FACULATY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ENEE 2101

Circuits Laboratory

Experiment.6 Prelab

First Order Circuits

Prepared by:

Malak Qasem 1210484

Supervised by:

Dr. Jaser Sa'ed

Teacher assistance:

Eng. Mohammed Deek

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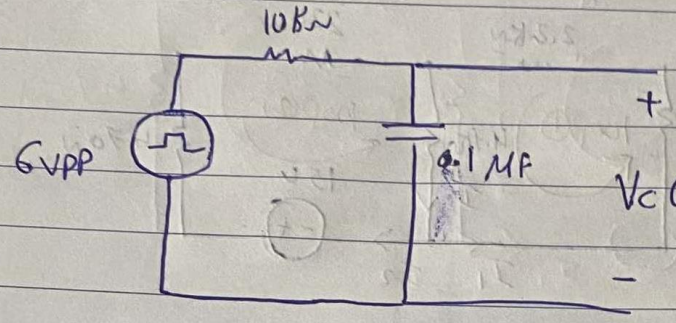
Part A: Step response of First-order RC circuit:

Malak Qasem
1210484

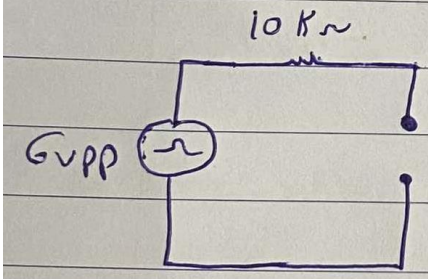


* The general formula for $V_c(t)$:

$$V_c(t) = V_c(\infty) + [V_c(0^+) - V_c(\infty)]\, e^{-t/T}$$

→ $V_c(0^+) = V_c(0^-)$ The circuit is open

So $V(-0) = V(+0) = 0$ at $t = \infty$



$V_c(\infty) = V_{in} = 0$

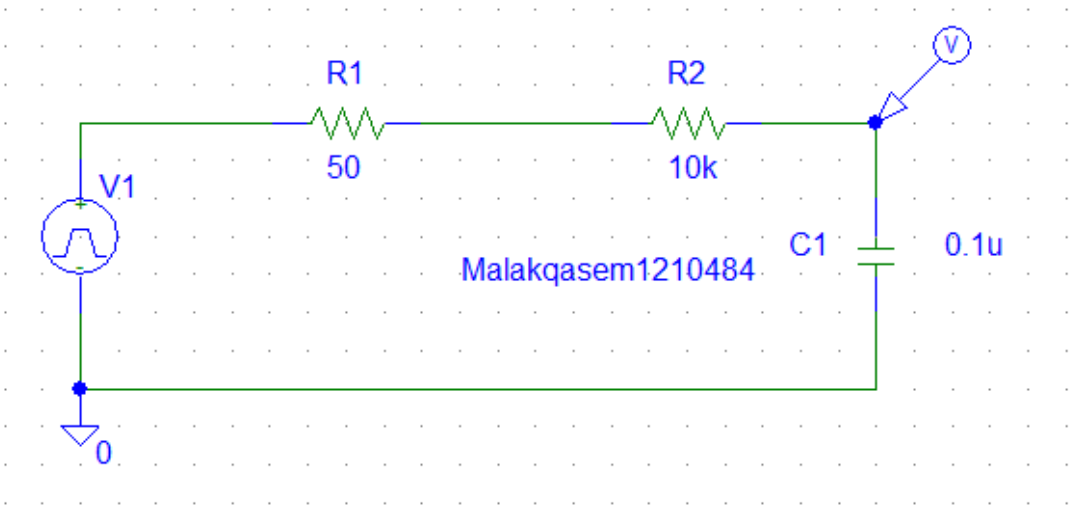
$I = R.C$

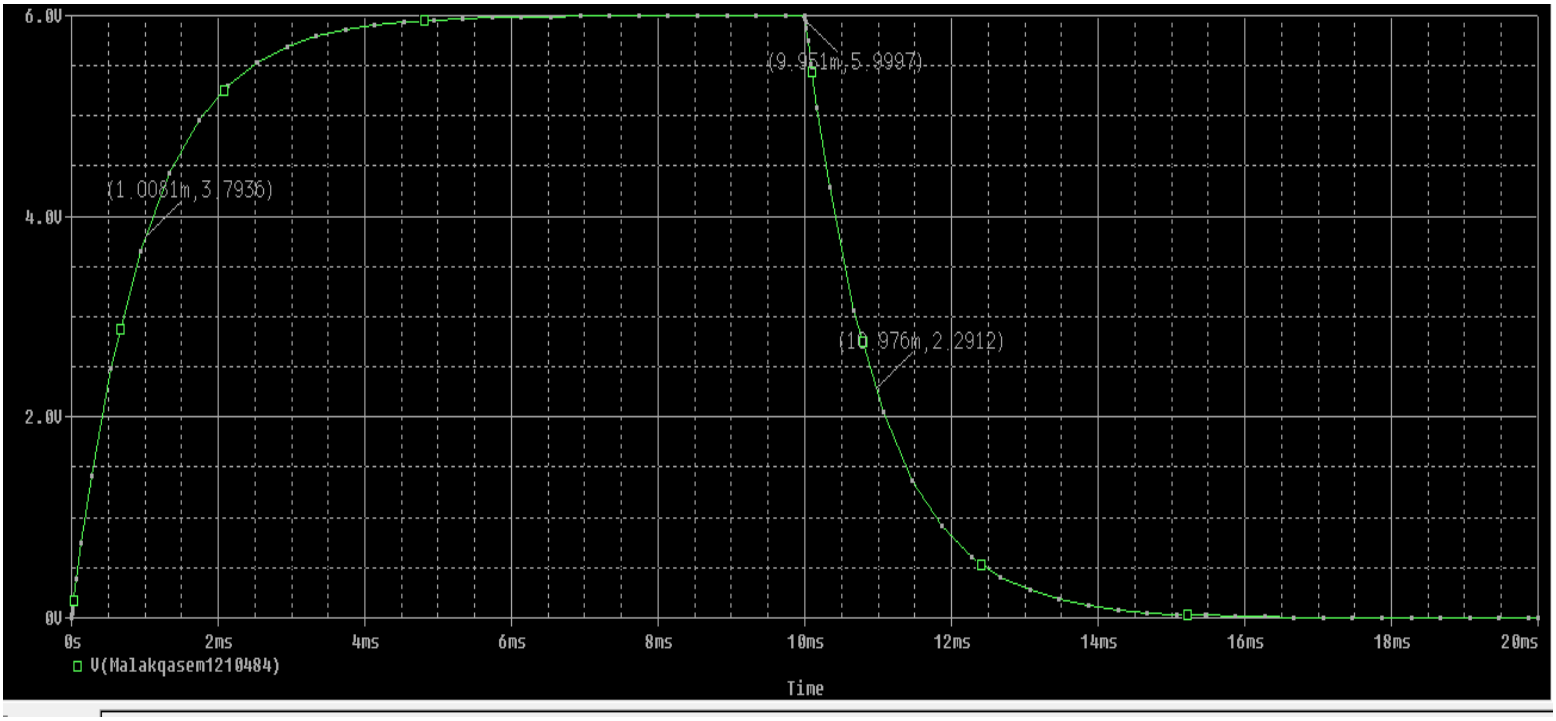
$= 10K\Omega \cdot 0.1\,MF = 1 \times 10^{-3}\,s = 1ms$

→ $V_c(t) = -V_{in}\, e^{\frac{-t-t_0}{T}} + V_{in}$

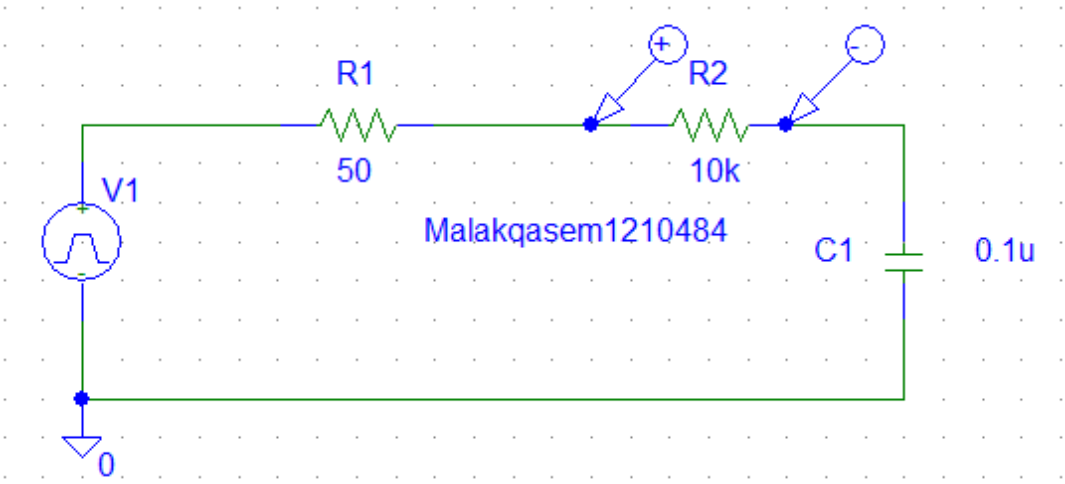
∴ $V_c(t) = -6\, e^{\frac{-t-t_0}{T}} + 6$ —

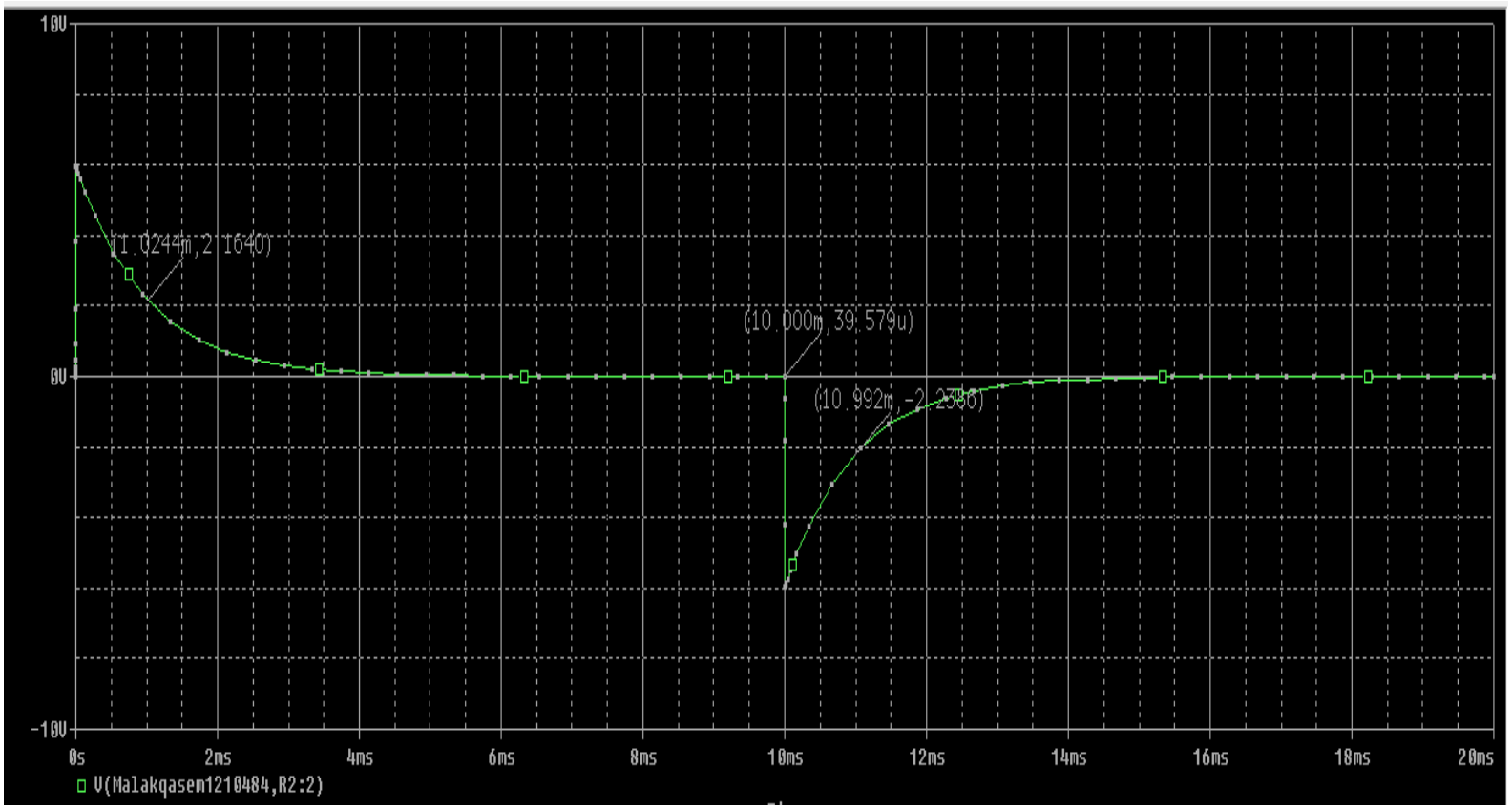
- The voltage over the Capacitor:



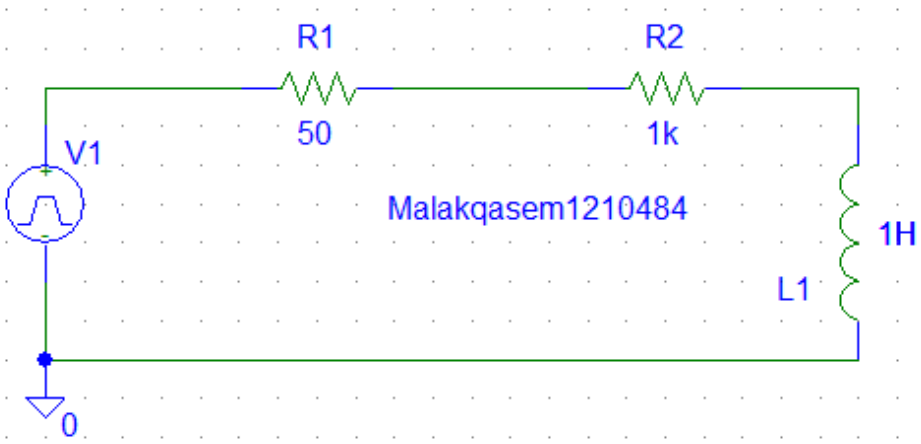


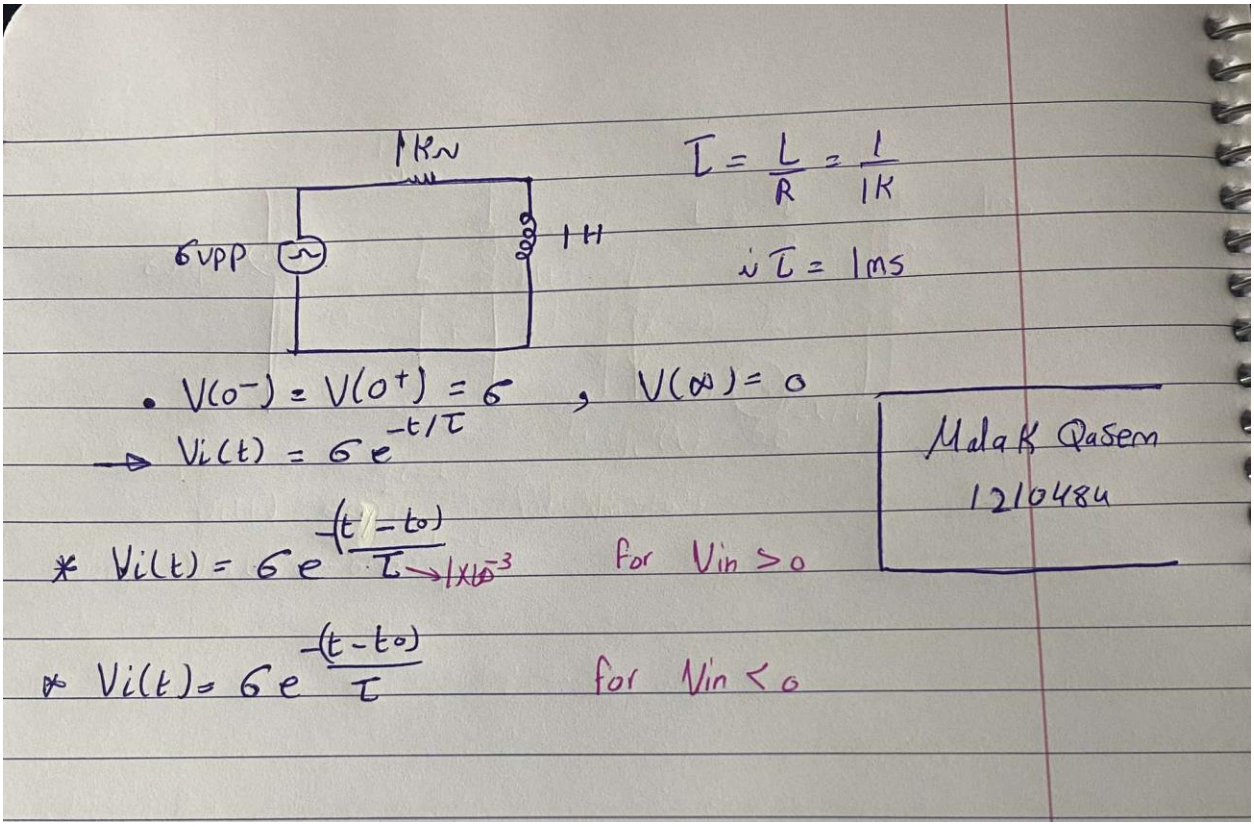
- The voltage over the Resistor:



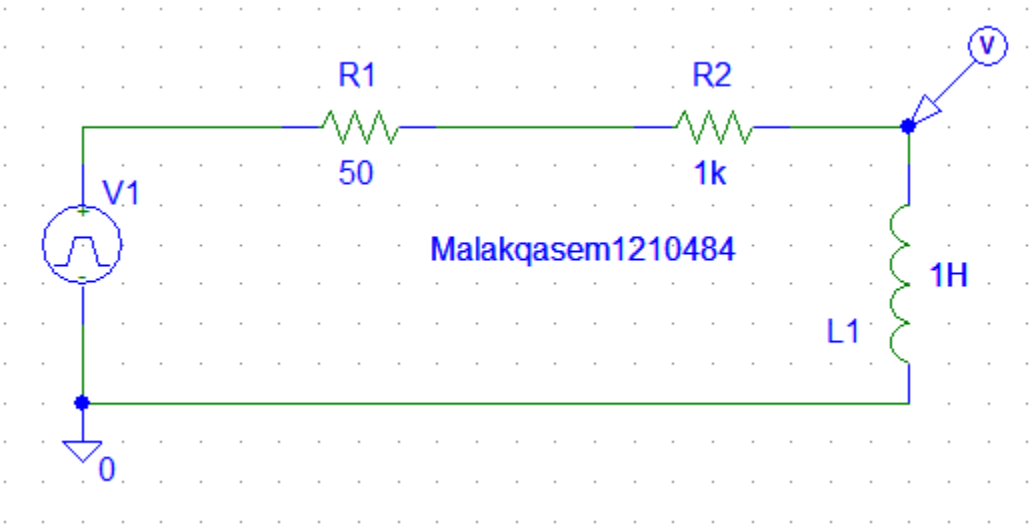


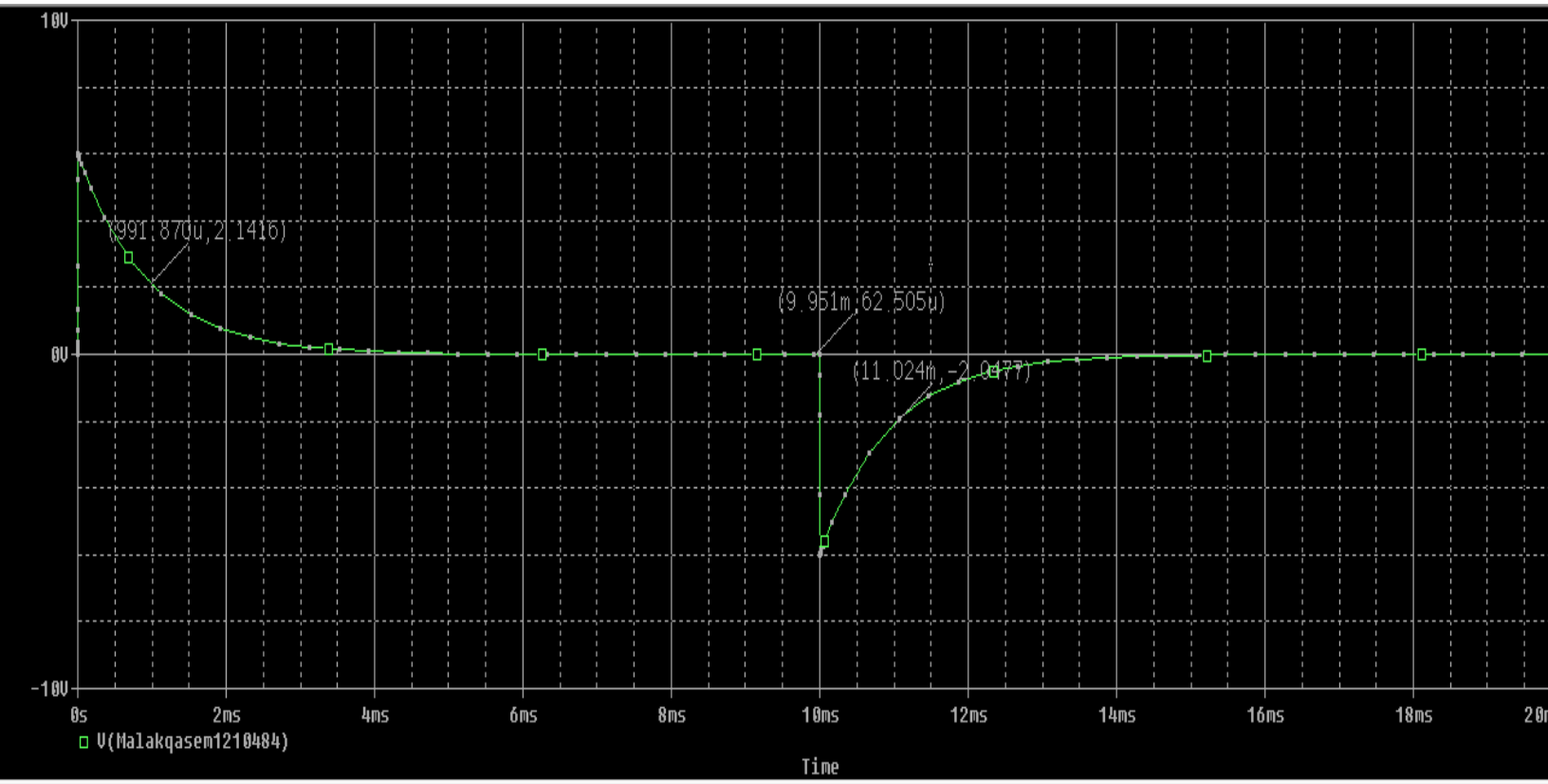
Part B: Step response of First-order RL circuit:





- The voltage over the Inductor:





- The voltage over the Resistor: