Electronics Workshop Report - 2

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- Objective:

  To solder an RC circuit to a PCB and thereby find out the time constant of the circuit.

- Equipment Used:
  - Soldering Equipment
  - PCB
  - Resistor
  - Capacitor
  - Wires
  - DSO (Digital Storage Oscilloscope)

- Procedure:
  1. Identify the components of the circuit, namely the resistors, capacitors, wires. Identify the points of input/output connections.
  2. Calculate the theoretical time constant of the circuit, using the formula,

     $$\tau = RC$$

     Where,

     τ is the theoretical time constant (seconds)

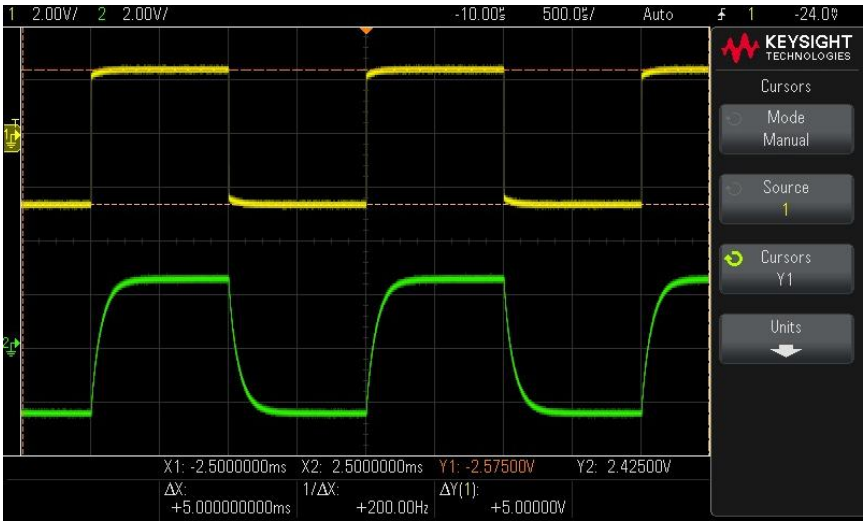
     R is the resistance (ohms)

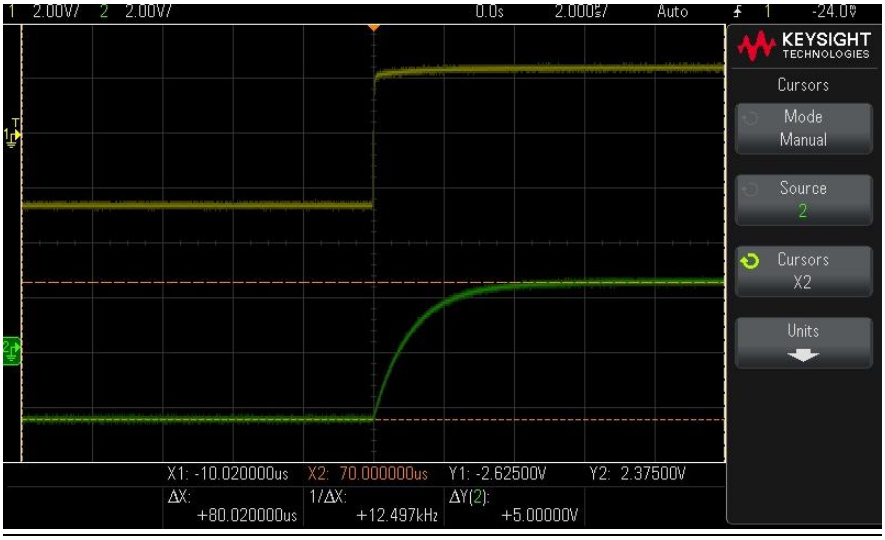
     C is the capacitance (farads)
  3. Organize the components on the PCB as per the circuit diagram and apply some flux on the ends/joints of the components.
  4. Heat the soldering iron and wipe the tip to remove any oxidation.

5. Apply some of the solder to the tip of the iron and apply it to the joints of the circuit components on the PCB. Let the soldered joints cool down.
6. Inspect the connections and test the circuit.
7. Connect the function generator of the DSO to the circuit and apply a square wave to the circuit using the Wave Generator option.
8. Connect input pin 1 to the function generator pins and input pin 2 to the wires across the capacitor.
9. Calculate the maximum voltage difference supplied by the function generator. Verify whether the difference is the same as the maximum voltage difference observed across the capacitor. If not, then change the frequency of the square wave.
10. Calculate the observed time constant by figuring out the time that it takes for the potential difference across the capacitor to reach 63% of the maximum value.
11. Repeat steps 2 – 9 for another combination of resistance and capacitance.
12. Tabulate the theoretical and observed values of time constants.

- Observation:
  - Combination 1:-

    Checking voltages,

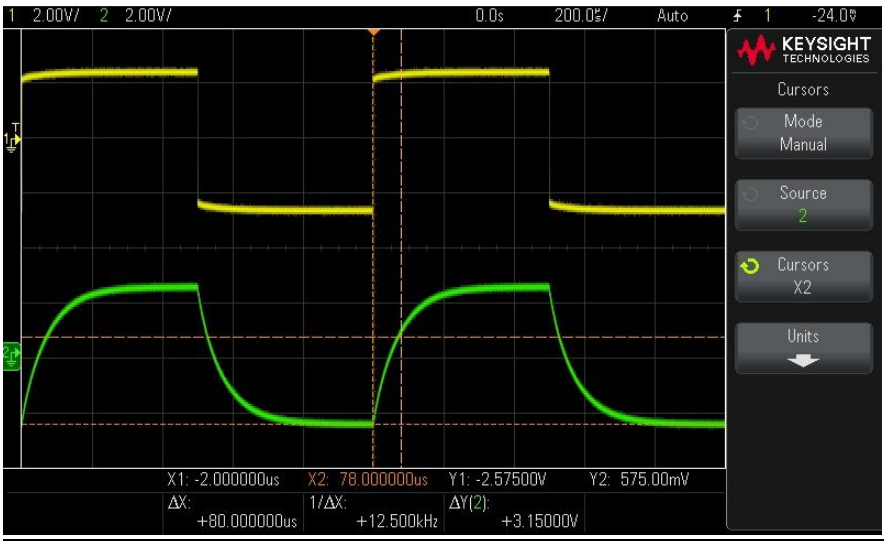




The voltage provided by the input and the maximum voltage across the capacitor is the same. (5 volts)

63% of 5V = 3.15V

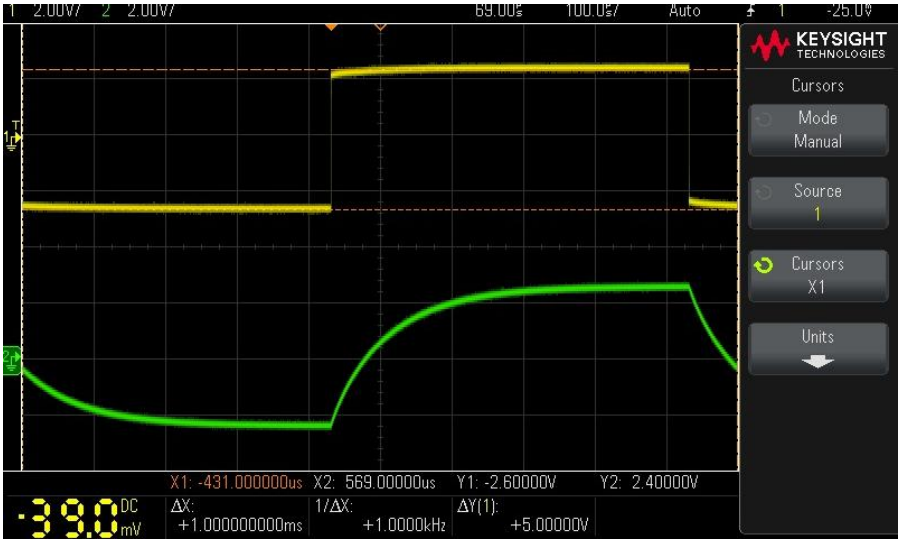
Measuring Time Constant,

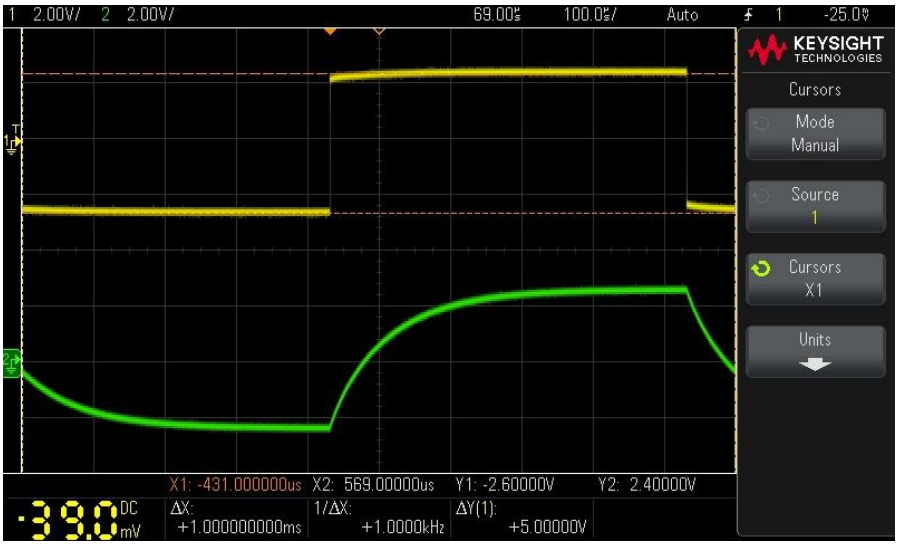


The time constant is measured to be 80 us.

- Combination 2:-

  Checking voltages,

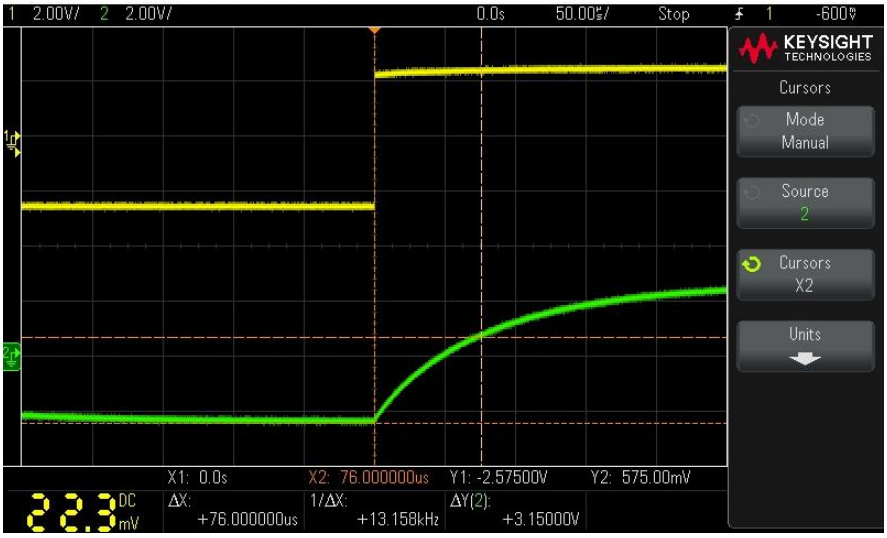




The voltage provided by the input and the maximum voltage across the capacitor is the same. (5 volts)

63% of 5V = 3.15V

Measuring Time Constant,



The time constant is measured to be 76 us.

- Observation Table:-

S.no	R (in ohms)	C (in microfarads)	Theoretical Time Constant (in microseconds)	Practical Time Constant (in microseconds)
1.	1000	0.1	100	80
2.	1000	0.1	100	76

- Result:
  - The time constants of the assembled RC circuit combinations are:
    - Theoretical:
      1) 100 us
      2) 100 us
    - Practical:
      1) 80 us
      2) 76 us

- Conclusion:

  An RC circuit has been assembled and soldered, and its time constant has been calculated experimentally.