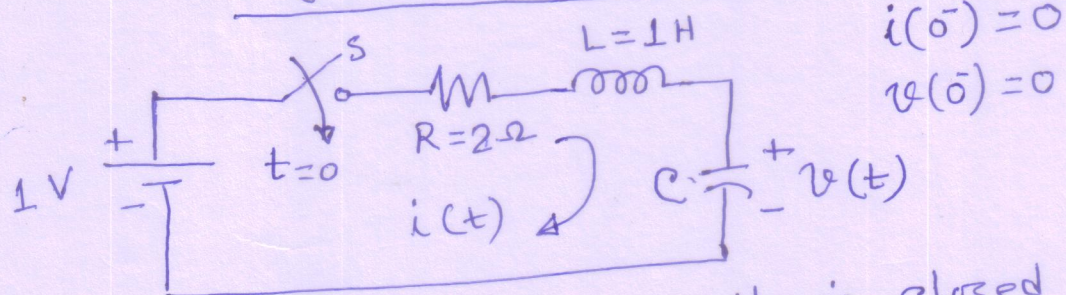


## Signet Lab Expt. 2

Q1



The switch S in the circuit is closed at  $t = 0$ . You have to find out  $v(t)$  and  $i(t)$  for  $t \geq 0$  and also sketch them showing values of  $v(t)$  and  $i(t)$  at ~~times~~ some times you consider important for capacitance values (i)  $\frac{25}{9} F$ , (ii)  $\frac{1}{2} F$  and (iii)  $1 F$ ,

For each of the above cases

(a) Form a differential equation involving  $v(t)$ .  
 (b) Write down the characteristic equation and comment on the nature of roots.

(c) Write down complete solution showing clearly how you get the constants of the natural response.

(d) Simulate the circuit in Matlab Simulink or \*LT Spice ~~9/10/20~~ and get the plot of  $v(t)$  and  $i(t)$  for (i), (ii) and (iii) and compare these plots with the theoretical plots obtained earlier.

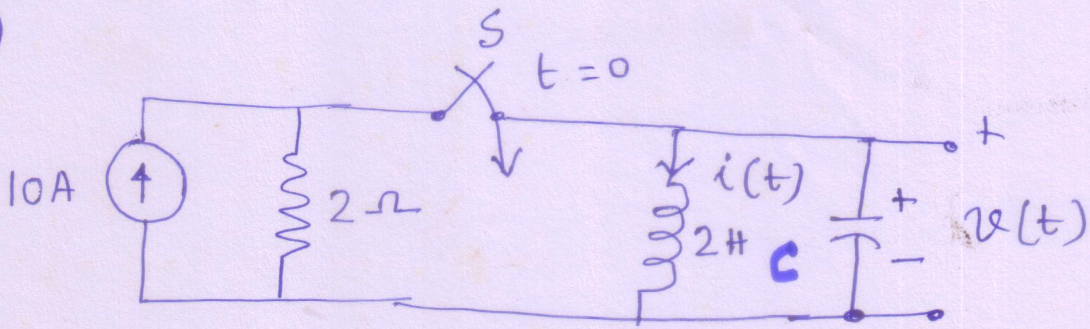
Last Date of submission  
 25th Oct 2020

~~Tapas~~  
 9/10/20

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Q2



- (A) In this part assume  $i(0^-) = 0$  and  $v(0^-) = 0$  ~~show and~~ obtain and solve the necessary differential equation to get  $v(t)$  and  $i(t)$  theoretically. Sketch them for (i)  $C = \frac{1}{9} F$ , (ii)  $C = \frac{1}{4} F$  and (iii)  $C = \frac{1}{8} F$

- (B) Repeat part (A) when  $i(0^-) = 0$  and  $v(0^-) = 5 V$ .

- (C) Compare the results obtained theoretically with Matlab simulation. OR LTSpice

Last date of Submission  
25<sup>th</sup> Oct 2020

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9/10/20

10/10/20

- (\*) I understand that you have been familiar with LTSpice simulation while doing expt. 1. So please use LTSpice simulation tools instead of Matlab.