Exp.No.10

IC 555 Application as a SCHMITT TRIGGER

AIM:

To design and construct a Schmitt trigger using IC555 Timer.

APPARATUS:

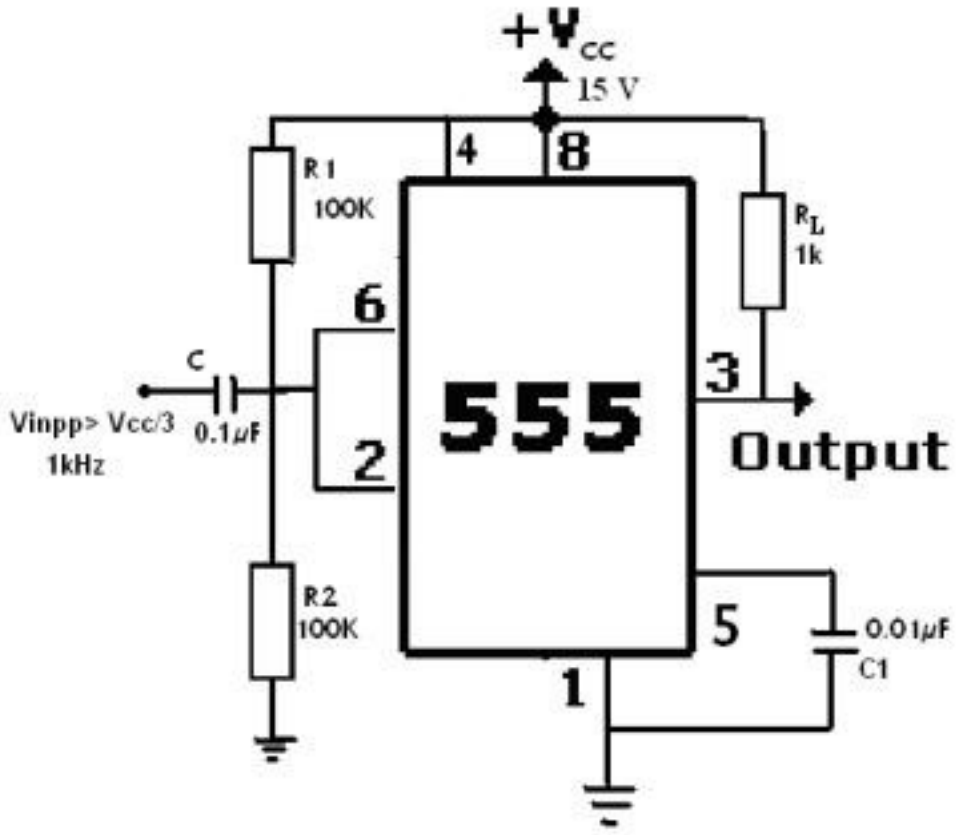
1. IC555 –1No
2. Resistors
3.Capacitors
4. Dual Power supply(0-20V)
5. Multimeter
6. CRO and Probes
7. Funtion Signal Generator
8. Bread board
9.Connecting wires

THEORY:

Schmitt trigger converts an irregular –shaped waveform to a square wave or pulse. The output of Schmitt trigger is a square wave when the input is sine wave or triangular wave, where as if the input is a saw tooth wave then the output is a pulse wave. So this circuit is also known as squaring circuit.

555 timer can be used as Schmitt trigger. Here two internal comparators are tied together and externally biased at VCC/2 through R1 & R2. Since the upper comparator will trip at (2/3) VCC and the lower comparator at (1/3) VCC the bias provided by R1 & R2 is centered within these two thresholds. Thus a sine wave of sufficient amplitude (> VCC /6 = 2/3 VCC – VCC/2) to exceed the reference levels causes the internal flip–flop to alternately set and reset providing a square wave output The input voltage Vin triggers (changes the state of) the output Vo every time it exceeds certain voltage levels called Upper threshold voltage, VUT and Lower threshold voltage, VLT. The hysteresis width is the difference between these two threshold voltages i.e. VUT – VLT.

CIRCUIT DIAGRAM:



PROCEDURE:

1.Initially set +Vcc = 15 volts.

2.Measure all resistors that are used in the amplifier circuits using the multimeter and record these values

3. As shown in the circuit diagram connect the circuit for Schmitt Trigger on a breadboard.

4.Before turning any power on, double check the wiring to make sure that it is correct. Make sure that the power supply to the 555 is correctly wired as not to apply the incorrect polarity to the 555.

5. Apply the input sine wave with peak voltage greater than the designed voltage (Ut). using function generator.

6. Connect the channel–1 of CRO at the input terminals and Channel-2 at the output terminals.

7. Observe the output square waveform corresponding to input sinusoidal signal.

8. Overlap both the input and output waves and note down voltages at positions on sine wave where output changes its state. These voltages denote the Upper threshold voltage and the Lower threshold voltage (see EXPECTED WAVEFORMS below).

9. Verify that these practical threshold voltages are almost same as the theoretical threshold voltages calculated using formula.

10. Sketch the waveforms on graph paper by noting down the amplitude and the time period of the input Vin and the output Vo.

EXPECTED GRAPH:

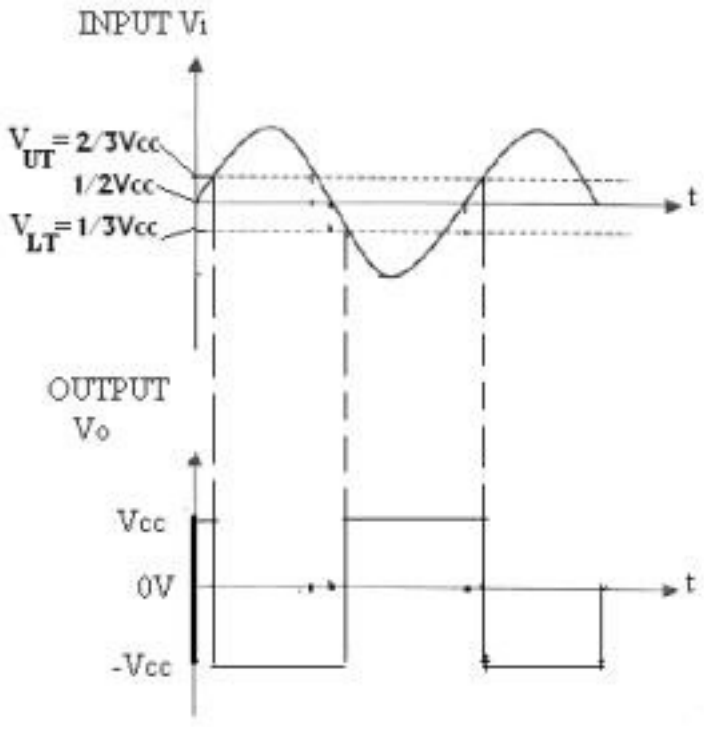
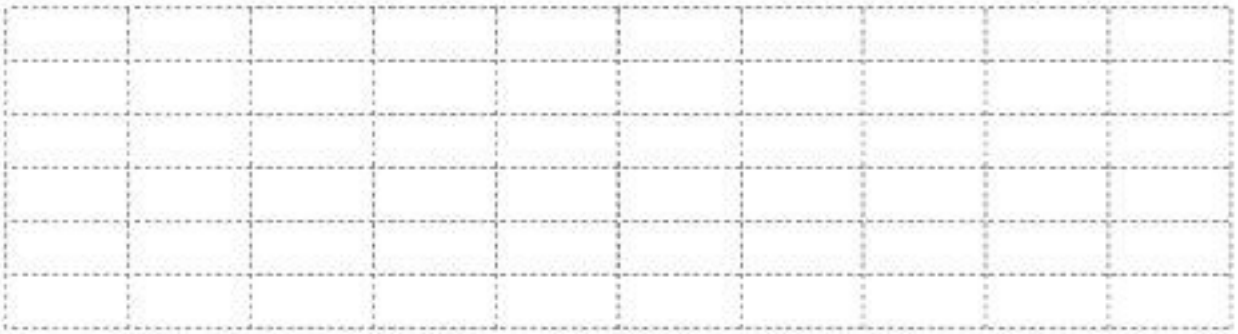


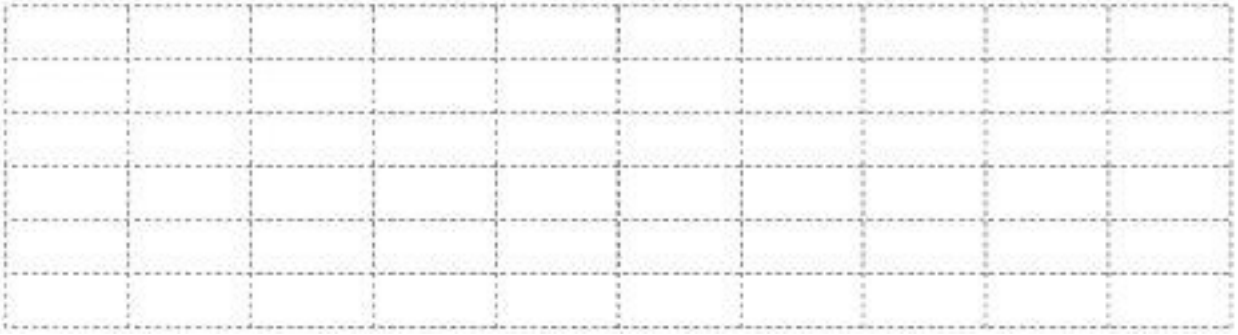
Figure shows that the output of the Schmitt trigger is a square wave when the input is a sinewave.

WORKSHEET:

Input Waveform:



Output Waveform:



RESULT:

Hence the output of Schmitt trigger using IC 555 Timer is observed.