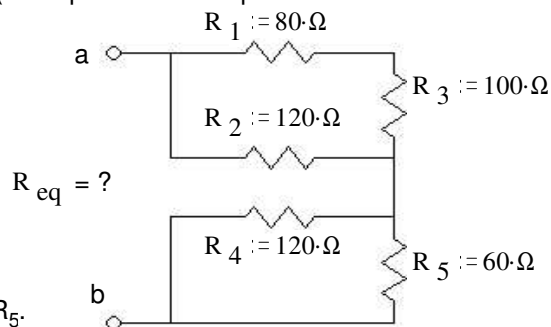


EE1050/60 Exam 1 given: Spring 01

(The space between problems has been removed.)

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.



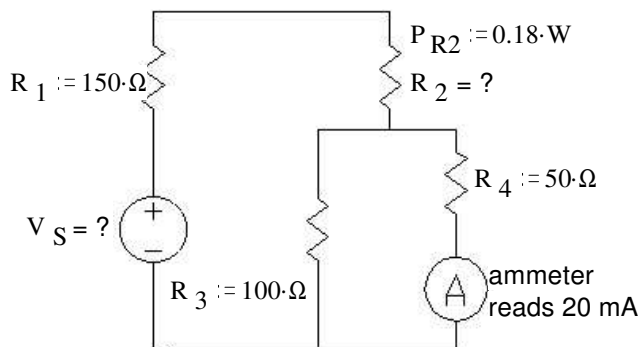
2. (5 pts) A 21V source is hooked to the terminals a and b above. Use the voltage divider concept to find the voltage across resistor R_5 .

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 use a letter (like I_{R1}) in place of the value and proceed.

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

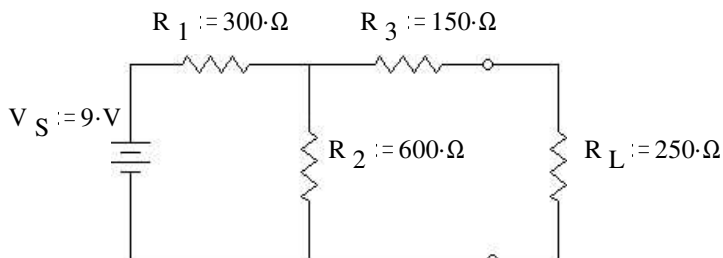
3. (17 pts) The ammeter, A, reads 20 mA.

- The power dissipated by R_2 is 0.18 W, what is the value of R_2 ?
- What is the value of V_S ?
- How much power is provided by the source?



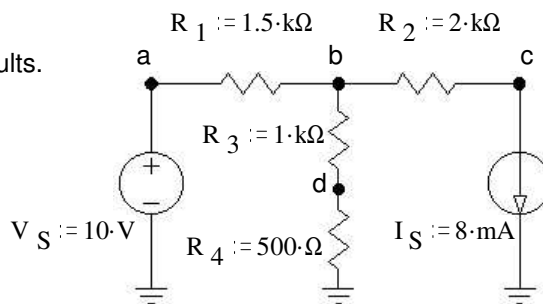
4. (22 pts)

- Find and draw the Thévenin equivalent of the circuit shown. The load resistor is R_L .
- Find and draw the Norton equivalent of the same circuit.
- Find the load voltage using either your Thévenin or Norton equivalent circuit.



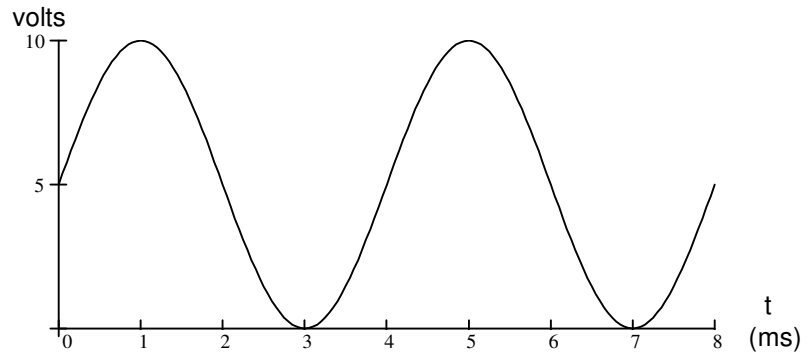
5. (12 pts) Use the method of superposition to find V_b .

Be sure to clearly show and circle your intermediate results.



6. (8 pts) If you wanted to solve the problem above using nodal analysis, you would have to write one or more nodal equations. Write all the necessary equation(s) 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. Don't panic, this is an easy problem and it has more than one right answer.

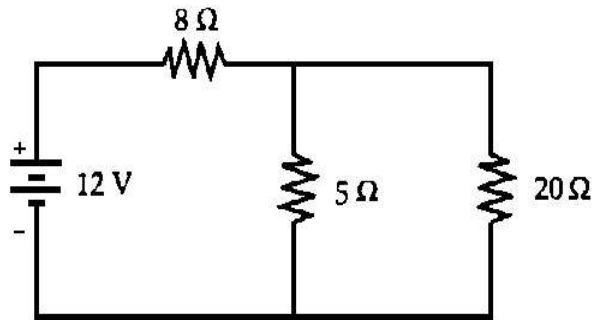
7. (22 pts) For the waveform shown, find:
- peak-to-peak voltage or current, V_{pp}
 - amplitude, A
 - period, T
 - frequency f in cycles/sec or Hz
 - frequency ω in radians/sec
 - the phase angle in degrees
 - a complete expression for $v(t)$, include numbers and units
 - The RMS value of this waveform.



8. (4 pts) The question below is similar to what you might see on the FE exam. They expect you to answer this in less than 2 minutes.

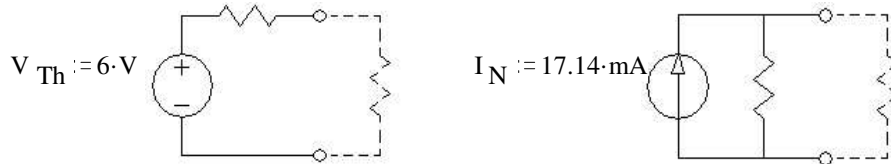
The power delivered to the 5 ohm resistor is

- 1.5 W
- 2.15 W
- 2.85 W
- 3.2 W



Answers

1. 112Ω 2. $7.5V$ 3.a) 200Ω b) $11.5V$ c) $0.345W$
 4.a) $R_{Th} := 350\Omega$ b) $R_N := 350\Omega$ c) $2.5V$



5. $5V - 6V = -1V$ 6. $\frac{V_S - V_b}{R_1} = \frac{V_b}{R_3 + R_4} + I_S$

- 7.a) $V_{pp} = 10 \cdot V$ b) $A = 5 \cdot V$ c) $T = 4 \cdot ms$ d) $f = 250 \cdot Hz$ e) $\omega = 1571 \cdot \frac{rad}{sec}$ f) $\phi = -90 \cdot deg$
 g) $v(t) := 5 \cdot V \cdot \cos\left(1571 \cdot \frac{rad}{sec} \cdot t - 90 \cdot deg\right) + 5 \cdot V$ h) $V_{RMS} = 6.124 \cdot V$

8. d