

Clippers
PRE LAB QUESTIONS

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1. What are the differences between linear and nonlinear wave shaping circuit?

Ans In the non-linear circuit, the non-linear elements are an electrical element and it will not have any linear relationship between the current & voltage.

In the linear circuits, the linear element is also an electrical element and there will be a linear relationship between the voltage and current. The examples of the linear elements are resistors in the most common element, capacitor, and air core inductors.

2. What are the applications of wave shaping circuit?

Ans The applications of Wave shaping circuits are :-

1. Integrator and Differentiator
2. Wave modifications
3. Adjusting DC Levels - Clipping & Clamping
4. Pulse Timings [Multivibrators]

3. What is wave shaping?

Ans A wave shaping circuit is the one which can be used to change the shape of a waveform from alternating current or direct current.

For example, a clipper circuit is used to prevent the waveform voltage from exceeding the predetermined voltage without affecting the remaining part of the waveform. This is nothing but wave-shaping.

A clamper circuit fixes either the positive or the negative peak excursions of a signal to a defined value by shifting its DC value.

4. What is the necessity of wave shaping?

Ans. The necessity of wave shaping are :-

1. To limit the voltage level of the waveform to some present value.
2. To shift the waveform to a particular voltage level.
3. To generate one wave from the other.
4. To cut the negative and positive portions of the waveform.

5. Mention the application of clipper and clamper.

Ans Clippers and clampers can be defined as clippers that are used to protect the electronic circuits by applying the AC input signals to the described voltage range. It will remove either the positive half or the negative or both the positive and the negative halves of the AC by considering the requirement of the defined voltage range. Without any alteration, the shape of the applied signal in any electronic circuit, the DC level can be shifted as desired by the clamper circuits. This is done by using a capacitor in the circuits. So clippers and clampers play an essential role in electronic circuits.

| | |
|--|-----------------|
| Experiment No. Date : | CLIPPERS |
|--|-----------------|

Aim

To study the clipping circuits for different reference voltages and to verify the responses.

Apparatus Required

| S.No. | Name | Range | Qty |
|-------|------------------------------|-----------|-----|
| 1 | CRO | 1Hz-20MHz | 1 |
| 2 | RPS | (0–30) V | 1 |
| 3 | B r e a d Board | - | 1 |
| 4 | Connecting Wires | - | Req |
| 5 | F u n c t i o n Generator | 1Hz-1MHz | 1 |

Components Required

| S.No. | Name | Range | Qty |
|-------|----------|--------------|-----|
| 1 | Resistor | 10K Ω | 1 |
| 2 | Diode | IN4007 | 1 |

Theory

The non-linear semiconductor diode in combination with resistor can function as clipper circuit. Energy storage circuit components are not required in the basic process of clipping. These circuits will select part of an arbitrary waveform which lies above or below some particular reference voltage level and that selected part of the waveform is used for transmission. So they are referred as voltage limiters, current limiters, amplitude selectors or slicers. There are three different types of clipping circuits.

- 1) Positive Clipping circuit.
- 2) Negative Clipping.
- 3) Positive and Negative Clipping (slicer).

In positive clipping circuit positive cycle of Sinusoidal signal is clipped and negative portion of sinusoidal signal is obtained in the output of reference voltage is added, instead of complete positive cycle that portion of the positive cycle which is above the reference voltage

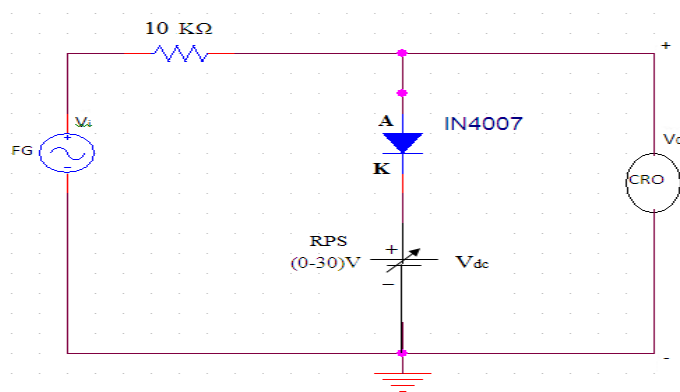
value is clipped. In negative clipping circuit instead of positive portion of sinusoidal signal, negative portion is clipped. In slicer both positive and negative portions of the sinusoidal signal are clipped.

Procedure

1. Connect the circuit as shown in the circuit diagram.
2. Connect the function generator at the input terminals and CRO at the output terminals of the circuit.
3. Apply a sine wave signal of frequency 1 KHz, Amplitude greater than the reference voltage at the input and observe the output waveforms of the circuits.

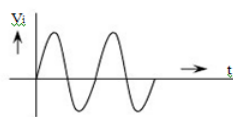
Circuit Diagram

Positive Clipper

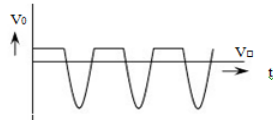


Model Graph:

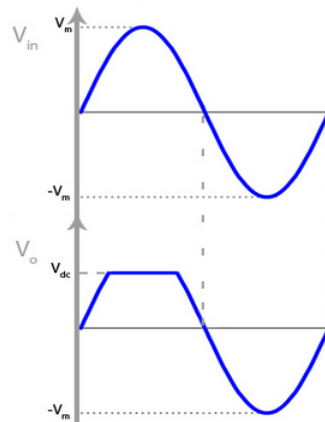
Input waveform



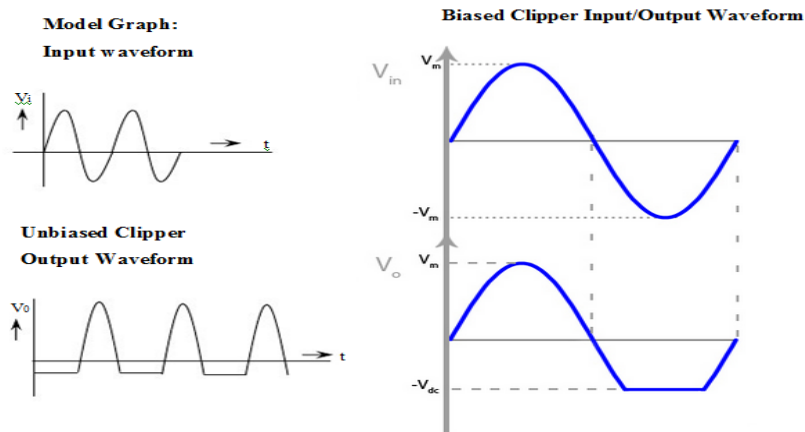
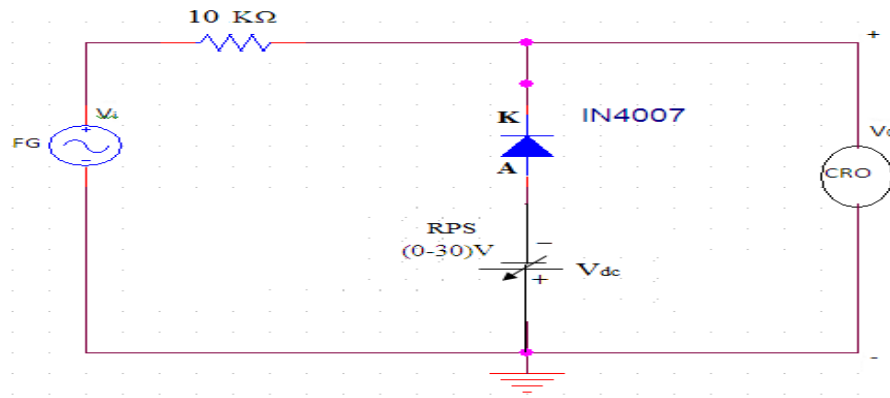
Unbiased Clipper Output Waveform



Biased Clipper Input Output Waveform



Negative Clipper



Tabulation:

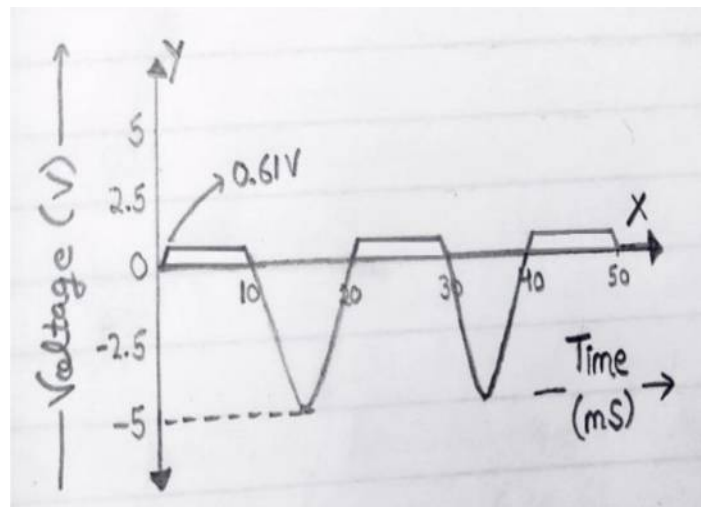
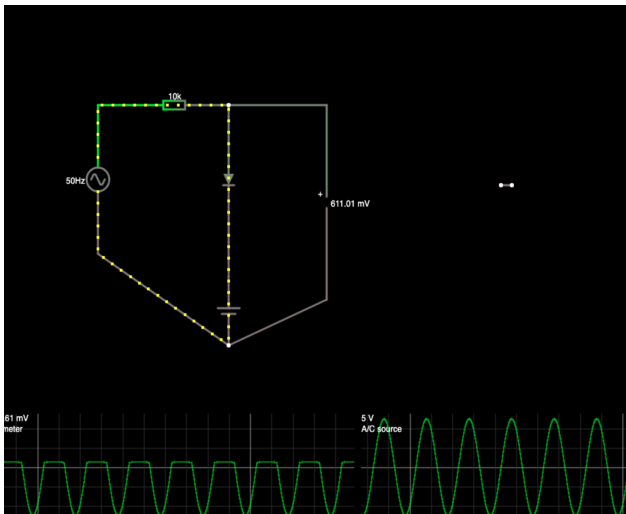
Positive Clipper

Negative Clipper

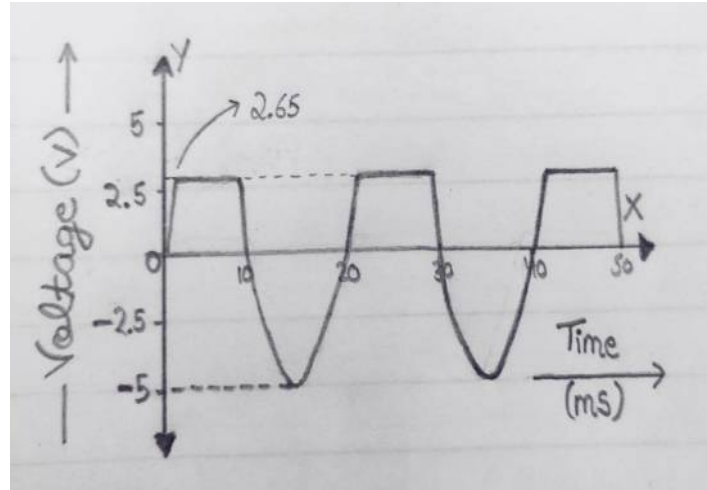
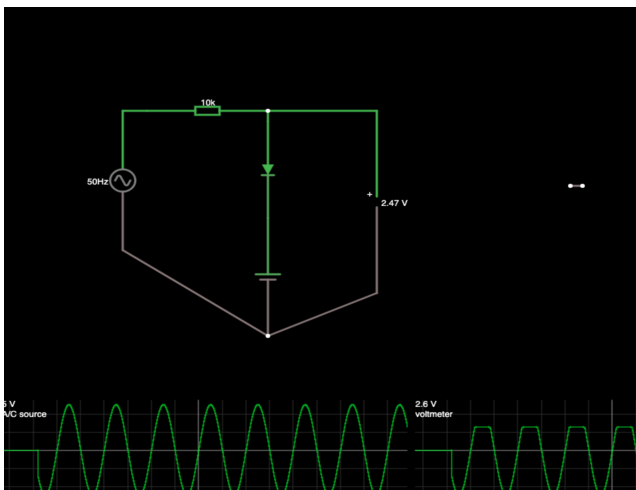
| Unbiased Clipper | | | |
|-----------------------|---------------------|-----------------------|---------------------|
| $V_{ref} = 0V$ | | $V_{ref} = 0V$ | |
| Output voltage (V) | Time Period (ms) | Output voltage (V) | Time Period (ms) |
| 0.61, -4.93 | 20ms | -0.61, 4.92 | 20ms |
| Biased Clipper | | | |
| $V_{ref} = 2V$ | | $V_{ref} = 2V$ | |
| Output voltage (V) | Time Period (ms) | Output voltage (V) | Time Period (ms) |
| 2.6, -4.93 | 20 | -2.6, 4.92 | 20ms |

Simulation circuit and waveform:

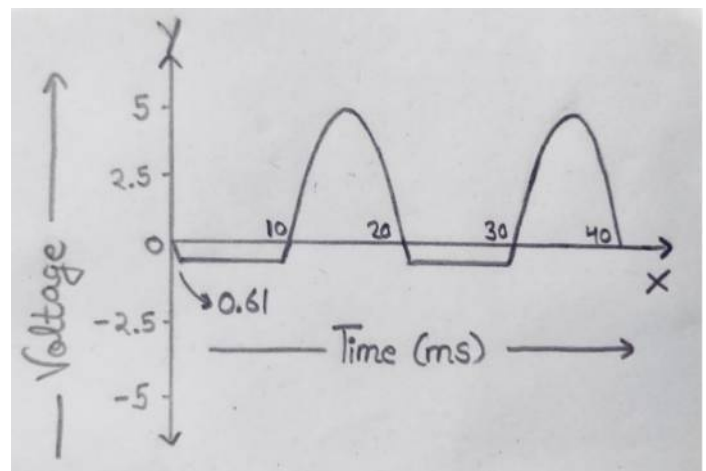
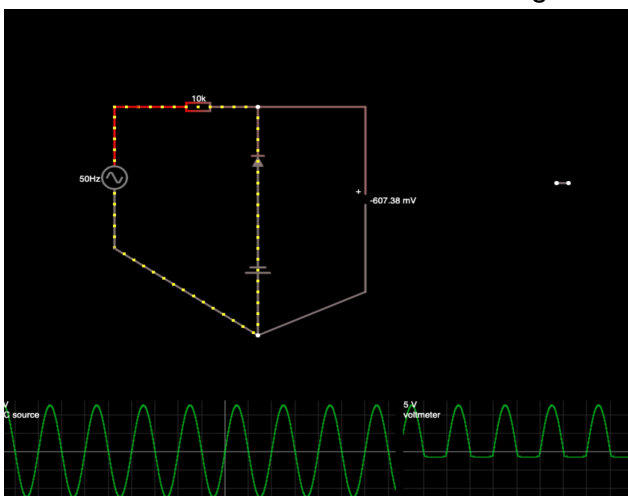
Positive Unbiased clipper $v = 0$

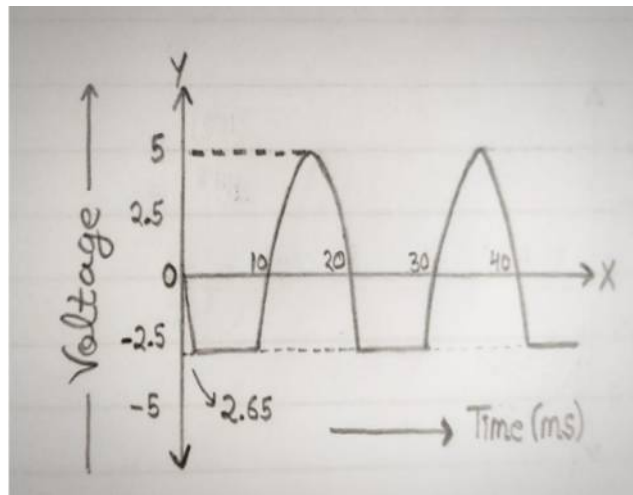
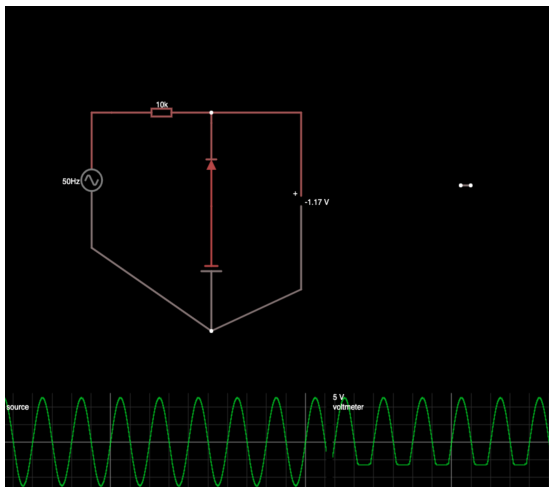


Positive biased clipper $v = 2$



Negative Unbiased $v = 0$





POST LAB QUESTIONS

1. Differentiate +ve and -ve Clippers.

Ans The major difference between +ve and -ve clippers are that Positive clipper-the clipper which removes the positive half cycles of the input voltage, while the negative clipper the clipper which removes the negative half cycles of the input voltage.

2. What is the function of Clampers?

Ans A **clammer** is an electronic circuit that fixes either the positive or the negative peak excursions of a signal to a defined value by shifting its DC value. The clamper does not restrict the peak-to-peak excursion of the signal, it moves the whole signal up or down so as to place the peaks at the reference level.

3. Write the classifications of clippers and clampers.

Ans

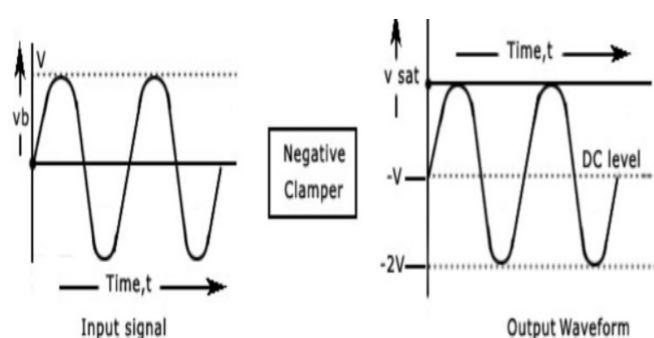
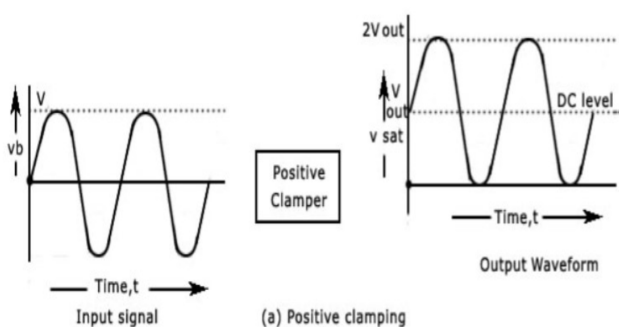
• Various types of clippers are :-

1. Series Clippers
2. Shunt Clippers
3. Dual Clippers

• Various types of clampers are :-

1. Positive clampers
2. Negative clampers
3. Biased clampers

4. Draw the output for the given input to the clamper circuit



5. What is the need of wave shaping circuit?

Ans The wave shaping is used to perform any one of the following functions. To hold the waveform to a particular d.c. level. To limit the voltage level of the waveform of some presenting value and suppressing all other voltage levels in excess of the present level.

Result :-

The study for different clipping circuits and there voltages are verified.