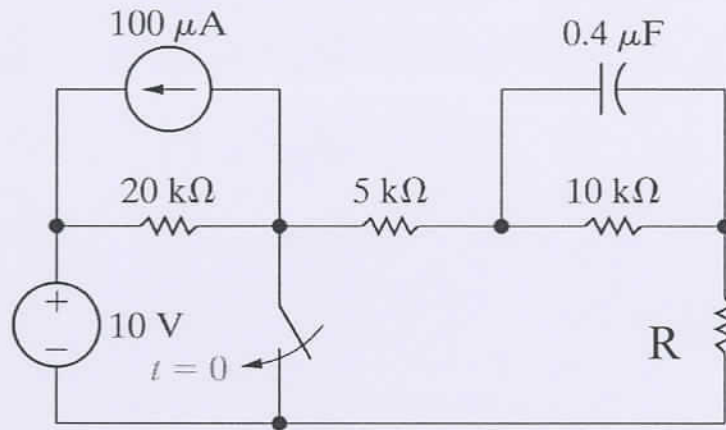
- a)  $L = 8\text{H}$
- b)  $L = 20\text{H}$
- c)  $L = 40\text{H}$
- d)  $L = 120\text{H}$
- e) None of the above

9. Find the Thevenin equivalent voltage seen between terminals ab if  $V_1 = 3\text{V}$  and  $R_1 = 10\Omega$ .



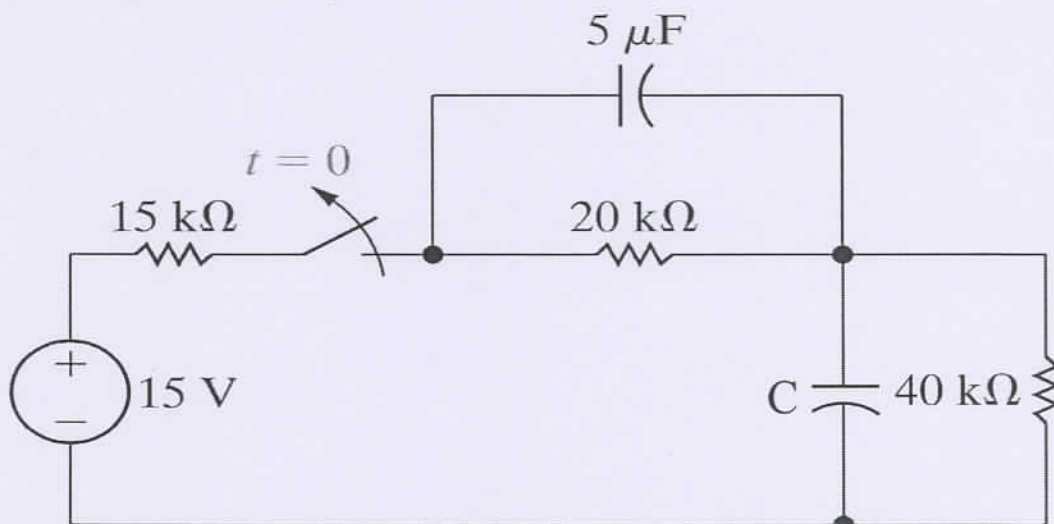
- a) 50V
- b) 13V
- c) 17V
- d) 15V
- e) None of the above

10) The switch was open for a long time before it closes at  $t=0$ . Find the voltage across the capacitor after  $t = 1\tau$  (one time constant after closing the switch) given that  $R = 10\text{ k}\Omega$ .



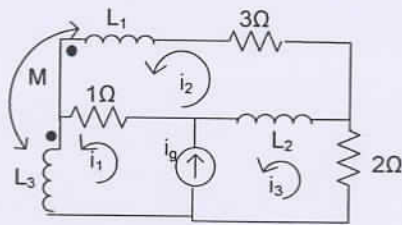
- a) 0.37 V
- b) 0.65 V
- c) 0.29 V
- d) 1V
- e) None of the above

11) The switch was closed for a long time. It opens at  $t=0$ . Find the total energy stored in the capacitors at  $t=0$ , given that  $C = 1\mu\text{F}$ .



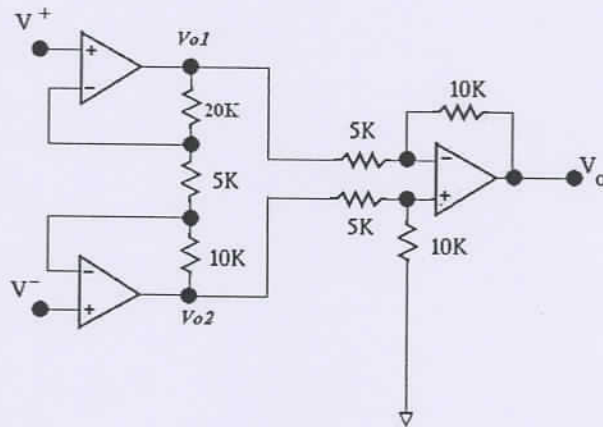
- a) 136  $\mu\text{J}$
- b) 104  $\mu\text{J}$
- c) 100  $\mu\text{J}$
- d) 72  $\mu\text{J}$
- e) None of the above

12. Assume in the following circuit  $L_1=3\text{ H}$ ,  $L_2=2\text{ H}$ ,  $L_3=26\text{H}$ , and  $M=5\text{H}$ . Find the mesh equation around  $i_2$ .



- a)  $4 \frac{di_1}{dt} + 7 \frac{di_2}{dt} - 6 \frac{di_3}{dt} - i_1 + 4i_2 = 0$
- b)  $2 \frac{di_1}{dt} + 5 \frac{di_2}{dt} - 7 \frac{di_3}{dt} - i_1 + 4i_2 = 0$
- c)  $\frac{di_1}{dt} + 2 \frac{di_2}{dt} - 6 \frac{di_3}{dt} - i_1 + 4i_2 = 0$
- d)  $3 \frac{di_1}{dt} + 7 \frac{di_2}{dt} - 8 \frac{di_3}{dt} - i_1 + 4i_2 = 0$
- e) None of the above

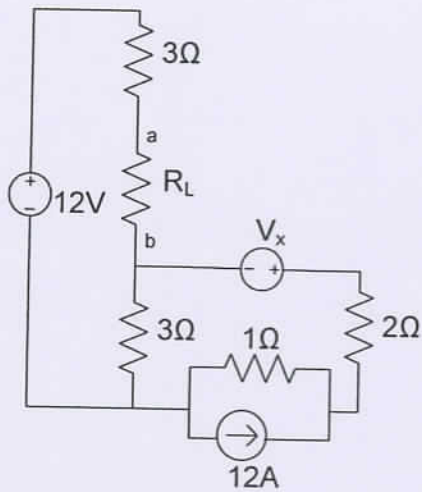
13. In the circuit shown below, find the output voltage  $V_o$  if  $V^+=2\text{V}$   $V^-=1\text{V}$  assuming that all operational amplifiers are ideal and operating in their linear region.



- a) 14V
- b) -14V
- c) -28V
- d) 28V
- e) None of the above



14. In the circuit shown below, calculate the maximum power that can be dissipated by  $R_L$  if  $V_x=6V$ .



- a) 4.5W
- b) 18W
- c) 24.5W
- d) 12W
- e) None of the above