ECE1050/60 Exam 1 given: Spring 05

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.

Feel free to show answers & work right on the schematic

1. (9 pts) Find the equivalent resistance of this network, i.e. what would an ohmmeter read if hooked to the terminals a and b.

![Network Diagram](image)

R_{eq} = ?

2. (5 pts) A 15V source is hooked to the terminals a and b above. Use the voltage divider concept to find the voltage across resistor R_4.

![Network Diagram](image)

V_S = ?

3. (21 pts) The ammeter, A, reads 20 mA.

   a) The power dissipated by R_2 is 0.18 W, what is the value of R_2?

   ![Network Diagram](image)

   P_{R2} = 0.18 W

   R_2 = ?

   b) The source provides 0.6W of power. What is the value of V_S?

   ![Network Diagram](image)

   V_S = ?

   c) What is the value of R_1?

   ![Network Diagram](image)

   R_1 = ?

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.

   ![Network Diagram](image)

   I_S = 6 mA

   V_S = 18 V

   R_1 = 6 kΩ

   R_2 = 3 kΩ

   R_3 = 9 kΩ

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5. (20 pts) a) Find and draw the Thévenin equivalent of the circuit shown. The load resistor is $R_L$.

b) Find and draw the Norton equivalent of the same circuit.

c) Find the load voltage using your Thévenin equivalent circuit.

6. (18 pts) a) Use nodal analysis to find the voltage across $R_2$ ($V_{R2}$).

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

b) Find the current through $R_1$ ($I_{R1}$).

7. (12 pts) For the waveform shown, find a complete expression for $v(t)$ as a cosine wave. Include numbers and units.

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**Answers**

1. 125 $\Omega$

2. 8.64 V

3.a) 50 $\Omega$  
   b) 10 V  
   c) 86.7 $\Omega$

4. 2 mA - 4 mA = -2 mA

5. a) $3 \cdot V$  

   b) 24 mA

   c) 0.5 V

6.a) 2 V  

   b) 150 mA

7. $6 \cdot V \cdot \cos \left( \frac{785400 \text{ rad}}{\text{sec}} t - 90 \text{ deg} \right) + 4 \cdot V$

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ECE 1050 / 60 Midterm #1  Arn Stolp

Name _________________________________

Scores:

Pages 1&2 _________ of a possible  35 pts

Pages 3&4 _________ of a possible  35 pts

Pages 5&6 _________ of a possible  30 pts

Total _________ of a possible 100 pts