General Sir John Kotelawala Defense University
Faculty of Computing
Department of Computer Engineering

1.2

BSc (Hons) in Computer Engineering
Laboratory Practical

Experiment #2 Hand on Experience on Basic Circuits

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Intake
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Date
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Instructor Name and Signature:
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Comments ……
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Grade

Objectives:
To make an electronic circuit on a breadboard, then implement it as a complete product using a dot board

Outcomes:
After completing this experiment, students would be able to:

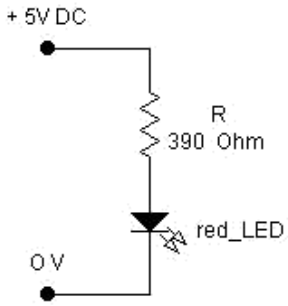
a) Explain steps for circuit designing.
b) Read the exiting circuit diagram and implement it.
c) Understand different soldering tools and how it used in a proper way.
d) Read the datasheet and modify the existing circuit as required.

Equipment Required:

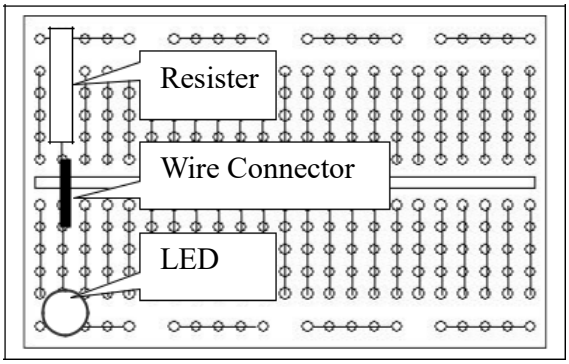
A breadboard, A power supply, A signal generator, An oscilloscope, A multimeter.

Ex 01: Create a power indicator light

Use a LED and create a simple power indicator. Your power source is 5V DC; however, LED works on 2V (2.2v) DC voltage and takes 10mA current. Therefore, you must use a resistor. (**DO NOT USE** LED without resister)



Circuit



Connection on the breadboard

Figure 01: Simple Circuit

Create a Simple Multivibrator Circuit and explain How its work

Note:

Multivibrator is the most commonly used type of relaxation oscillator because not only are they simple, reliable, and easy to construct, they also produce a constant square wave output waveform.

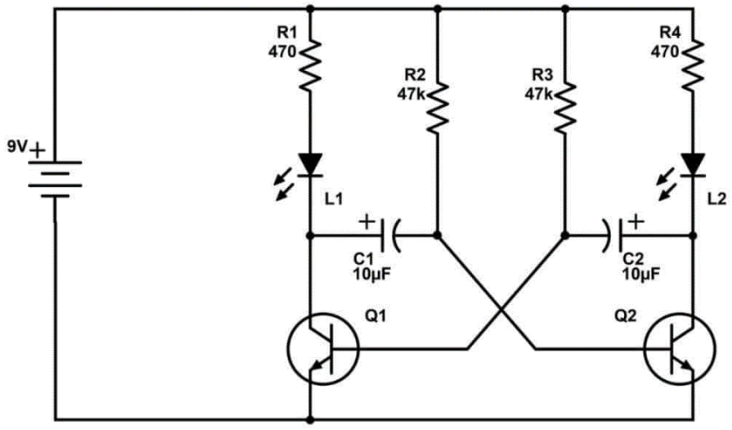


Figure 02: Multivibrator Circuit

Ex 02: Implement an electronic circuit using a breadboard

Implement the above Multivibrator circuit using a breadboard.

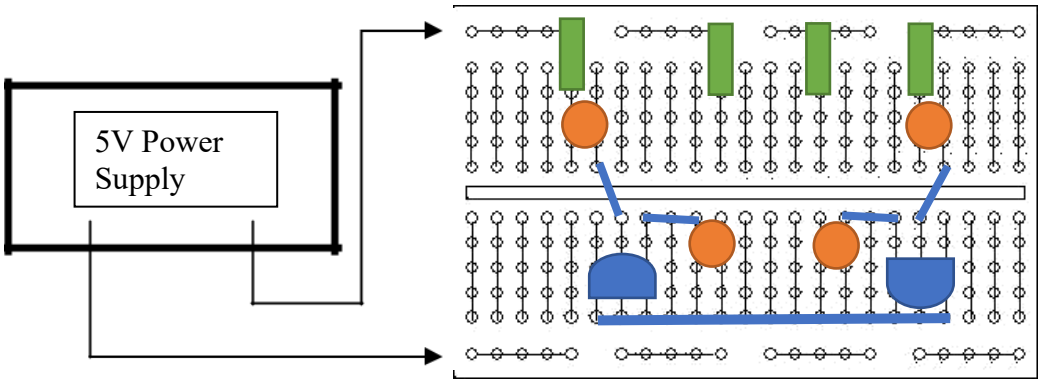


Figure 03: Multivibrator Circuit implementation on a breadboard

Ex 03: Explain the behavior of the multivibrator

1. Explain task of the R1 and R4 Resister (Assume that LED take 10mA maximum current)

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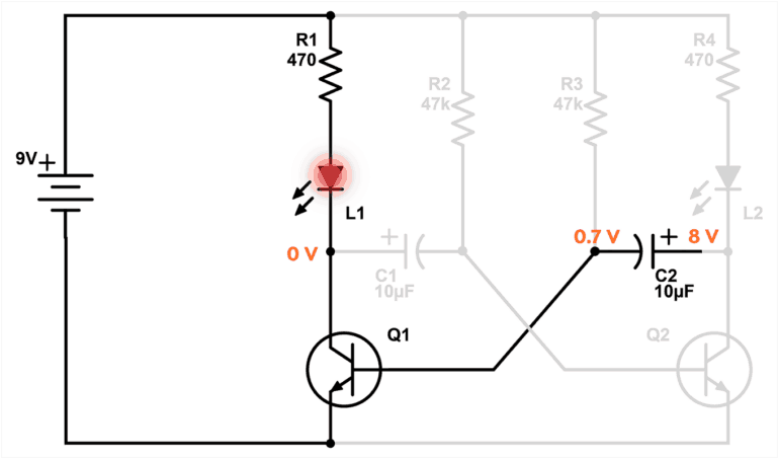
2. Use the following sample states and explain how the system works. Note that, six components make up the oscillator: Q1, Q2, C1, C2, R2, and R3.



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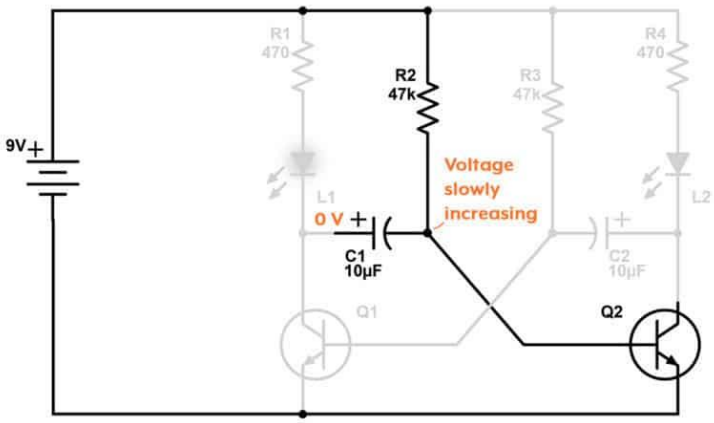

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Note: Frequency of Oscillation

$$f = \frac{1}{T} = \frac{1}{1.38RC}$$

Example:

Multivibrator circuit is constructed using two timing capacitors of equal value of 3.3uF and two base resistors of value 10kΩ. Calculate the minimum and maximum frequencies of oscillation if a 100kΩ dual-gang potentiometer is connected in series with the two resistors.

With the potentiometer at 0%, the value of the base resistance is equal to 10kΩ.

$$f = \frac{1}{1.38 \times 3.3\text{uF} \times 10\text{k}\Omega} = 22\,\text{Hz}$$

with the potentiometer at 100%, the value of the base resistance is equal to 10kΩ + 100kΩ = 110kΩ.

$$f = \frac{1}{1.38 \times 3.3uF \times 110k\Omega} = 2.0\,Hz$$

Then the output frequency of oscillation for the multivibrator can be varied from between 2.0 and 22 Hertz.

Ex 04: Identify Suitable RC values

Calculate suitable RC values to create 1Hz 10 Hz and 100 Hz oscillation (Use existing R or C value first and calculate appropriate other value)

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Ex 0: Make the complete product

Use the suitable dot board and make the entire circuit. Use the stranded soldering techniques

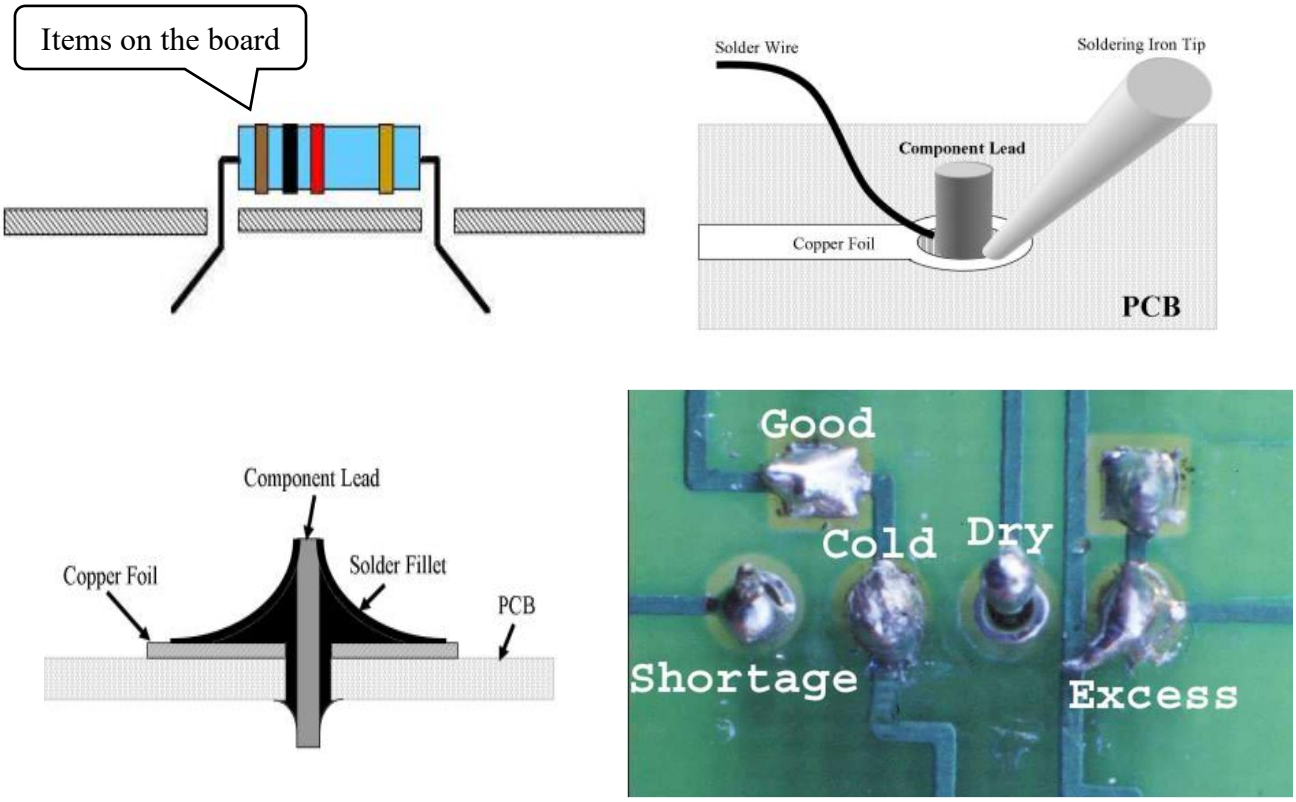

Figure 04: Soldering Techniques

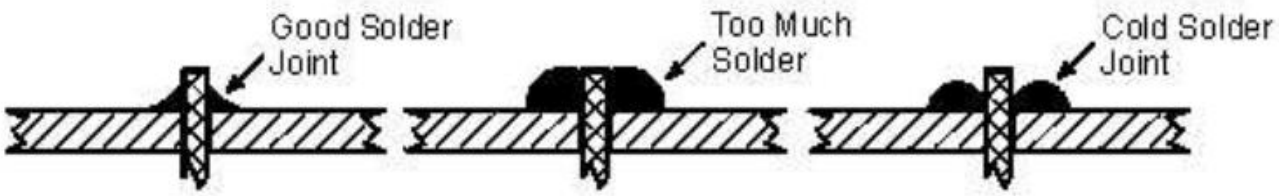

Figure 05: Soldering Techniques

With this experience explain a way to transfer each component into a dot board.

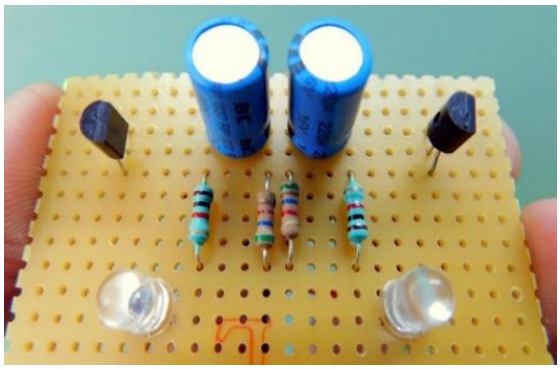

Figure 06: End Product

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