PART 6

Multivibrators

- 1. Analyzing Astable Multivibrators Constructed by Operational Amplifiers (4.1)
- 2. Analyzing Monostable Multivibrators Constructed By Operational Amplifiers (4.2)
- 3. Analyzing Bistable Multivibrators Constructed By Operational Amplifiers (4.3)
- 4. Analyzing Symmetric Square Wave Generator Constructed By Operational Amplifier (4.4)

MODULE Y-0014/04

ANALYZING ASTABLE MULTIVIBRATORS CONSTRUCTED BY OPERATIONAL AMPLIFIERS

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



- **1-** Set the potentiometer to its maximum resistance position (the middle pin is down). Apply power to the circuit. Write down the behavior of the LED at the output.
- **2-** Set the potentiometer to its minimum resistance position (the middle pin is up). Write down the behavior of the LED at the output. If there is any change, explain the reason.

3- Calculate the down and upper limit for the frequency of the output signal.

The frequency of the output signal is minimum when the resistance of the potentiometer is maximum. At that instant the resistance "R" is;

$$R = P + R3 =$$

$$K = \frac{R1}{R1 + R2} =$$

$$T = 2.R.C.Ln.\frac{1+K}{1-K} =$$

$$T =$$

$$F = \frac{1}{T} =$$

The frequency of the output signal is maximum when the resistance of the potentiometer is minimum. At that instant the resistance "**R**" is;

$$R=R3=100K$$
$$T = 2.R.C.Ln.\frac{1+K}{1-K} =$$
$$T =$$
$$F = \frac{1}{T} =$$

4- Observe the output signal on the oscilloscope screen and draw it. Measure its amplitude and frequency. Compare the frequency with the calculation result.

ANALYZING MONOSTABLE MULTIVIBRATORS CONSTRUCTED BY OPERATIONAL AMPLIFIERS

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Set the potentiometer to its maximum resistance position (the middle pin is up). Apply power to the circuit. Wait for 5 seconds. What is the state of the LED at the output?

2- Set the oscilloscope to DC mode. Read the voltage at the output.

Vo=

3- Press the button and depress it after a while. Write down the behavior of the LED and the change in the output signal.

4- Set the potentiometer to its mid-position. Press the button and depress it after a while. Write down the change in the behavior of the Led.

ANALYZING BISTABLE MULTIVIBRATORS CONSTRUCTED BY OPERATIONAL AMPLIFIERS

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Apply power to the circuit. Write down the states of the LEDs connected to the output.

2- Press the button **"B2**" and depress it after a while. Write down the states of the LEDs connected to the output. Measure the output voltage at that instant.

3- Press the button "**B1**" and depress it after a while. Write down the states of the LEDs connected to the output. Take note of the output voltage at that instant.

ANALYZING SYMMETRIC SQUARE WAVE GENERATOR CONSTRUCTED BY OPERATIONAL AMPLIFIER

EXPERIMENTAL PROCEDURE:

Connect the circuit as shown in the figure.



1- Apply power to the circuit. Define the output waveform.

2- Vary the potentiometer P. Find the minimum and maximum frequency values.

3- Measure the amplitude of the output signal. Why is that value obtained?