

Name: _____

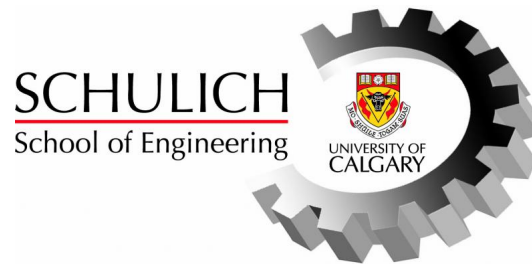
Lecture Section: _____

L01 - *Anis Haque*

L02 - *Anders Nygren*

L03 - *Norm Bartley*

L04 - *Michel Fattouche*



ENGG 225 - Fundamentals of Electrical Circuits and Machines

Midterm Examination

Thursday, March 1, 2012

Time: 7:00 - 8:30 PM

Instructions:

- Time allowed is 90 minutes.
 - The examination is closed-book.
 - Only calculators sanctioned by the Schulich School of Engineering are permitted in the examination.
 - The maximum number of marks is 50, as indicated; please attempt all questions. The midterm examination counts 25% toward the final grade.
 - Please use a pen or heavy pencil to ensure legibility.
 - Please answer questions in the spaces provided; if space is insufficient, please use the back of the pages.
 - Please show your work; where appropriate, marks will be awarded for proper and well-reasoned explanations.
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1. Consider the circuit in Fig. 1.

(a) Determine the mesh currents i_1 , i_2 , i_3 . (Note: if you are unable to obtain answers for these, you may assume any non-zero values for part (b).)

[6 marks.]

(b) Using your answers to part (a), determine the power in each of the sources. State whether power is absorbed or supplied.

[5 marks.]

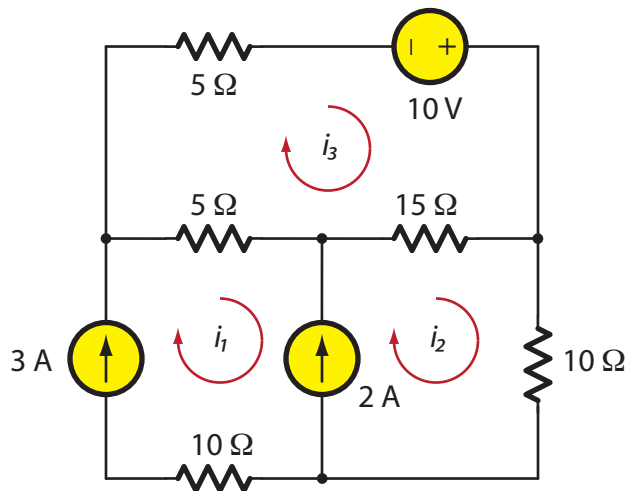


Fig. 1. Find mesh currents; power in the sources.

[11 marks total.]

(Question 1, additional workspace ...)

2. Consider the circuit in Fig. 2.

- (a) Use the node-voltage method to find the node voltages v_1, v_2, v_3, v_4 . (Note: as before, if you are unable to obtain answers for these, you may assume any non-zero values for part (b).) [9 marks.]
- (b) Based on your answers to part (a), use any method you wish to determine v_5 . [3 marks.]

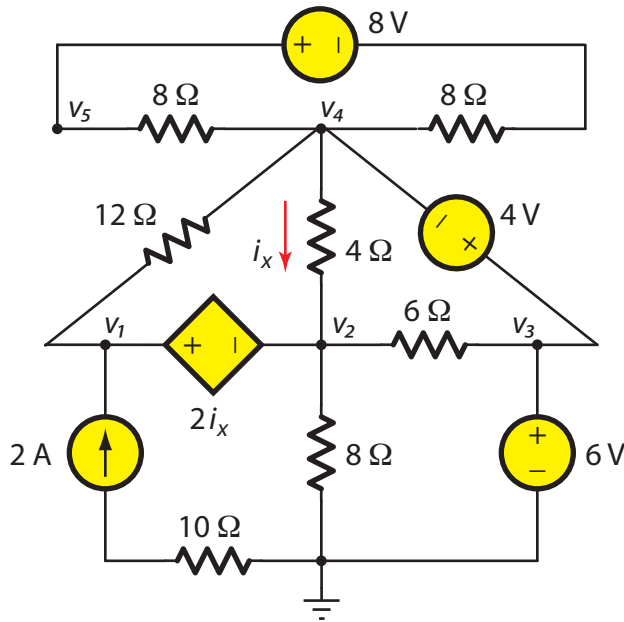


Fig. 2. Determine the node voltages.

[12 marks total.]

(Question 2, additional workspace ...)

3. Consider the circuit shown in Fig. 3.

- (a) Determine the Thévenin equivalent circuit to the left of the terminals **x** and **y**. [13 marks.]
- (b) Predict v_{xy} when a resistor R and current source i are placed between the terminals **x** and **y** as shown, where $R = 0.4 \Omega$ and $i = 50 \text{ A}$. [3 marks.]

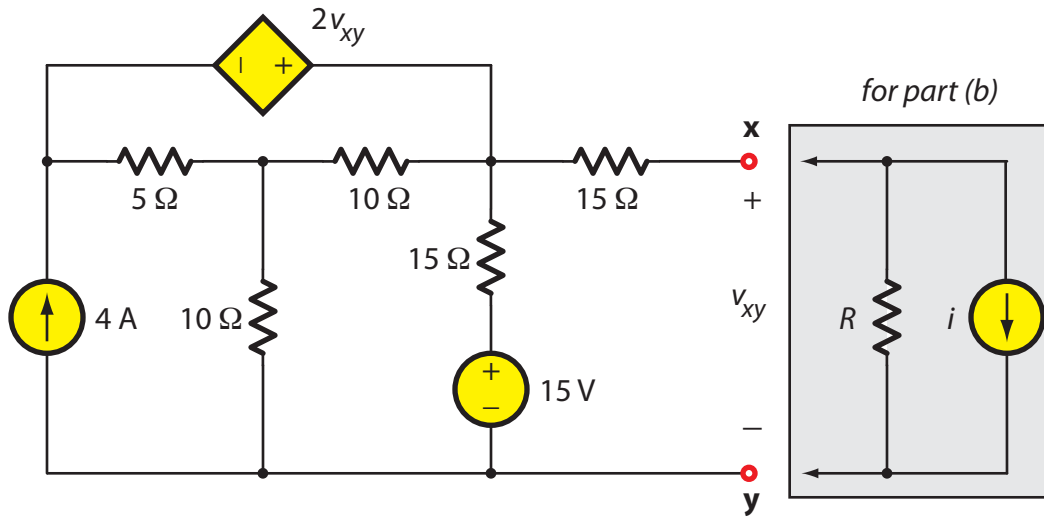


Fig. 3. Find the Thévenin equivalent circuit; find v_{xy} for $R = 0.4 \Omega$, $i = 50 \text{ A}$.

[16 marks total.]

(Question 3, additional workspace ...)

4. For the circuit given in Fig. 4, find v_x using the principle of superposition.

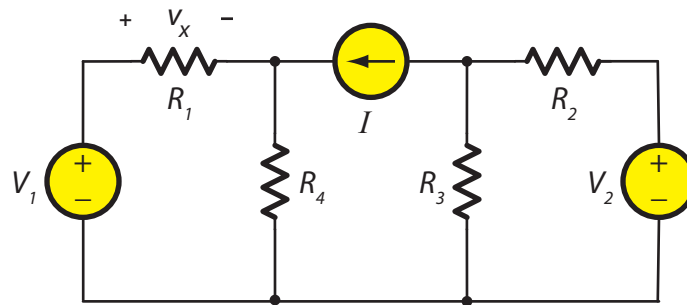


Fig. 4. Find v_x by superposition.

[11 marks.]

(Question 4, additional workspace ...)

(Please do not write in this space.)

#1 (11)	#2 (12)	#3 (16)	#4 (11)	Total (50)