ECE 2210/00 Exam 1 given: Fall 09

(The space between problems has been removed.)

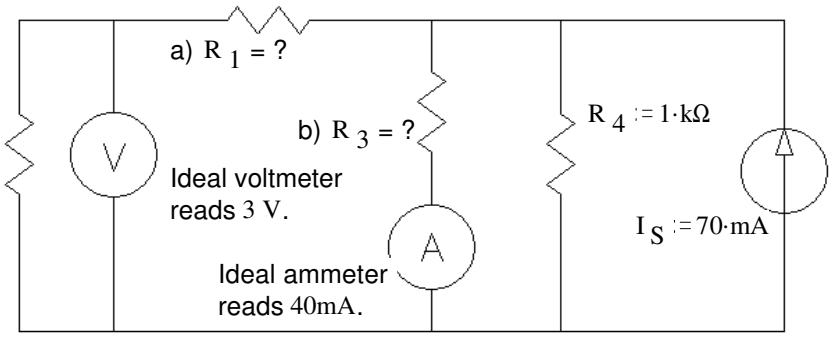
1. (23 pts) Find the values below.
   Show your work

   Note: feel free to show answers & work right on the schematic

   a) R_1 = ?

   b) R_3 = ?

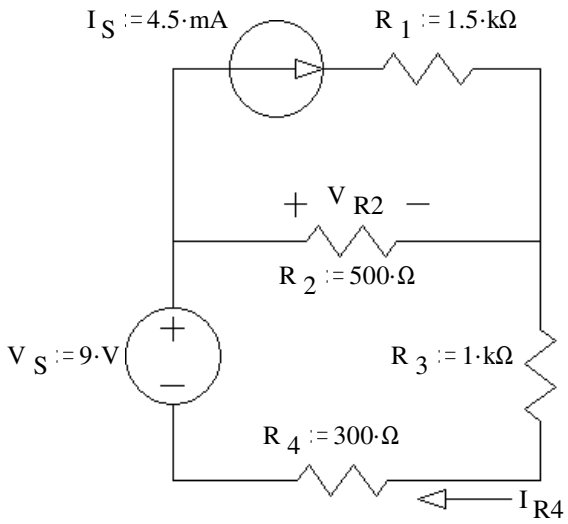
   c) P_S = ?



Remember, You were asked for 3 things, R_1, R_3, & P_S. Circle your answers!

2. (20 pts) Use the method of superposition to find the voltage across R_2 (V_{R2}) and the current through R_4 (I_{R4}).

   Be sure to redraw the circuit as needed and to clearly show and **circle** your intermediate results.



Remember, You were asked for 2 things, V_{R2} and I_{R4}.

3. (18 pts) A rechargeable battery is shorted with an ideal ammeter. The ammeter reads 1.5 A. The ammeter is replaced with an ideal voltmeter. The voltmeter reads 12 V.

   a) Draw a simple, reasonable model of the battery pack using ideal parts. Find the value of each part.

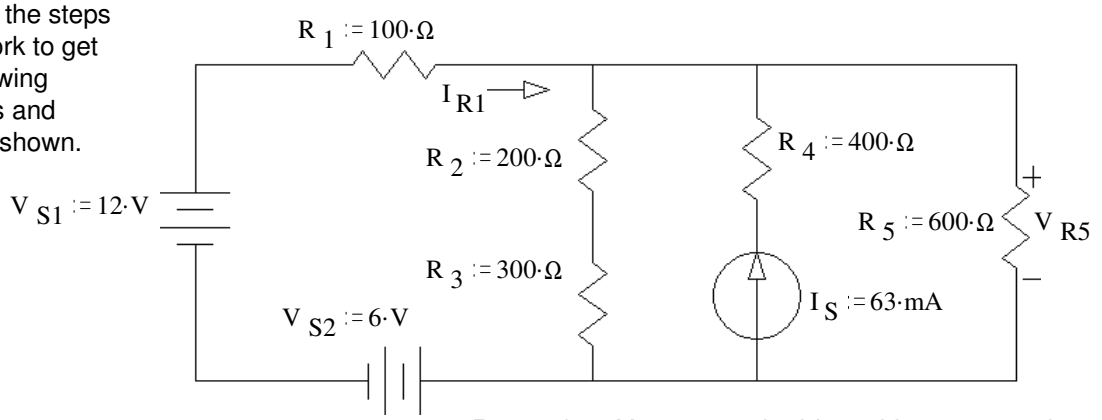
   b) The battery is hooked to a load resistor and the terminal voltage drops to 10 V. Find the value of the load resistor.

   c) What voltage would be required to charge this battery at 200 mA?

   d) What is the maximum power this battery can supply to a load resistor (R_L)? You may use whatever R_L you want.

4. (23 pts) Use nodal analysis to find the voltage across R_5 (V_{R5}) and the current through R_1 (I_{R1}). .

You **MUST** show all the steps of nodal analysis work to get credit, including drawing appropriate symbols and labels on the circuit shown.



Remember, You were asked for 2 things, V_{R5} and I_{R1}.

5. (16 pts) For the waveform shown, find:

a) peak-to-peak voltage, V_{pp}

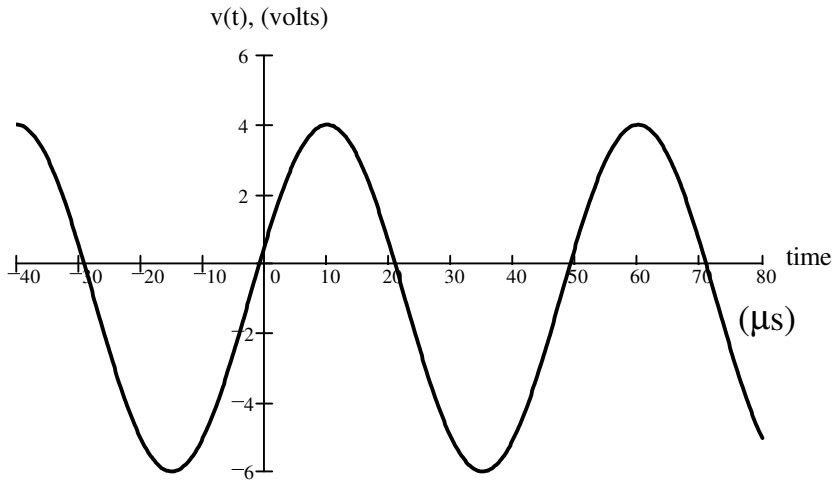
b) amplitude, A

c) period, T

d) frequency f in cycles/sec or Hz

e) frequency ω in radians/sec

f) the phase angle in degrees



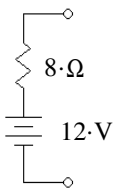
g) a complete expression for v(t), include numbers and units

Answers

1. a) $350\cdot\Omega$ b) $250\cdot\Omega$ c) $700\cdot mW$

2. $2.5\cdot V - 1.625\cdot V = 0.875\cdot V$ $\quad 5\cdot mA + 1.25\cdot mA = 6.25\cdot mA$

3. a)



b) $40\cdot\Omega$ c) $13.6\cdot V$ d) $4.5\cdot W$

4. $9\cdot V$ $\quad -30\cdot mA$

5. a) $10\cdot V$ b) $5\cdot V$ c) $50\cdot\mu s$ d) $20\cdot kHz$ e) $1.26\cdot 10^5\cdot\frac{rad}{sec}$ f) -72^o

g) $5\cdot V\cdot\cos\left(1.26\cdot 10^5\cdot\frac{rad}{sec}\cdot t - 72\cdot deg\right) - 1\cdot V$

ECE 2210 / 00 Midterm #1 Arn Stolp

Name _____

Scores:

Pages 1&2 _____ of a possible 43 pts

Pages 3&4 _____ of a possible 41 pts

Page 5 _____ of a possible 16 pts

Total _____ of a possible 100 pts