EXPERIMENT NO.(7)
MULTIVIBRATORS AND WAVE SHAPING

**Object:** To study and examine the operation of different types of multivibrators.

**Equipment**
1. Function generator
2. DC power supply
3. Two transistor, capacitors & resistors

**Theory**

Pulse generators are circuits that generate a pulse waveform directly and most of them use the relaxation principle (charging & discharging of capacitor). The most common type is the multivibrator, which consists of two stages, resistance coupled amplifier with the output of each stage coupled resistively to the other. In generation collector current of one stage is a maximum when Ic of the other stage is at cut-off at regular intervals. Multivibrators are classified into three types:

(A) **Astable multivibrator**

It is a multivibrator in which stages are switched from ON to OFF state in regular time intervals without any triggering. It is also called (free running) and has no stable state. The circuit diagram is shown in Fig.(1).

(B) **Monostable multivibrator**

In this case, one stage is ON until it is triggered, in the same time the other stage is made to be ON for a predetermined length of time, and
then switched back to its original state automatically. The circuit diagram is shown in Fig.(2).

(C) Bistable multivibrator

In this case, one stage remains stable in one state (ON. or Off) until a triggering pulse is applied to initiate the switching action to reverse the stability condition (it has two stable state), the circuit diagram is shown in Fig.(3).

Procedure

Astable circuit

1. Connect the circuit shown in Fig.(1).
2. Draw the waveform at the collector & the base of each transistor.
3. Vary the value of VBB and observe the effect on the waveforms.
4. Repeat step 2 with (C1 =C2= 1μF, (C1 =0.01μF) & (C2 =0.1μF).

Monostable circuit

1. Connect the circuit as shown in Fig.(2)
2. Draw the waveform at the collector & the base for each transistor.
3. Apply triggering pulses from a pulse generator and plot the waveform at the collector & the base for one of the transistor.
4. Change C to 0.01μF and repeat step 2.

Bistable circuit

1. Connect the circuit as shown in Fig.(3).
2. Draw the Waveform at the collector & the base for each transistor.
3. Apply triggering pulses from a pulse generator and draw the output of one transistor.
Discussion

1. State the applications of multivibrators circuits.
2. Explain the operation of the astable multivibrator.
3. How can you improve the shape of the output in the multivibrator circuit?
4. How can you change the frequency of the output in each multivibrator circuit?
5. Discuss the effect of triggering frequency on the output for monostable & bistable circuit.

Fig.(1): Astable multivibrator.
Fig. (2): Monostable multivibrator

Fig. (3): Bistable multivibrator