Name of experiment: Design and implement of astable multivibrator using 555 timer.

Objective:

(i) To learn to use the oscilloscope for troubleshooting digital circuits.

Tasks:

(i) To design a circuit using 555 timer to study astable multivibrator.

(ii) To implement the designed circuit on the breadboard.

(iii) To observe the output signal.

Theory: Astable multivibrator operates as a free running oscillator. Its output is a repetitive rectangular waveform that switches between two logic levels. The 555 timer is made of two voltage comparators and a SR latch. The voltage comparator are devices that produces a HIGH output when the voltage on the positive (+) input is greater than the voltage of the negative (-) input. The external capacitor charges up until its voltage exceeds $2/3\,V_{cc}$ as determined by the upper voltage comparator. When this comparator output goes HIGH, it resets the output latch, causing the output pin(3) to go LOW. At the same time $\overline{Q}$ goes HIGH closing the discharge switch and causing the capacitor to begin to discharge until the capacitor voltage drops below $\frac{1}{3}\,V_{cc}$ as determined by the lower voltage comparator. When this comparator output goes high, it sets the SR Latch, causing the

output pin (3) to go to HIGH, opening the discharge switch and allowing the capacitor to start charging again as the cycle repeats.

Circuit Diagram :

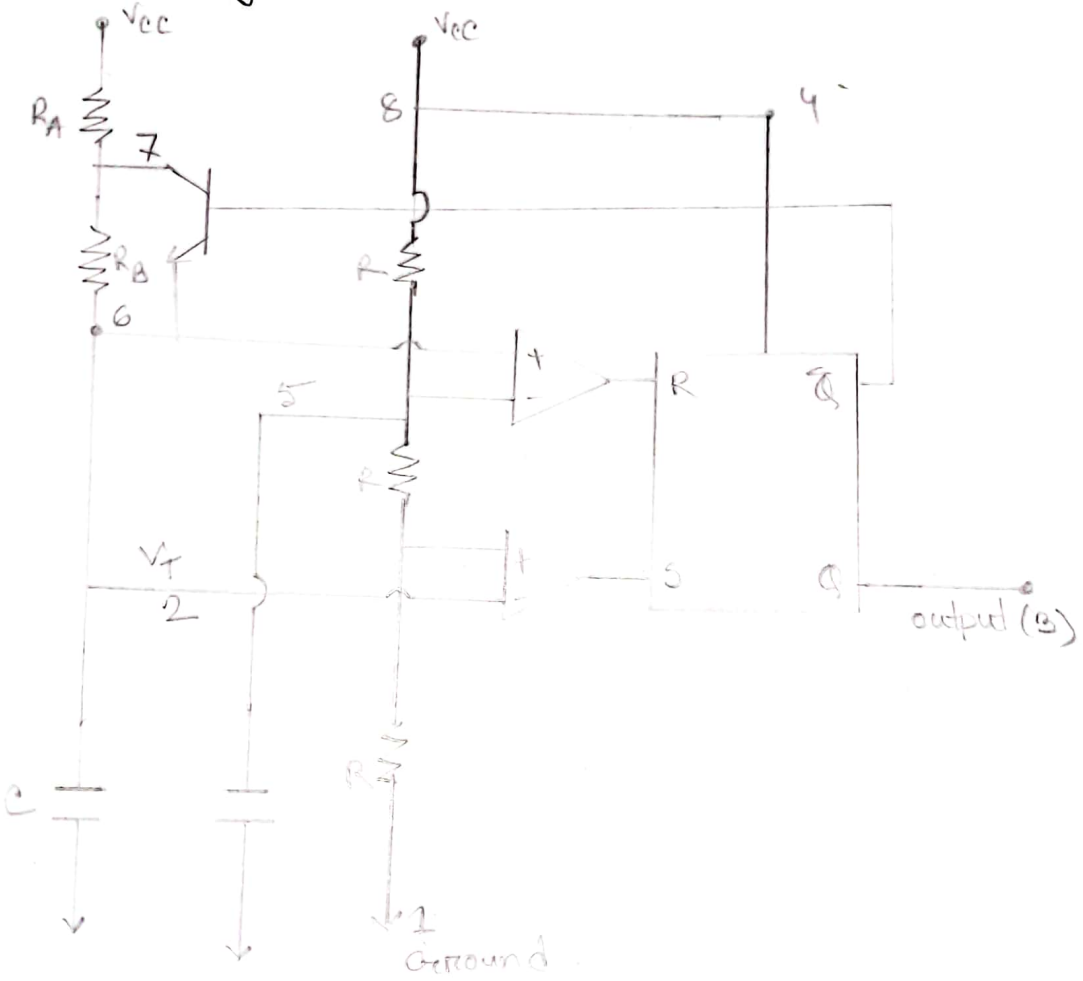


Fig : Astable multivibrator using 555 timer.

Equipment :

(i) Oscilloscope.
(ii) Breadboard and wire.
(iii) 555 timer.
(iv) Resistor.
(v) Capacitor.

Working procedure:

(i) At first all the necessary equipment had been taken and made a circuit according to the circuit drawn before.

(ii) The output pin(3) was connected to the oscilloscope.

(iii) Then the output was observed from the oscilloscope.

Observation:

Fig: Analog output

Fig: Digital output

Result and Discussion: When the power supply switch was closed the output was HIGH at the aseilloscope. But after some time the output goes LOW. Again after cirtain period of time the output goes HIGH. This continued until the power is on.

Hence the both HIGH and LOW ~~stables~~ are states are unstable, its a astable multivibrator. Here, the HIGH time is greater than the LOW time. This is due to ses resistors. If we supply $R_B >> R_A$ the duty cycle will be closed to 50%.

Precaution :

(i) 555 timer should be placed properly on the breadboard
(ii) Circuit should be implemented carefully.
(iii) Connections should be made properly.
(iv) Power supply should be 5 V.
(v) Power supply should be turned off whenever there was a need to make a circuit change.

Name of the experiment: Design and implement of monostable multivibrator using 555 timer.

Objective:

(i) To learn to use the oscilloscope for troubleshooting digital circuits.

Tasks:

(i) To design a circuit using 555 timer to study monostable multivibrator.

(ii) To implement the designed circuit on the breadboard.

(iii) To observe the output signal.

Theory: The monostable multivibrator is also called "one shot" pulse generator. The sequence of events starts when a negative going trigger pulse is applied to the trigger & Comparator. When this trigger comparator senses the short negative going trigger pulse to be just below the reference voltage ($\frac{1}{3}V_{cc}$) the device triggers and the output goes HIGH. The discharge transistors is turned off and the capacitor C that is externally connected to its collector will start charging to the a maximum value through the resistor R.

The HIGH output pulse ends when the charge of the capacitor reaches $\frac{2}{3}V_{cc}$. The internal connection of the monostable multivibrator is given below.

Circuit diagram:

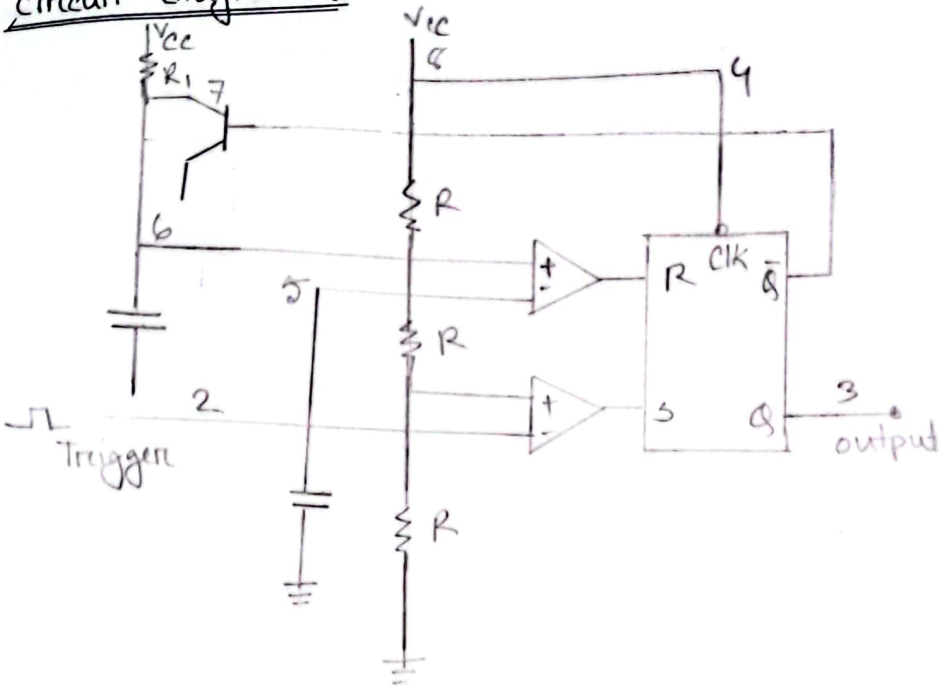


Fig: Monostable multivibrator using 555 timer.

Equipments:

(i) Oscilloscope.
(ii) Breadboard and wires.
(iii) 555 timer.
(iv) Resistors.
(v) Capacitors.

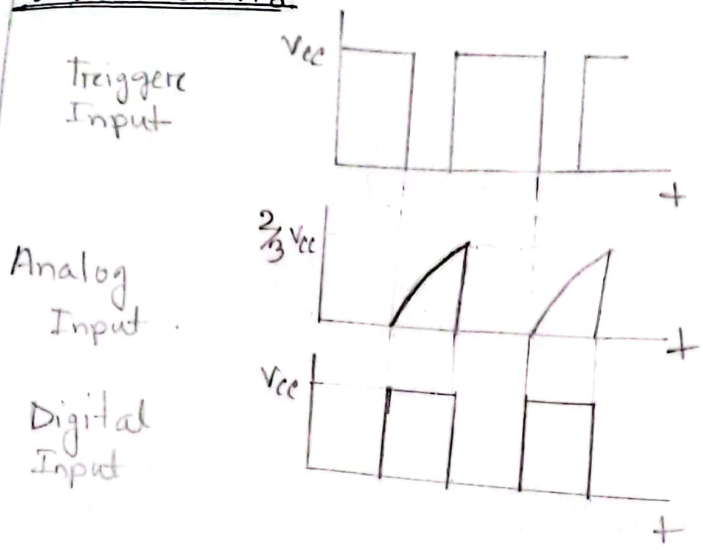
Working Procedure:

(i) At first all the necessary equipments were taken and then the circuit was implemented according to the diagram.

(ii) Trigger pin (2) was connected to a negative pulse. Trigger switch to provide negative pulse and output pin (3) was connected to the oscilloscope.

(iii). Then the output signal was observed several times when the switch was pressed.

Observation:



Result and discussion: Initially the output was LOW (stable state). When the trigger pulse switch was pressed, the output goes HIGH (unstable state). After a certain amount of time the output returned to LOW. This LOW state continued until next trigger pulse occured This observation indecates that the circuit has one stable st and one unstable state. the unstable state disappears after a certain amount of time. Hence it is a monostable multivibrator.

Precaution:

(i) 555 timer should be placed properly on the breadboard.

(ii) Circuit should be implemented properly.

(iii) Connection should be made properly.

(iv) Power supply should be 5 V.

(v) Power supply should be turned off whenever these was a need to make a circuit change.