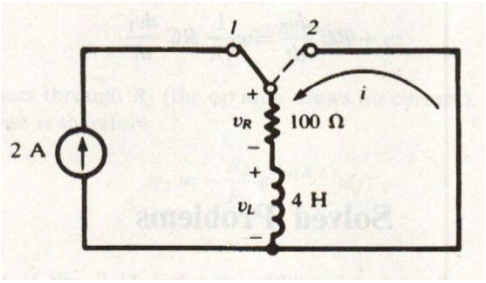
ENGR 12 Assignment 8 Due: next wed

Part I. Drills -- 2 point each

1) Switch at 1 a long time, moves to 2 at t=0

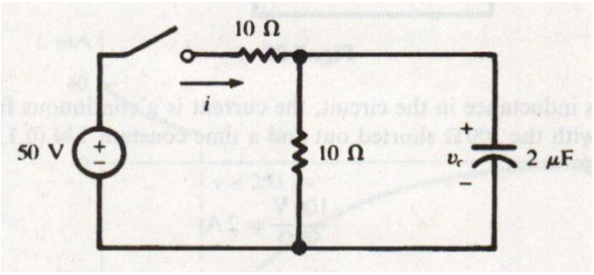


This is a _____ response

For the circuit above, find the:

a) initial current i(0-)
b) final current i(∞)
c) Effective R seen by inductor (t>0)
d) time constant for t>0
e) $i_L(t)$
f) $v_L(t)$

2) Switch has been open a long time, closes at t=0



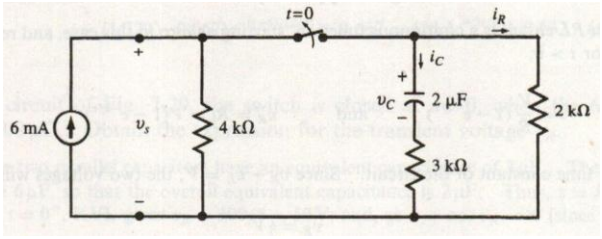
This is a _____ response

For the circuit above, find the:

a) initial voltage Vc(0-)
b) final voltage Vc(∞)
c) Req seen by capacitor (t>0)
d) time constant for t>0
e) $v_c(t)$
f) $i_c(t)$

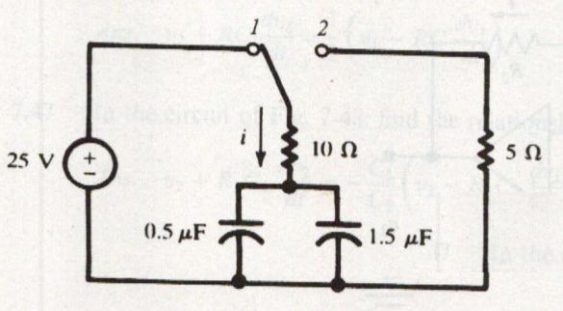
Part II. Assisted Problem Solving – 1.5 pts each

3. Switch has been closed and opens at t=0. Find Vc, Ic, Ir and Vs for t>0



This is a _____ response

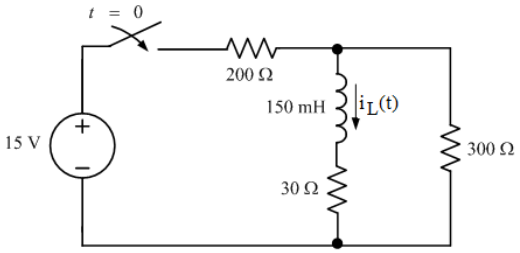
PLAN
1) Steady state capacitor has Ic = 0 (open cct)
2) Solve for Vs for t<0 (current source sees 4k ||2 k)
3) Because ic=0, Vc(0-) = Vs(0-)
4) Consider Req seen by cap for t>0
5) Calc tau
6) Final value of Vc is?
7) Compute Vc(t) using formula
8) Derive Ic, Ir and Vs for t>0

4. For t<0, swich had been at 2 a long time. At t=0, switch goes to 1. At t = 60 micro-seconds, switch goes back to 2. Find i(t) for t> 0  This is a _____ response	PLAN 1) Find initial voltage on capacitors (switch at 2 a long time) 2) Find effective C for two parallel capacitors 3) Find asymptote voltage for capacitors Vc(∞) if they are allowed to reach it. 4) Find Req seen by those parallel capacitors (0<t<60 usec) 5) Find tau during charge cycle (0<t<60 usec) 6) Find Vc (t) for parallel caps 7) Evaluate Vc(t) at t=60 usec 8) This becomes initial voltage for next switch position 9) Final voltage is same as in 1) 10) Find new Req, new tau, then Vc (t) for t>60 usec 11) Calc i using capacitor relationship (C dVc/dt) in both time zones (0 to 60 and 60 to ∞). 12) Sketch or plot Vc and i (if you know how try using matlab (wolfram does not seem to handle piecewise plots but you can use it to plot each part and then sketch the whole curve on paper).

Part III. Unassisted Problem Solving – 2 points each

5) The switch has been open a long time. At t=0 the switch closes. Find $i_L(t)$ for t>=0^+

This is a _____ response

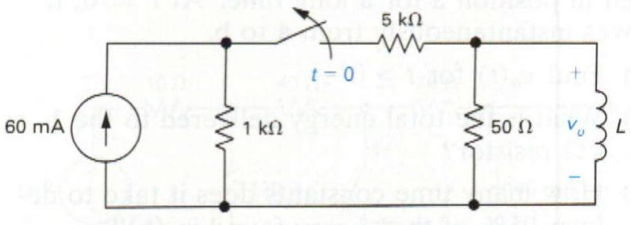


6)

In the circuit the switch has been closed for a long time before opening at $t = 0$.

(a) Find the value of L so that $v_o(t)$ equals $0.25\ v_o(0^+)$ when $t = 5$ ms.

(b) Find the percentage of the stored energy that has been dissipated in the 50 Ω resistor when $t = 5$ ms.



This is a _____ response