Experiment No.6

SCHMITT TRIGGER

Aim: To design and setup a Schmitt trigger, plot the input output waveforms and measure V_{UT} and V_{LT}.

Objectives: After completion of this experiment, student will be able to design and setup a Schmitt trigger circuit using OP AMP.

Equipments/Components:

Sl .No	Name and Specification	Quantity required
1	Dual power supply +/- 15V	1
2	Function generator(0- 1MHz)	1
3	Oscilloscope	1
4	Bread board	1
5	IC 741C	1
6	Resistor	3
7	Probes and connecting wires	As required.

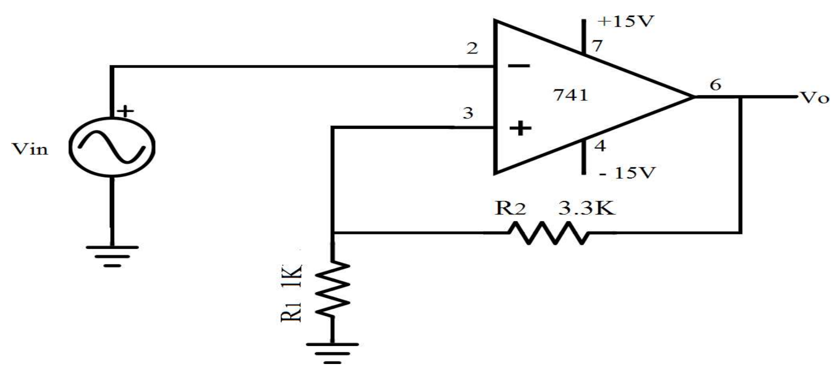
Theory:

It is a regenerative comparator or it is a comparator with hysteresis. This circuit uses positive feedback and the op-amp is operated in saturation. The output can take two values
+Vsat and –Vsat. When output = +Vsat, the voltage appearing at the non-inverting terminal is V_{UT} or UTP = +Vsat(R_1/R_1+R_2) called the upper threshold point. Similarly When output = - Vsat, the voltage appearing at the non-inverting terminal is V_{LT} or LTP = -Vsat(R_1/R_1+R_2) called the lower threshold point. When Vin is greater than UTP, the output will switch from +Vsat to –Vsat. Similarly When Vin is less than LTP; the output will switch from -Vsat to +Vsat which is shown in the graph. The difference between UTP-LTP is called hysteresis. Hysteresis avoids false triggering of the circuit by noise. Hysteresis curve is the plot of Vo versus Vin . Schmitt trigger circuit is used to convert any irregular wave into square wave.

Procedure:

1. Check the components.
2. Setup the circuit on the breadboard and check the connections.
3. Switch on the power supply.
4. Give V_i= 10 Vpp / 1KHz sine wave.
5. Observe input and output on two channels of oscilloscope simultaneously.
6. Note down and draw the input and output waveforms on the graph.

Circuit Diagram



Design:

UTP = $+V_{sat}(R_1/R_1+R_2)$

Let UTP = +3V and LTP = -3V,

Vsat=+13V

UTP, +3 = +13(
R_1/R_1+R_2) Let R_1 = 1 KΩ

Then R_2 = 3.3KΩ

Observations:

UTP=

LTP =

Graph:

Result: