ECE 2210/00 Exam 1 given: Spring 10   (The space between problems has been removed.)
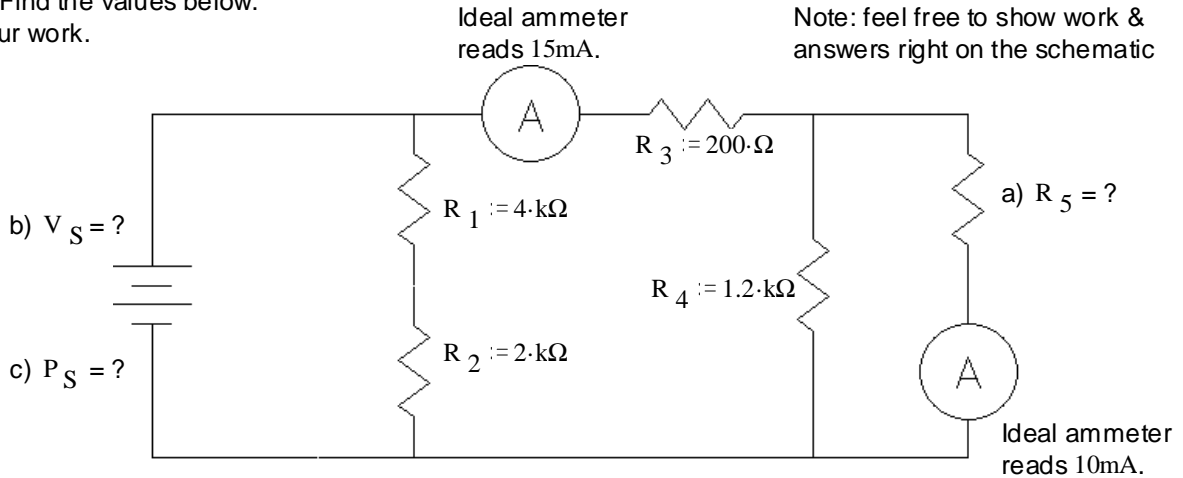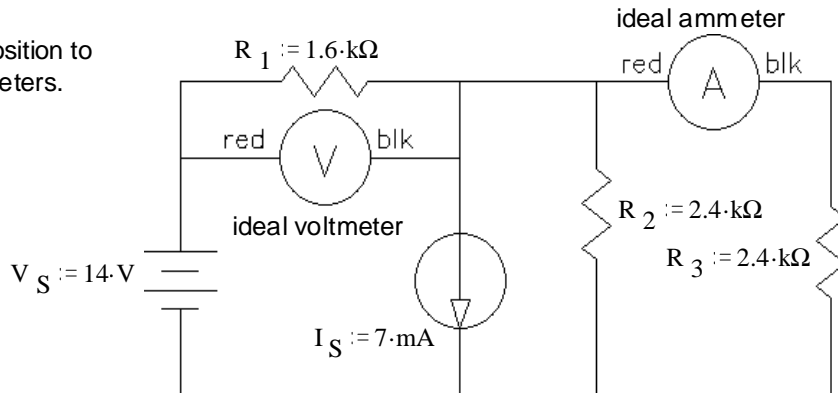
1. (21 pts) Find the values below.
   Show your work.

   a) $R_5 = ?$

   b) $V_S = ?$

   c) $P_S = ?$

   b) $V_S = ?$

   c) $P_S = ?$

Ideal ammeter
reads 15mA.

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

$R_3 := 200 \cdot \Omega$

$R_1 := 4 \cdot k\Omega$

a) $R_5 = ?$

$R_4 := 1.2 \cdot k\Omega$

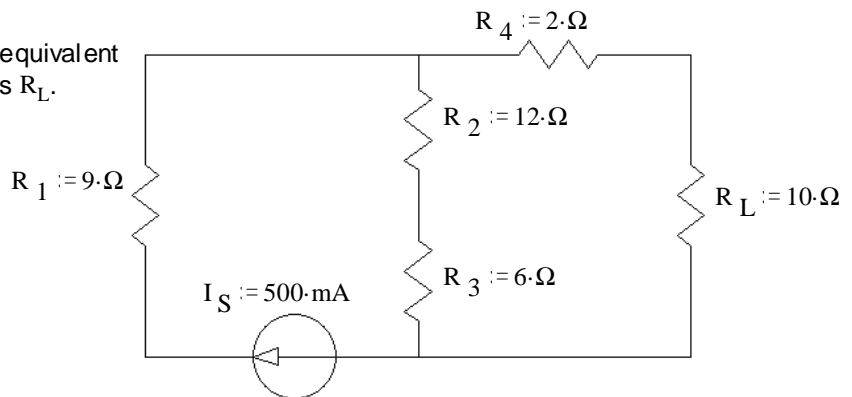$R_2 := 2 \cdot k\Omega$

Ideal ammeter
reads 10mA.

2. (22 pts) Use the method of superposition to
   find the readings of the two ideal meters.

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

$R_1 := 1.6 \cdot k\Omega$

ideal ammeter

red   A   blk

red   V   blk

ideal voltmeter

$R_2 := 2.4 \cdot k\Omega$

$R_3 := 2.4 \cdot k\Omega$

$V_S := 14 \cdot V$

$I_S := 7 \cdot mA$

3. (22 pts) a) Find and draw the Thévenin equivalent
   of the circuit shown. The load resistor is R_L.

$R_4 := 2 \cdot \Omega$

$R_2 := 12 \cdot \Omega$

$R_1 := 9 \cdot \Omega$

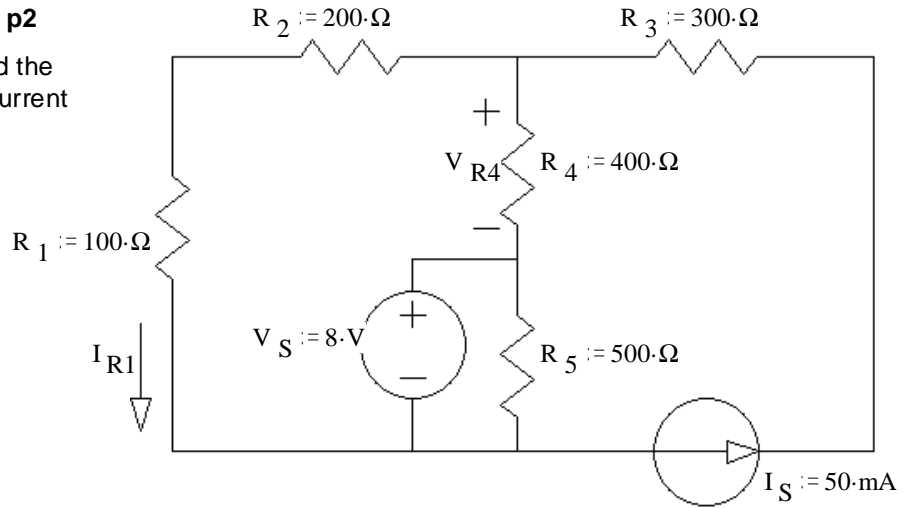$R_L := 10 \cdot \Omega$

$I_S := 500 \cdot mA$

$R_3 := 6 \cdot \Omega$

b) Find the load current using your Thévenin equivalent circuit.

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

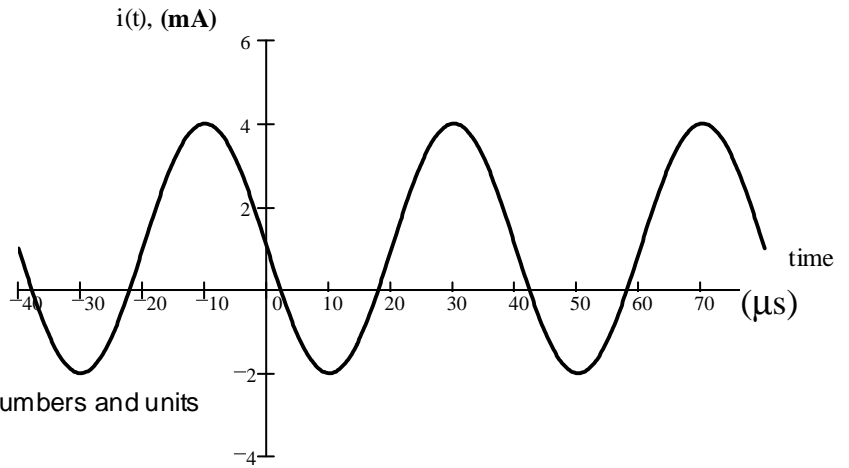d) Find the load voltage using your Norton equivalent circuit.

4. (19 pts) Use nodal analysis to find the voltage across R_4 (V_{R4}) 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.

$R_2 := 200 \cdot \Omega$ $R_3 := 300 \cdot \Omega$

V_{R4} $R_4 := 400 \cdot \Omega$

$R_1 := 100 \cdot \Omega$

I_{R1}

$V_S := 8 \cdot V$

$R_5 := 500 \cdot \Omega$

$I_S := 50 \cdot mA$

5. (16 pts) For the waveform shown, find:
INCLUDE UNITS IN YOUR ANSWERS

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 $i(t)$, include numbers and units

i(t), **(mA)**

time

(µs)

Answers

1. a) $600 \cdot \Omega$ b) $9 \cdot V$ c) $149 \cdot mW$ 2. $0.5 \cdot mA$ $12.8 \cdot V$

3. a) $20 \cdot \Omega$ b) $300 \cdot mA$ c)   d) $3 \cdot V$

$9 \cdot V$

$450 \cdot mA$ $20 \cdot \Omega$

4. $200 \cdot \Omega$ V_a

$+$ I_4
V_{R4} $50 \cdot mA$
$400 \cdot \Omega$

$100 \cdot \Omega$ $-$ $8 \cdot V$

a) $4 \cdot V$

b) $40 \cdot mA$

I_{R1} $8 \cdot V$ $500 \cdot \Omega$
$50 \cdot mA$

ECE 2210 / 00   Midterm #1   Arn Stolp

Name _____

Scores:

Pages 1&2 _____ of a possible 43 pts

5 a) $6 \cdot mA$ b) $3 \cdot mA$ c) $40 \cdot \mu s$ d) $25 \cdot kHz$ e) $1.57 \cdot 10^5 \cdot \dfrac{rad}{sec}$

Pages 3&4 _____ of a possible 41 pts

f) $90°$ g) $3 \cdot mA \cdot \cos\left(1.57 \cdot 10^5 \cdot \dfrac{rad}{sec} \cdot t + 90 \cdot deg\right) + 1 \cdot mA$

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Total _____ of a possible 100 pts