ECE 2210/00 Exam 1  given: Spring 07  (The space between problems has been removed.)

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 \( I_{R_1} \)) or a guessed value and proceed.

1. (20 pts) Show your work  
   Note: feel free to show answers & work right on the schematic
   a) \( R_2 = ? \)
   ![Diagram 1](image1)
   b) \( V_S = ? \)
   c) \( P_S = ? \)
   
   b) What is the value of \( V_S \)?
   c) How much power is provided by the source?

2. (20 pts) Use the method of superposition to find the current through \( R_1 (I_{R_1}) \) and the voltage across \( R_3 (V_{R3}) \). Be sure to clearly show and **circle** your intermediate results.
   ![Diagram 2](image2)

3. (22 pts) a) Find and draw the Thévenin equivalent of the circuit shown. The load resistor is \( R_L \).
   ![Diagram 3](image3)
   
   b) Find and draw the Norton equivalent of the same circuit.
   c) Find the load current using your Thévenin equivalent circuit.
   d) What value of load resistor (\( R_L \)) would you choose if you wanted to maximize the power dissipation in the load.
4. (18 pts) 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.

Remember, you want to find $V_{R2}$.

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

5. (20 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 $\omega$ in radians/sec

f) the phase angle in degrees

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

Answers

1. a) 250-$\Omega$  b) 8-$V$  c) 240-mW

5.  

a) $8-V$  
b) $4-V$  
c) $2-ms$  
d) $500-Hz$  
e) $3142\frac{rad}{sec}$

f) $144^\circ$  
g) $4-V\cdot\cos\left(3142\frac{rad}{sec}\cdot t + 144^\circ\right) + 2-V$