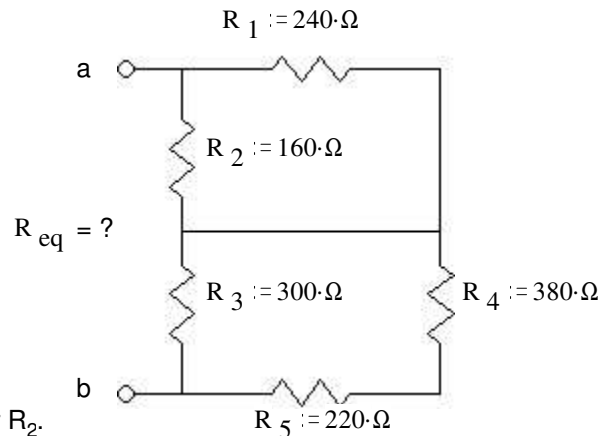


EE1050/60 Exam 1 given: Fall 02 (The space between problems has been removed.)

Remember, to get the most possible partial credit, always show all the intermediate values that you can calculate. If further calculations depend on a value that you can't figure out, just use a letter (like I_{R1}) or a guessed value and proceed.

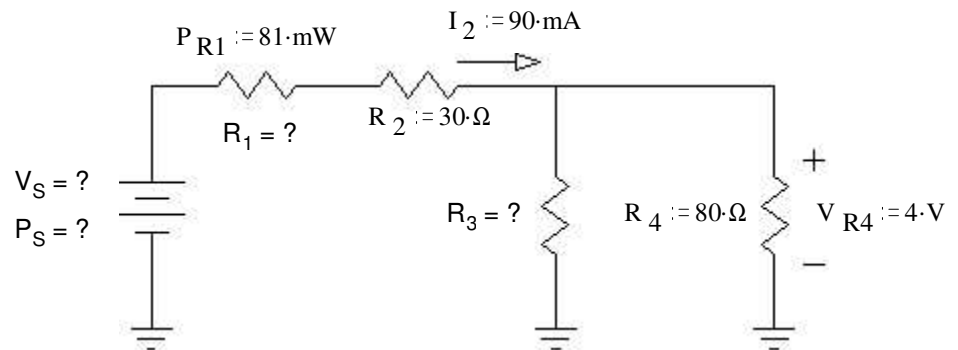
Note: feel free to show answers & work right on the schematic

1. (10 pts) Find the equivalent resistance of this network, i.e. what would an ohmmeter read if hooked to the terminals a and b.

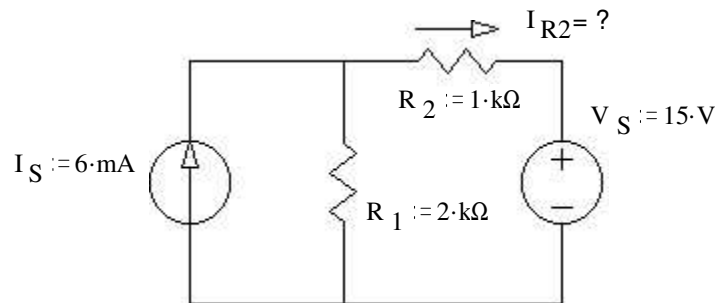


2. (5 pts) A 37V source is hooked to the terminals a and b above. Use the voltage divider concept to find the voltage across resistor R_2 .

3. (20 pts) In the circuit shown find the voltage source (V_S), the power input by the source (P_S), and the resistor values; R_1 and R_3 .



4. (15 pts) a) Use the method of superposition to find the current through R_2 . Be sure to clearly show and **circle** your intermediate results.



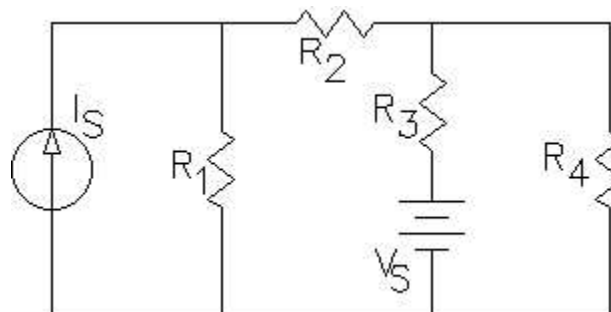
5. (16 pts) Nodal analysis. Assume that you know the values of all the resistors and sources and you want to find the circuit voltages.

a) Select a ground (reference) node and label it on the schematic (draw ground symbol).

b) Label other nodes and currents as necessary to perform nodal analysis.

c) How many simultaneous equations will you need to perform this analysis?

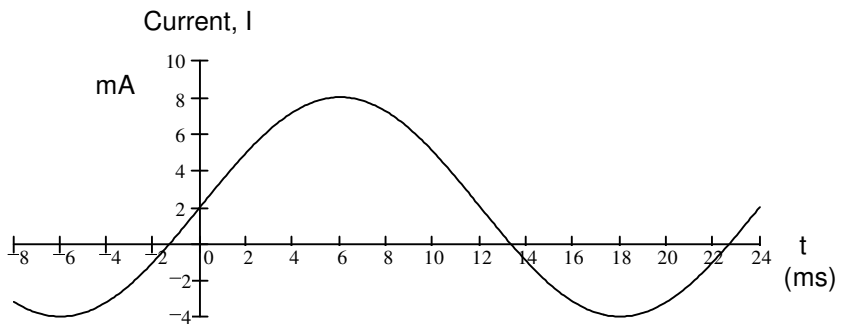
d) Write all the necessary equations in terms of the resistors, the sources, and the unknown nodes. Just write and circle the equations, do not try to simplify or solve them.



EE1050/60 Exam 1 Fall 02 p2

6. (18 pts) For the waveform shown, find:

- a) peak-to-peak current, I_{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



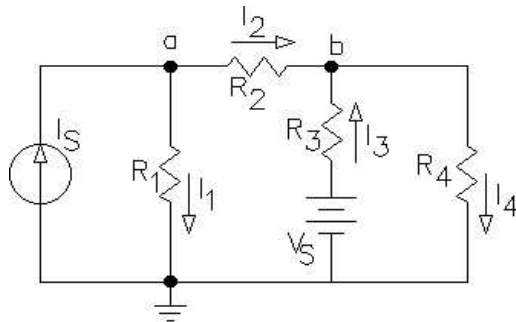
7. (16 pts) A NiCad Battery pack is used to power a cell phone. When the phone is switched on the battery pack voltage drops from 4.80 V to 4.65 V and the cell phone draws 50 mA.

- a) Draw a simple, reasonable model of the battery pack using ideal parts. Find the value of each part.
- b) The cell phone is used to make a call. Now it draws 300 mA. What is the battery pack voltage now?
- c) The battery pack is placed in a charger. The charger supplies 5.10 V. How much current flows into the battery pack?

Answers

- 1. 296Ω
- 2. 12V
- 3. 7.6V, 684mW, 10Ω , 100Ω
- 4. $4\text{mA} - 5\text{mA} = -1\text{mA}$

5. a) & b)



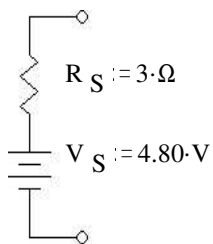
c) 2

$$I_S = \frac{V_a - 0}{R_1} + \frac{V_a - V_b}{R_2}$$

$$\frac{V_a - V_b}{R_2} + \frac{V_S - V_b}{R_3} = \frac{V_b - 0}{R_4}$$

- 6. a) 12mA b) 6mA c) 24ms d) 41.7Hz
- e) 262 rad/s f) -90°
- g) $6 \cdot \text{mA} \cdot \cos\left(262 \cdot \frac{\text{rad}}{\text{sec}} \cdot t - 90 \cdot \text{deg}\right) + 2 \cdot \text{mA}$

7. a)



- b) 3.9V c) 100mA

EE 1050 / 60 Midterm #1 Arn Stolp

Name _____

Scores:

Page 1 - 3 _____ of a possible 35 pts

Page 4&5 _____ of a possible 31 pts

Page 6&7 _____ of a possible 34 pts

Total _____ of a possible 100 pts