UNIVERSITY OF MANITOBA

DEPARTMENT:	Electrical & Computer Engineering	DATE & TIME:	1st November 2010 at 1800
PAPER NO.:	—	PAGE NO.:	1 of 5
COURSE:	ENG 1450–Intro. Elect. & Comp. Eng.	EXAMINATION:	Mid-term (20%)
DURATION:	1 Hour	EXAMINERS:	C. Shafai/B. Kordi

INSTRUCTIONS:

- Do not remove the staple.
- Closed-book exam. No books/notes allowed.
- Calculators are NOT allowed.
- Return both this booklet and the bubble sheet at the end of the examination.
- This is a multiple choice examination and consists of 15 questions.
- Mark your answer in pencil on the bubble sheet provided.
- No marks will be given for working on this booklet.
- Each correct answer has one mark and each wrong answer has zero marks.
- No negative marks for wrong answer.

STUDENT NUMBER

PRINT YOUR NAME IN FULL ON THIS LINE

SIGNATURE

A01 (Prof. Shafai) A02 (Prof. Kordi)

CIRCLE YOUR SECTION

E2-105 E2-110 E3-270

CIRCLE YOUR EXAMINATION ROOM

(n/a)

SEAT NUMBER

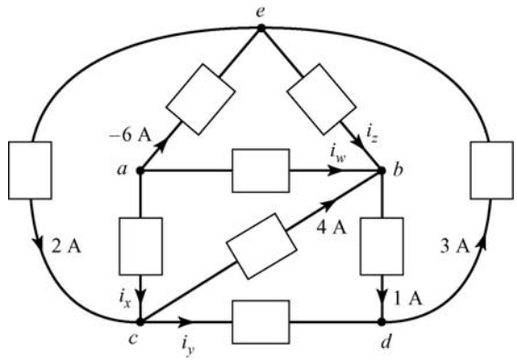
Mark	
Out of	15

1 A 10-V battery has been supplying power to a flashing light for 10 hours. The flashing light is on for 1 second and is off for 2 seconds, in a repeating cycle. If the resistance of the light (when it is on) is 10 Ω, then how much energy has been supplied by the battery for every 30-minute period of time?

A) 3,000 J.
B) 6,000 J.
C) 12,000 J.
D) 36,000 J.
E) 120,000 J.

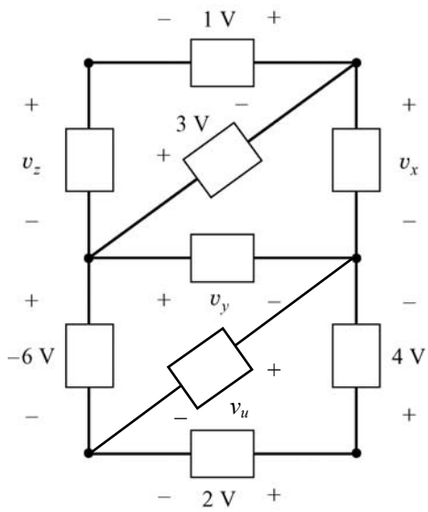
2 In the circuit shown below, what is $\frac{i_x}{i_w}$?

A) 2.
B) 1.
C) 0.
D) -1.
E) -2.



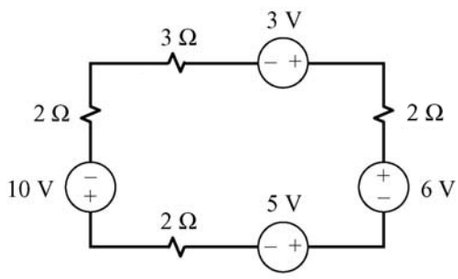
3 What is $v_u + v_y$ in the circuit shown below?

A) 2 V.
B) 4 V.
C) 6 V.
D) -6 V.
E) None of the above.



4 How much power is delivered/absorbed by the 3-V voltage source?

A) 6 W, delivered.
B) 6 W, absorbed.
C) 18 W, delivered.
D) 18 W, absorbed.
E) -6 W, absorbed.



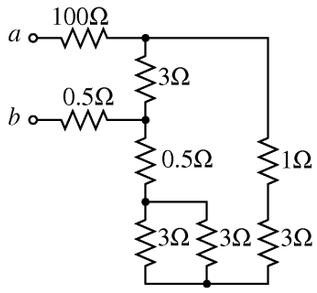
5 How much is the total power absorbed by all resistors in the circuit of Problem 4?

A) 0 W.
B) 18 W.
C) 36 W.
D) 162 W.
E) None of the above.

6 We have an unknown number of identical resistors. When we connect them in series the equivalent resistance is 100 Ω, and when we connect them in parallel the equivalent resistance is 1 Ω. How many resistors do we have and what is the resistance of each of them?

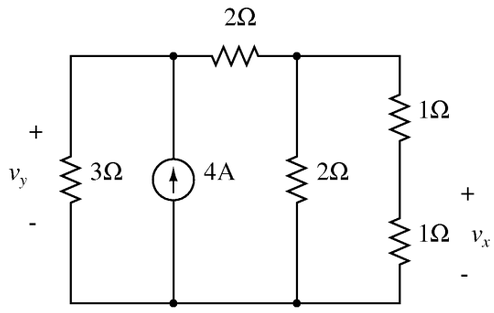
A) 4 resistors, 25 Ω each.
B) 10 resistors, 1 Ω each.
C) 10 resistors, 10 Ω each.
D) 5 resistors, 20 Ω each.
E) None of the above.

7 What is the equivalent resistance at terminals *ab*?



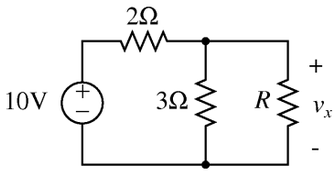
A) 103.5 Ω.
B) 114 Ω.
C) 106 Ω.
D) 102.5 Ω.
E) None of the above.

8 What is $\frac{v_y}{v_x}$ in the circuit shown below?



A) 6.
B) 5.
C) 4.
D) 3.
E) None of the above.

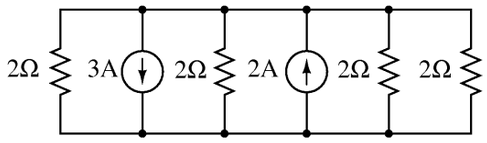
9 Determine the value of R so that $v_x = 5$ V.



A) 6 Ω.
B) 3 Ω.
C) 2 Ω.
D) 1 Ω.
E) None of the above.

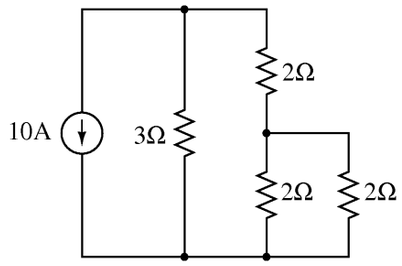
10 How much power is absorbed/delivered by the 3-A current source?

A) 2.5 W, delivered.
B) 1.5 W, delivered.
C) 0.5 W, delivered.
D) 0.5 W, absobred.
E) None of the above.



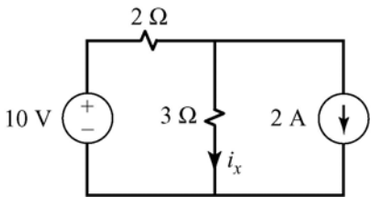
11 How much power is absorbed by the 3-Ω resistor?

A) 15 W.
B) 100/3 W.
C) 75 W.
D) 100 W.
E) None of the above.



12 What is the current i_x in the circuit given below?

A) 2 A .
B) 3 A.
C) -1.2 A.
D) 1.2 A.
E) None of the above.

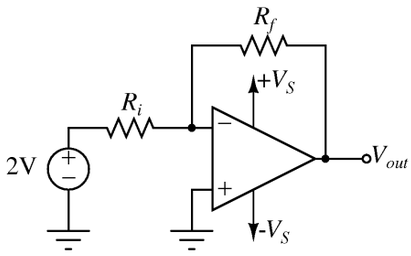


13 What is the capacitance of a capacitor that can store 18 mJ when charged by a 6-V voltage?

A) 10 mF.
B) 1000 μF.
C) 1 F.
D) 10,000 nF.
E) None of the above.

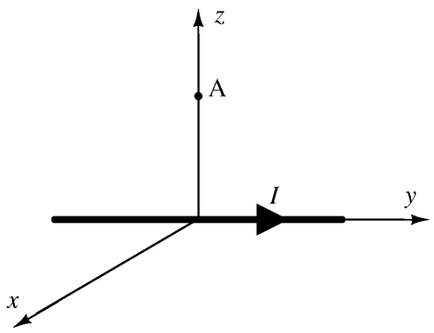
14 For what values of V_S, R_f, and R_i the output voltage of the following circuit, V_{out}, is -12 V?

A) $V_S = 10$ V, $R_f = 10\ \Omega$, $R_i = 10\ \Omega$.
B) $V_S = 10$ V, $R_f = 60\ \Omega$, $R_i = 10\ \Omega$.
C) $V_S = 15$ V, $R_f = 10\ \Omega$, $R_i = 60\ \Omega$.
D) $V_S = 12$ V, $R_f = 10\ \Omega$, $R_i = 10\ \Omega$.
E) None of the above.



15 A wire carries an electric current, I, that is flowing in the $+y$ direction as shown below. What is the direction of the magnetic field generated by this current at point A?

A) $+y$.
B) $+x$.
C) $-x$.
D) $+z$.
E) $-z$.



Formula Sheet

Ohm's law	$V = RI$
Power	$P = VI$
Energy	Energy = Power × Time
Voltage division	$V_k = \frac{R_k}{\sum R_i} V_S$
Current division	$I_k = \frac{\frac{1}{R_k}}{\sum \frac{1}{R_i}} I_S$
Resistors in series	$R_{eq} = \sum R_i$
Resistors in parallel	$\frac{1}{R_{eq}} = \sum \frac{1}{R_i}$
Energy stored in a capacitor	$W = \frac{1}{2} C V^2$