Student's name:

Student's ID:

PRINCIPLES OF EE2

Spring 2019

Homework #1

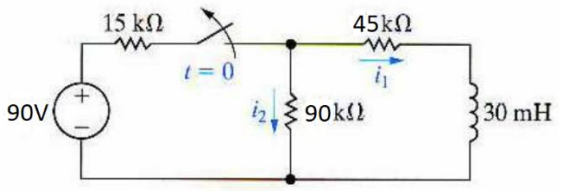
Deadline: 13/03/2020

NOTE:

- While doing your homework, please write down your work in detail (circuit draws are recommended)
- The homework must be submitted via Blackboard, in the format of either Word files or scanned version of hand written papers (PDF format is recommended). Any late submission will be subtracted by 20% per day.
- Copying your classmate homework is prohibited. If caught with evidences, violation cases will result in 0 in the marks from both parties, respectively.

Problem 1 (25 marks):

The switch in the circuit shown in below has been closed for a long time before opening at t = 0:



a. Find $i_1(0^-)$ and $i_2(0^-)$

b. Find $i_1(0^+)$ and $i_2(0^+)$

c. Find $i_1(t)$ for $t \geq 0$

d. Find $i_2(t)$ for $t \geq 0$

e. Explain why the value of $i_2(0^-)$ and $i_2(0^+)$ are different

Problem 2 (25 marks):

The switch in the circuit shown in Fig. 1 had been closed for a long time and is opened at t = 0.

a) Calculate the initial value of $\boldsymbol{i}$.
b) Calculate the initial energy stored in the inductor.
c) What is the time constant stored of the circuit for $t > 0$
d) What is the numerical expression for $\boldsymbol{i}(t)$ for $t \geq 0$
e) What percentage of the initial energy stored has been dissipated in the 4Ω resistor 2 ms after the switch has been opened?

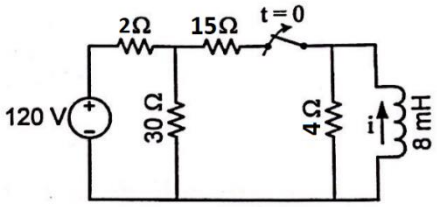


Fig. 1

Problem 3 (10 marks):

The switch in the circuit in Fig. 2 has been closed for a long time, and it is opened at t = 0. Find $v(t)$ for $t \geq 0$. Calculate initial energy stored in the capacitor.

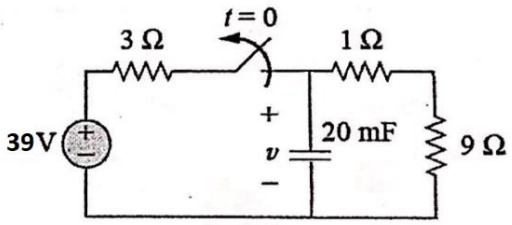


Fig. 2

Problem 4 (15 marks):

The switch in Fig. 3 has been in position A for a long time. At t = 0, the switch moves to position B. Determine $v(t)$ for $t \geq 0$. Then, calculate $v(t)$ value at $t = 0.1\ (s)$.

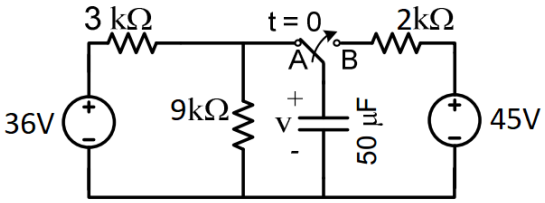


Fig. 3

Problem 4 (25 marks):

In the circuit showed in Fig. 4, the switch has been in position **a** for a long time. At t = 0, it moves instantaneously from **a** to **b**.

a. Find the value of $i_0(t)$ for $t \geq 0$.
b. What is the total energy delivered to the 8Ω resistor?
c. How many time constant does it take to deliver 95% of the total amount of energy found in question (b)

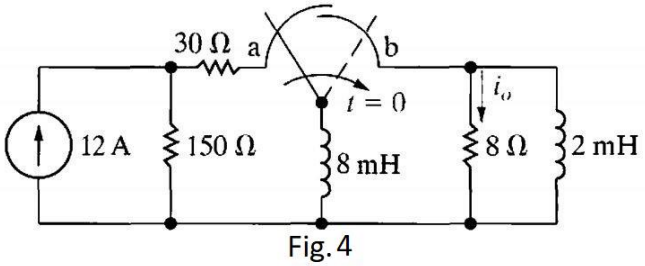


Fig. 4