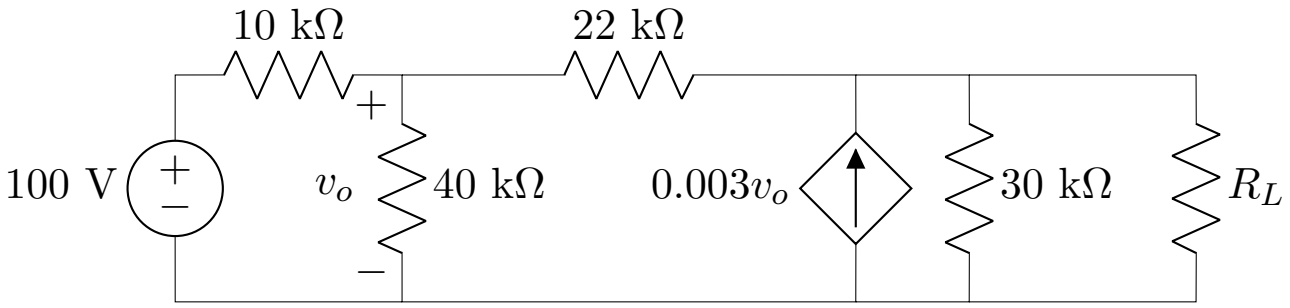
Department of Computer Science and Engineering
Final Examination Spring 2022
CSE250: Circuits and Electronics
Total Marks: **60** Duration: **2 hours**

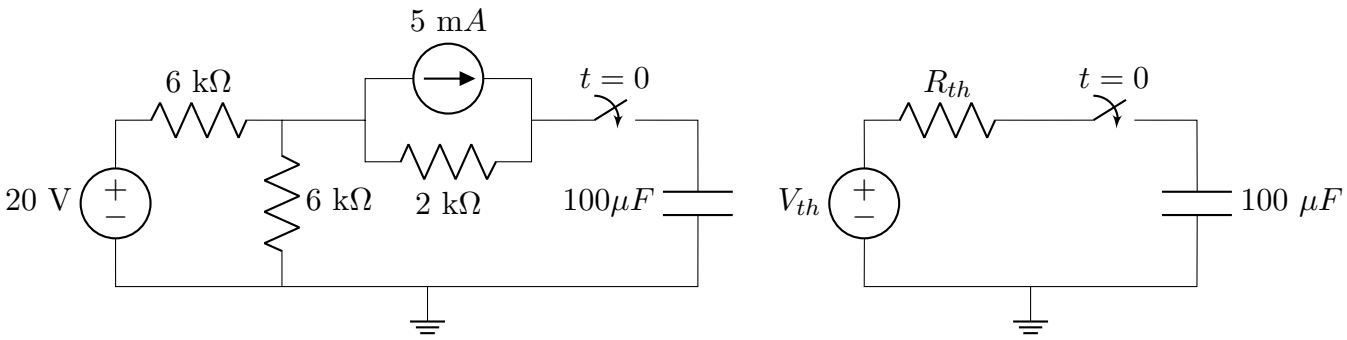
Must answer ***FIRST THREE*** questions. Questions marked '***Bonus***' are optional.

Question 1 of 4 *[20 marks + 1 bonus mark]*



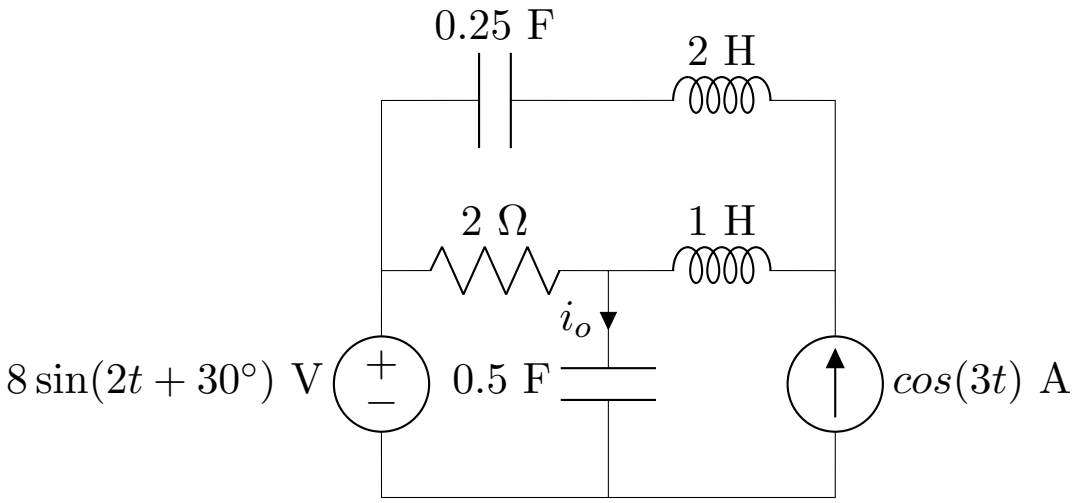
- **Find** the maximum power transferred to the load resistor R_L in this circuit. *(20 marks) [CO2, CO4]*
- ***Bonus:*** Can you **explain** why this question is technically wrong? *Hint: Is there anything unusal about R_{th}? (1 mark) [CO5]*

Question 2 of 4 *[20 marks]*



- **Use** Thevenin's theorem to **simplify** the left circuit (so that it takes the form of the circuit on the right). Mention values of V_{th} and R_{th} properly. *(12 marks) [CO3, CO4]*
- Perform Transient **analysis** and **calculate** $v_c(0), v_c(\infty), v_c(t)$ and $v_c(0.75)$. *(8 mark) [CO2, CO4]*

Question 3 of 4 *[20 marks]*



- **Find** the value of i_o in this circuit.
  Hint: Use Superposition Theorem. (20 marks) [CO3, CO4]

Question 4 of 4 *(Bonus) [5 marks]*

The voltage across a load is $v(t) = 20\cos(10t - 300)$ V and current through the element in the direction of voltage drop is $i(t) = -8\sin(10t - 700)$ A. **Determine** with appropriate units:

- the complex power *(2 marks) [CO1, CO2]*
- the apparent power *(1 mark) [CO1, CO2]*
- the real and reactive powers. Also, specify for each whether the load is supplying or absorbing. *(2 marks) [CO2, CO3]*