

Lab 3: Transient Lab

Name: _____

Student ID: _____

Date: _____

TA's signature: _____

Part I: First-Order Circuit:

- $R_1 = 1\text{k}\Omega$, $C = 0.1\mu\text{F}$;
- Steps:
 1. Turn on the function generator. Set a square wave at 1 V_{ppk} and 100 Hz. Apply it to the circuit as the input signal.
 2. Monitor the input signal in Channel 1 and the output in Channel 2 of the oscilloscope. Complete the table.

For the **fastest** circuit response, set $R_p = 0$, and set the oscilloscope:

- a) Vertical scale for the input signal 200mV/div;
- b) Vertical scale for the output signal 200mV/div;
- c) Horizontal scale 5ms/div;

For the **slowest** circuit response, set $R_p = 10\text{k}\Omega$, and set the oscilloscope:

- a) Vertical scale for the input signal 200mV/div;
- b) Vertical scale for the output signal 50mV/div;
- c) Horizontal scale 5ms/div;

The setting of the potentiometer Corresponds to the...	Fastest circuit response	Slowest circuit response
Peak-to-peak voltage of the Input square wave, V_{ppk} [V]		
Peak-to-peak voltage of the Output square wave, V_{ppk} [V]		
Period of the Input square wave, T [ms]		
Rise Time of the Output waveform, [ms]		
Fall Time of the Output waveform, [ms]		

Part II: Second-Order Circuit:

- $L = 1\text{mH}$, $R_2 = 100\Omega$, $R_P = 10\text{k}\Omega$, $C = 820\text{pF}$;
 - Steps:
1. On the function generator, set a square wave at $1V_{ppk}$ and 10 kHz as the input signal.
 2. Vary R_P to generate three kinds of plot on the oscilloscope. (Under-damped, critically damped, over-damped response).
 3. Observe and save the graph from the oscilloscope.
 4. Record: **Fall time** and **Rise time**, the time interval between the neighboring peaks, Δt , and the resistance of the potentiometer, R_P .

	Resistance, R_P	Rise Time, [ms]	Fall Time, [ms]	time interval, Δt
Under-damped				
critically damped				
over-damped				