BİLKENT UNIVERSITY
ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT

EE 201 CIRCUIT THEORY

EXPERIMENT 5

FIRST ORDER CIRCUITS

Student Name:

ID Number:

Section :

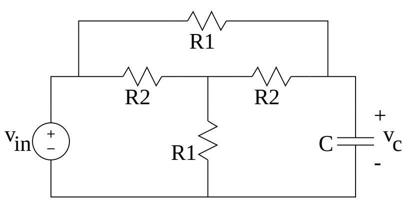
Date:

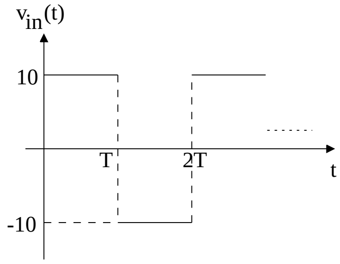
Preliminary Work

(1) Consider the following circuit. Chose the resistance in the kΩ range. Choose the capacitor C among 100, 150, 220, 330 and 470 nF. The input waveform is also given below.

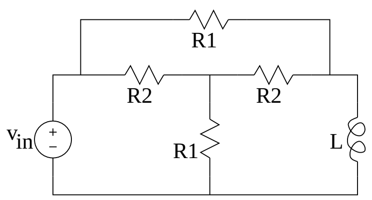
i) Let τ be the time constant of the circuit. Let $T \approx 10\tau$. Find and sketch the capacitor voltage waveform.

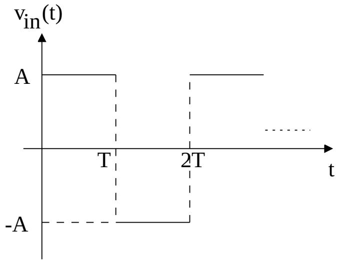
ii) Let $T \approx \tau$. Find the asymptotic waveform for $v_C(t)$. (see p. 269-272 of the book).





(2) Consider the following circuit. Here, $L = 1\ mH$. Choose the resistors so that the Thevenin equivalent resistance R_{eq} seen from the inductor terminals is in the range $[100\ \Omega, 500\ \Omega]$, and choose the magnitude A of the input so that the short-circuit current (for the inductor) is $i_{sc} \approx 10mA$. Let τ be the time-constant of the circuit. Find and sketch the current $i_L(t)$ and $v_L(t)$ for $T \approx 10\tau$. Sketch the same waveform for $T \approx \tau$.





EXPERIMENT:

Part 1:

Construct the circuit in problem 1.

i) Choose the input waveform so that $T \approx 10\tau$, and measure the capacitor voltage. Make comments if there are differences between the computed and measured quantities.

Observation and comments:

ii) Choose the input waveform so that $T \approx \tau$, and measure the capacitor voltage. Make comments if there are differences between the computed and measured quantities.

Observation and comments:

Part 2:

Construct the circuit in problem 2. Choose $T \approx 10\tau$ and $T \approx \tau$, measure the inductor voltage. Make comments if there are differences between the computed and measured quantities.

Observation and comments: