First Name: _____ Last Name: _____ ID:_____ Section:___

MECH 368 Winter 2019 - mid-term

Special Instructions:

Only ENCS approved calculators are allowed. A one-side half of page (letter size) with formulas only (no numerical answers to problems).

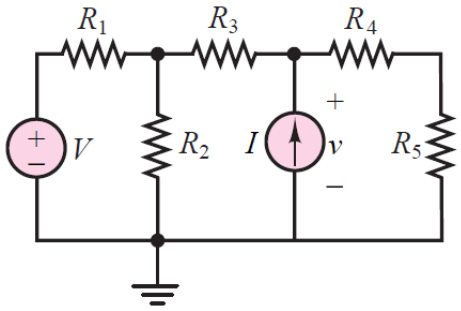
CELL PHONES OR ANY ELECTRONIC DEVICES ARE NOT PERMITTED.

- Attempt all questions. If you have any difficulty you may try to make REASONABLE assumptions. State the assumptions and how those assumptions limit your answers. Show all your work in detail and justify your answers.
- Marks are given for how an answer is arrived at, not just the answer itself.
- All answers are to be written into the question papers. Use the back sheets and extra blank papers for your rough work.
- ONLY the Final answer (without any calculations) will earn a Zero.
- Write Big, clear and legible. Provide a neat and professional presentation
- If needed, try making REASONABLE assumptions. State the assumption and how that assumption limits your answer.
- Show all the steps of your work and put a box around your final answer .

Good luck.

Problem 1 (45%)

a. (15%) Find the Thévnin equivalent resistance see by resistor R_5
b. (15%) Compute the Thévenin voltage when R_5 is the load
c. (15%) Compute the Norton current when R_5 is the load

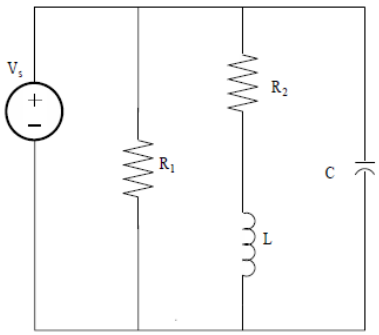


Known quantities:

V=6V, R_1=20Ω, R_2=30Ω, R_3=10Ω, R_4=30Ω, I=0.5A

Problem 2 (35%)

a. (15%) Determine the equivalent impedance seen by the source V_s.
b. (10%) Determine the required reactance type (capacitor, inductor) and its value which, in parallel with the capacitor C brings the power factor to 1
c. (10%) What is the AC power frequency?



Known quantities:

$v_s(t) = 5\cos(754t + 30°)\ V$, $R_1 = 300\Omega$, $R_2 = 300\Omega$, $L = 100mH$, $C = 50nF$

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Problem 3 (20%)

An automotive battery is rated 120 A-h. A car with a fully charged battery is forgotten with the headlights on during day parking, for 9h. The lights have a power-rating of 150W both. The electric engine starter motor requires 120A for 3 seconds.

Without realizing he forgot the lights on, the driver starts the car in the evening and drives back home. How much time can he drive safe, until the lights go off?

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