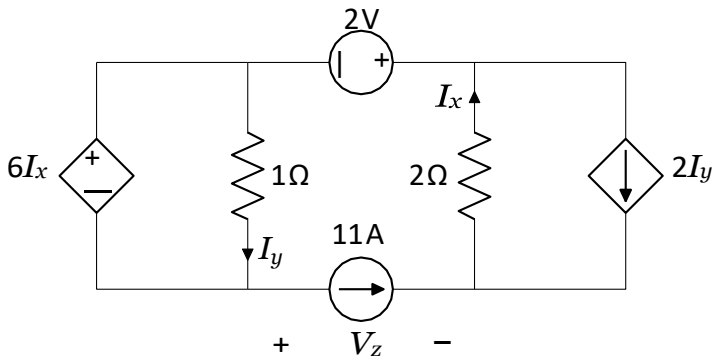
ESC201 Assignment 2

Topics

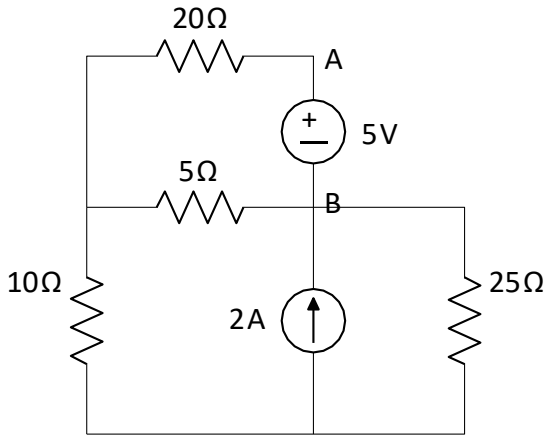
Superposition, Nodal/Mesh analysis, Thevenin/Nortan equivalent, Power, Transient analysis, Steady state.

Questions

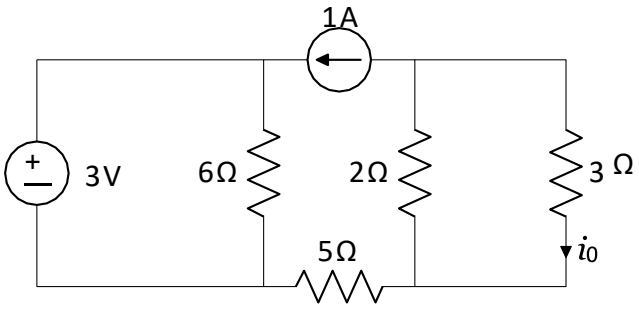
1. Determine I_x, I_y and V_z using superposition:



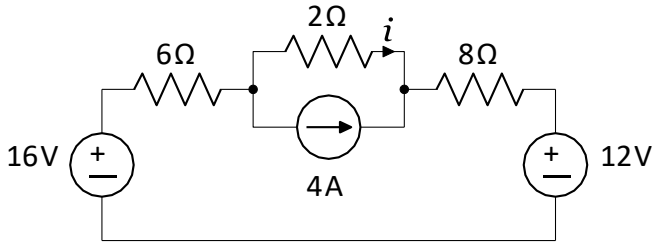
2. Determine the power supplied by the 5V source using
   (a) Mesh analysis
   (b) Nodal analysis
   (c) Superposition principle
   (d) Thevenin's equivalent circuit between terminals A and B.



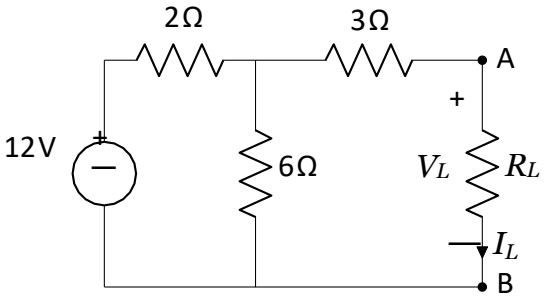
3. Use Thevenin's theorem to determine i_o.



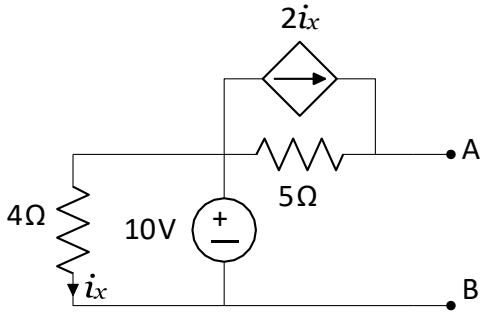
4. Determine current i through 2Ω resistor by building Thevenin's equivalent for the rest of the circuit.



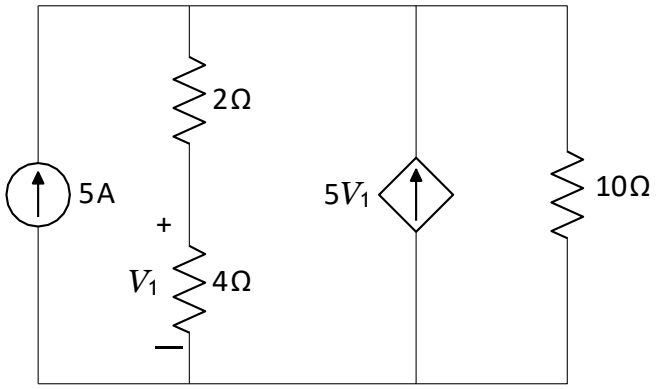
5. Find Voltage V_L across the load resister R_L, and the current I_L flowing through the load resistor R_L, in the below circuit, by using Norton's Theorem. Where R_L = 1.5Ω.



6. Find the Norton resistance R_N, and the Norton current I_N, at the terminals $A - B$.

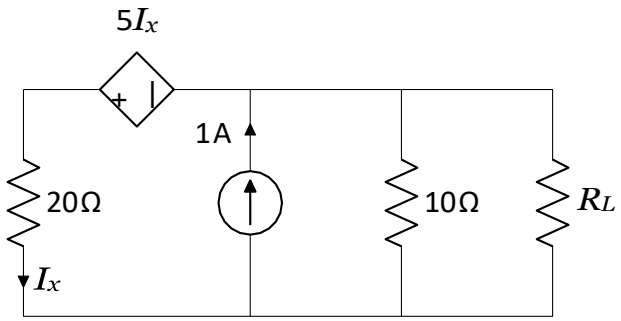


7. Determine the power dissipated in the 10Ω resistor in the following circuit

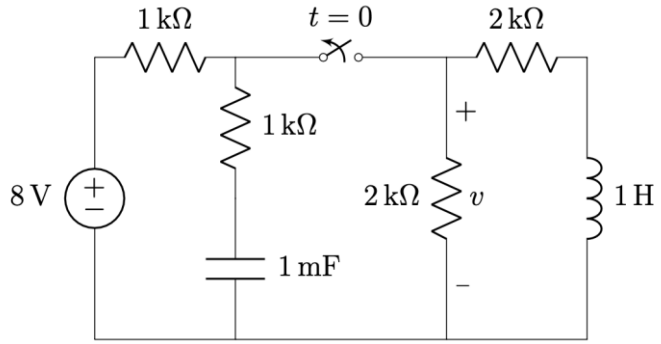


8. A practical current source provides $10W$ to 250Ω load and, $20W$ to 80Ω load. A resistance R_L with voltage v_L across it, and with current i_L through it, is connected to the source. Find the values of R_L, v_L, and i_L if,
   (a) $v_L.i_L$ is maximum.
   (b) v_L is maximum.
   (c) i_L is maximum.

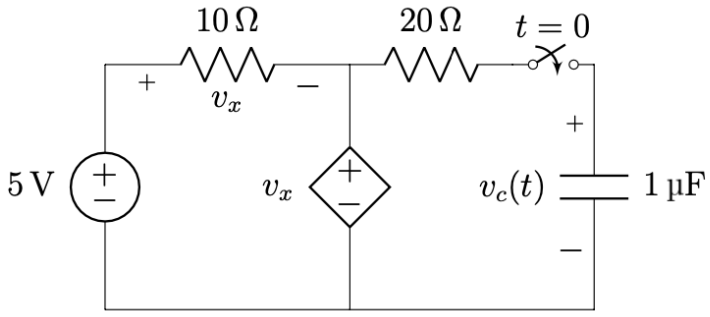
9. Determine the value of R_L in the below circuit, such that maximum power is delivered into R_L. Calculate the value of the maximum power.



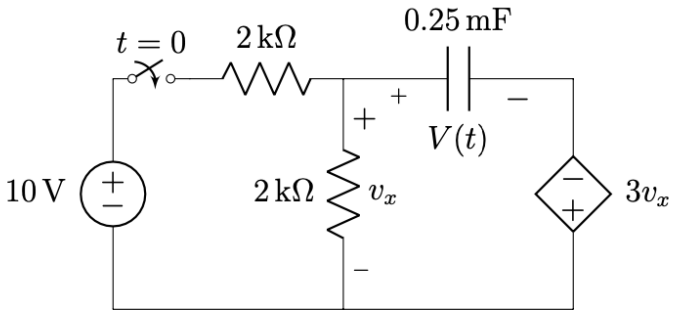
10. For the circuit shown below, determine the voltage across the 2K resistor (vertical) as a function of time after the switch is opened at $t = 0$.



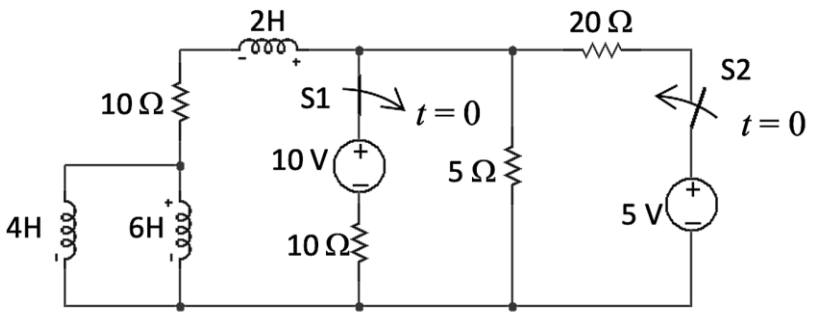
11. Find $v_c(t)$ for $t > 0$ in the following circuit if the capacitor voltage is zero for $t < 0$.



12. Assuming that the capacitor does not have any initial charge, determine the voltage across the capacitor $V(t)$ as a function of time after the switch is closed at $t = 0$.



13. In the following circuit the switch S1 is closed and S2 is left open for a long time. At t=0, S1 is opened and S2 is closed. Determine the current, i_5, through the 5Ω resistor for all time


2H
20 Ω
S2
10 Ω
S1
t = 0
t = 0
10 V
5 Ω
5 V
4H
6H
10 Ω