Lab 3: Transient Lab

Name:_____ **Student ID:** _____
Date:_____ **TA's signature:**_____

Part I: First-Order Circuit:

- R1 = 1kΩ, C = 0.1μF;
- 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 $\mathbf{R_P}$ **= 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 $\mathbf{R_P}$ **= 10 kΩ**, 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, $\mathbf{V_{ppk}}$ [V]		
Peak-to-peak voltage of the **Output** square wave, $\mathbf{V_{ppk}}$ [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 = 1mH, R2= 100Ω, R_P= 10kΩ, C = 820pF;
- Steps:

1. On the function generator, set a square wave at $\mathbf{1V_{ppk}}$ and **10 kHz** as the input signal.
2. Vary $\mathbf{R_P}$ 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, $\Delta\mathbf{t}$, and the resistance of the potentiometer, $\mathbf{R_P}$.

	Resistance, R_P	**Rise Time, [ms]**	**Fall Time, [ms]**	**time interval,** $\Delta\mathbf{t}$
Under-damped				
critically damped				
over-damped				