

To simulate Operational Amplifiers, use “UniversalOpamp2”. $V_{CC} = +15V$ and $V_{EE} = -15V$

To simulate Zener Diodes, use “1N750” 4.7V Zener Diode.

Experiment 5.1.

Simulate the circuit shown in Figure-1.

Outputs: Plot the output voltage (V_o-t) and input voltage (V_i-t) for two different reference voltage (V_{ref}).

Explain the circuit and simulation results.

Note: You can use two resistors, instead of potentiometer. The sum of the resistor values should be 10K.

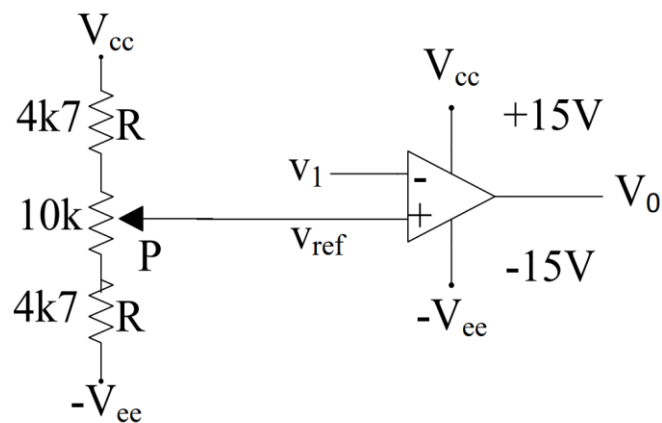


Figure 1: Voltage comparator test circuit.

Table 1: Input Signal Parameters (V_1) for Experiment 5.1.

Exp 5.1 - V_1	
Type	Triangle
Frequency	100Hz
Amplitude	10V (20V _{p-p})
DC Offset	0V

Experiment 5.2.

Simulate the circuit shown in Figure-2.

Outputs: Plot the output voltage of the OPAMP ($V_o - t$), output voltage of the circuit ($V_o' - t$) and input voltage ($V_i - t$).

Explain the circuit and simulation results.

Note: V_{ref} should be grounded. The zener voltage of the diodes is 4.7V.

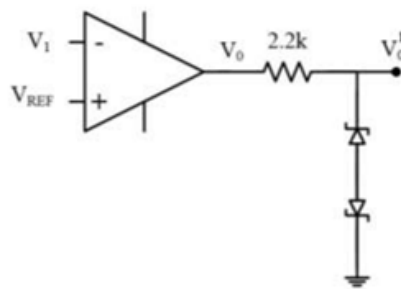


Figure 2: Voltage limiter circuit.

Table 2: Input Signal Parameters (V_1) for Experiment 5.2.

Exp 5.2 - V_1	
Type	Triangle
Frequency	100Hz
Amplitude	10V ($20V_{p-p}$)
DC Offset	0V

Experiment 5.3. and Experiment 5.4.

Simulate the circuit shown in Figure-3.

Outputs: Plot the output voltage ($V_o - t$) and input voltage ($V_i - t$) graphs.

Find the hysteresis parameters V_{o1} , V_{o2} , V_{11} and V_{12} as shown in Figure 4.

Explain the circuit and simulation results.

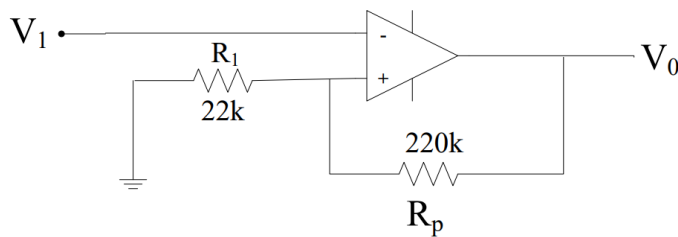


Figure 3: Schmitt trigger circuit.

Table 3: Input Signal Parameters (V_1) for Experiment 5.3 and Experiment 5.4.

Exp 5.3-5.4. - V_1	
Type	Triangle
Frequency	100Hz
Amplitude	10V ($20V_{p-p}$)
DC Offset	0V

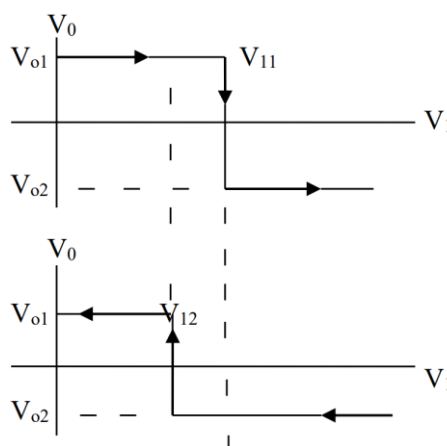


Figure 4: Hysteresis characteristic.

Experiment 5.5.

Simulate the circuit shown in Figure-5. Find the potentiometer resistance value for the symmetric output voltage waveform.

Outputs: Plot the output voltage ($V_o - t$), input voltage ($V_1 - t$) and ($V_{o'} - t$)

Explain the circuit and simulation results.

Note: The zener voltage of the diodes is 4.7V.

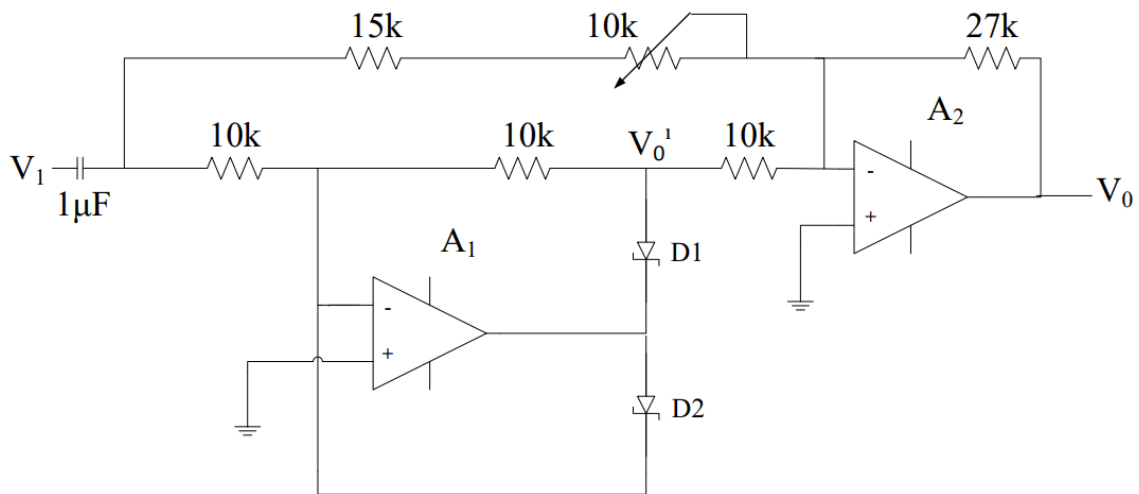


Figure 5: Full-wave rectifier circuit.

Table 4: Input Signal Parameters (V_1) for Experiment 5.5.

Exp 5.5. - V_1	
Type	Sine
Frequency	1kHz
Amplitude	Appropriate Level
DC Offset	0V