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paper-iv Lecture no-50

# Topic: Monostable Multivibrator

A monostable multivibrator, as the name implies, has only **one stable state**. When the transistor conducts, the other remains in non-conducting state. A stable state is such a state where the transistor remains without being altered, unless disturbed by some external trigger pulse. As Monostable works on the same principle, it has another name called as **One-shot Multivibrator**.

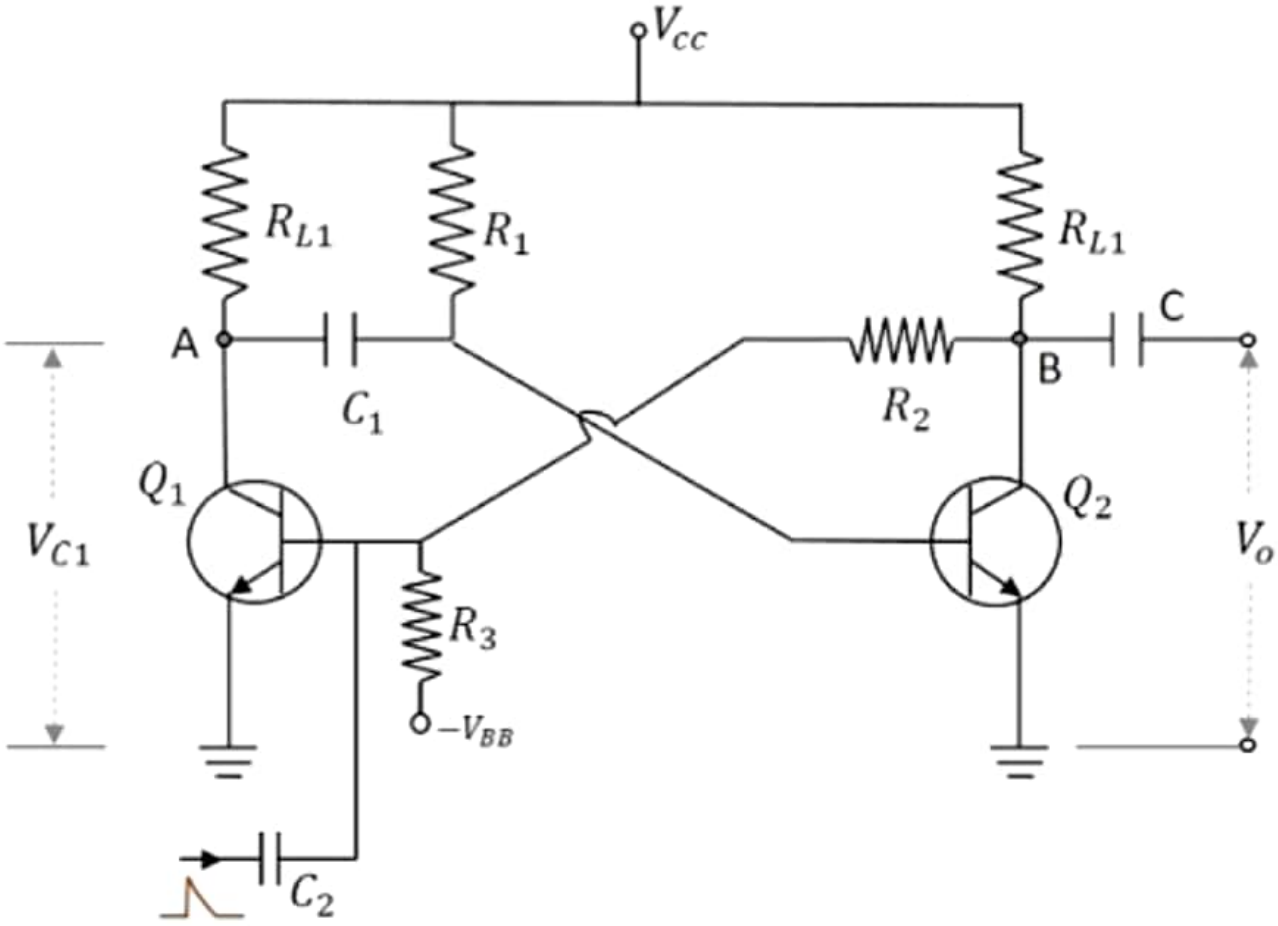
## Construction of Monostable Multivibrator

Two transistors $Q_1$ and $Q_2$ are connected in feedback to one another. The collector of transistor $Q_1$ is connected to the base of transistor $Q_2$ through the capacitor $C_1$. The

base $Q_1$ is connected to the collector of $Q_2$ through the resistor $R_2$ and capacitor C. Another dc supply voltage $-V_{BB}$ is given to the base of transistor $Q_1$ through the resistor $R_3$. The trigger pulse is given to the base of $Q_1$ through the capacitor $C_2$ to change its state. $R_{L1}$ and $R_{L2}$ are the load resistors of $Q_1$ and $Q_2$.

One of the transistors, when gets into a stable state, an external trigger pulse is given to change its state. After changing its state, the transistor remains in this quasi-stable state or Meta-stable state for a specific time period, which is determined by the values of RC time constants and gets back to the previous stable state.

The following figure shows the circuit diagram of a Monostable Multivibrator.




# Operation of Monostable Multivibrator

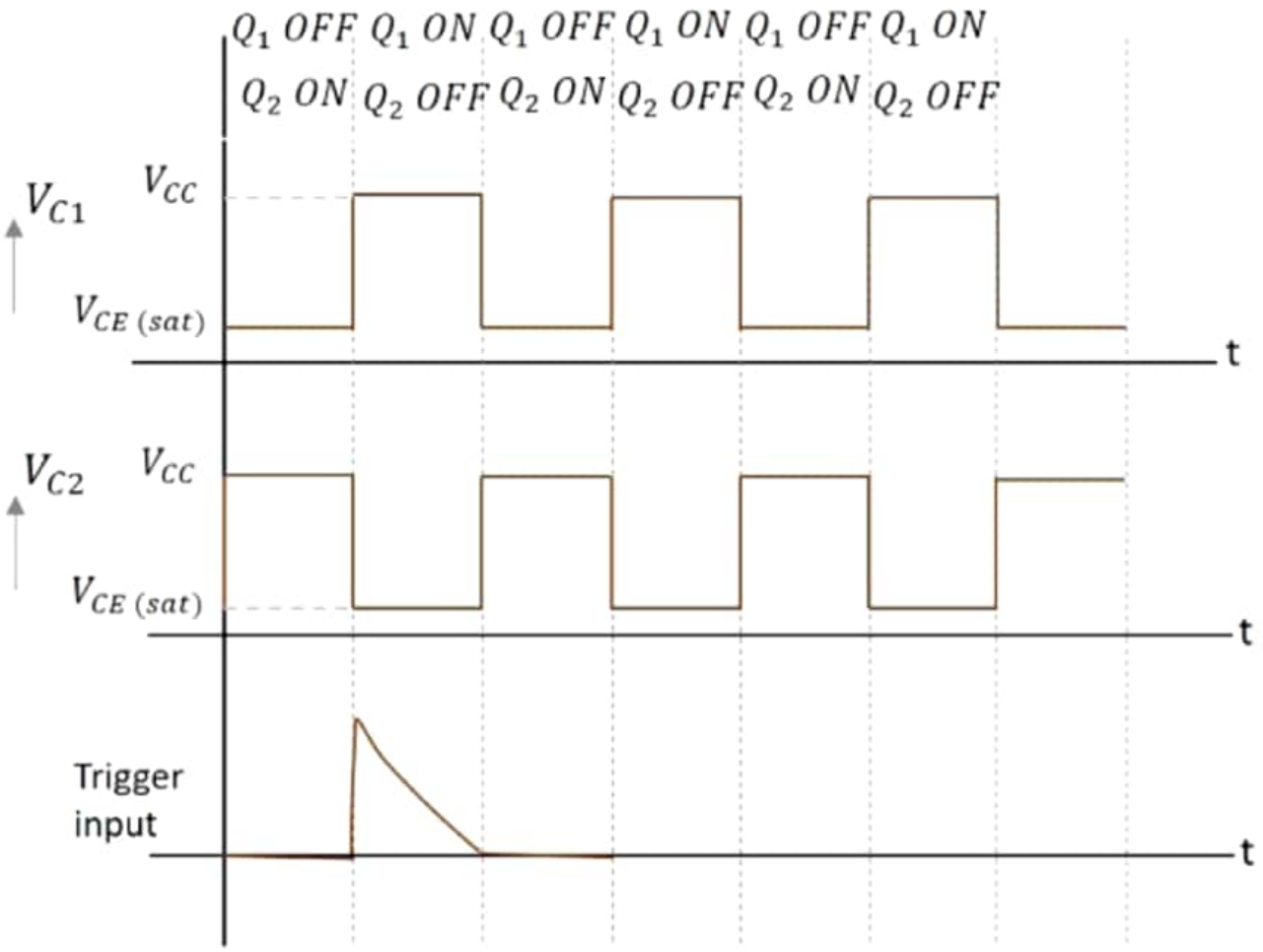
Firstly, when the circuit is switched ON, transistor $Q_1$ will be in OFF state and $Q_2$ will be in ON state. This is the stable state. As $Q_1$ is OFF, the collector voltage will be $V_{CC}$ at point A and hence $C_1$ gets charged. A positive trigger pulse applied at the base of the transistor $Q_1$ turns the transistor ON. This decreases the collector voltage, which

turns OFF the transistor $Q_2$. The capacitor $C_1$ starts discharging at this point of time. As the positive voltage from the collector of transistor $Q_2$ gets applied to transistor $Q_1$, it remains in ON state. This is the quasi-stable state or Meta-stable state.

The transistor $Q_2$ remains in OFF state, until the capacitor $C_1$ discharges completely. After this, the transistor $Q_2$ turns ON with the voltage applied through the capacitor discharge. This turn ON the transistor $Q_1$, which is the previous stable state.

## Output Waveforms

The output waveforms at the collectors of $Q_1$ and $Q_2$ along with the trigger input given at the base of $Q_1$ are shown in the following figures.




The width of this output pulse depends upon the RC time constant. Hence it depends on the values of $R_1C_1$. The duration of pulse is given by

$$T = 0.69R_1C_1$$

The trigger input given will be of very short duration, just to initiate the action. This triggers the circuit to change its state from Stable state to Quasi-stable or Meta-stable

or Semi-stable state, in which the circuit remains for a short duration. There will be one output pulse for one trigger pulse.

## Advantages

The advantages of Monostable Multivibrator are as follows −

- One trigger pulse is enough.
- Circuit design is simple
- Inexpensive

## Disadvantages

The major drawback of using a monostable multivibrator is that the time between the applications of trigger pulse T has to be greater than the RC time constant of the circuit.