B.P. PODDAR INSTITUTE OF MANAGEMENT & TECHNOLOGY

EXPERIMENT – 2

NAME OF STUDENT - Rajarshi Saha

PROGRAM - ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME – ANALOG CIRCUITS LAB

COURSE CODE – EC-492

ROLL NO. - 11500319063 *SECTION - A*

YEAR - 2021 *SEMESTER – IVTH*

ACADEMIC YEAR – 2021 – 22

Experiment No.-2(a)

Title:- Conduct an experiment to test diode clipping circuits.

Objective :- To actualize the theory of operation of the clipping diode circuits. To continue the wave shapes that meet different needs.

1. Positive clipper
2. Negative clipper.
3. Biased clipper.

Theory of positive clipper :- A positive clipper is that in which remove the positive half cycle of input cycle voltage. During the positive half cycle diode is forward biased and conducts heavily, therefore the voltage across the diode and heme across the load R_L is zero during the -ve half cycle of the input diode is reverse biased and behaves as an open, heme total supply current flow through the load and heme total voltage drop across R_L. The output voltage is given by :-

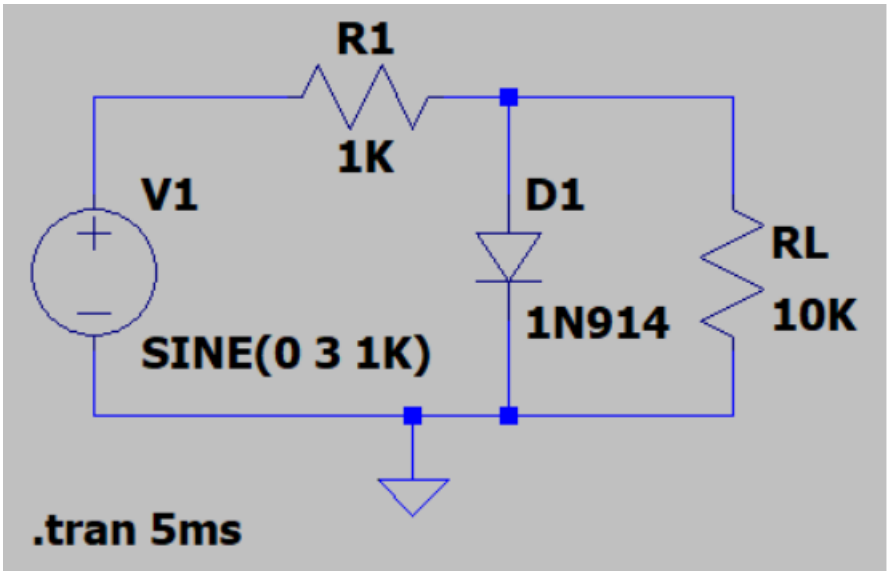
$$V_{out} = \frac{R_L}{R_1 + R_L} \times V_{in}$$

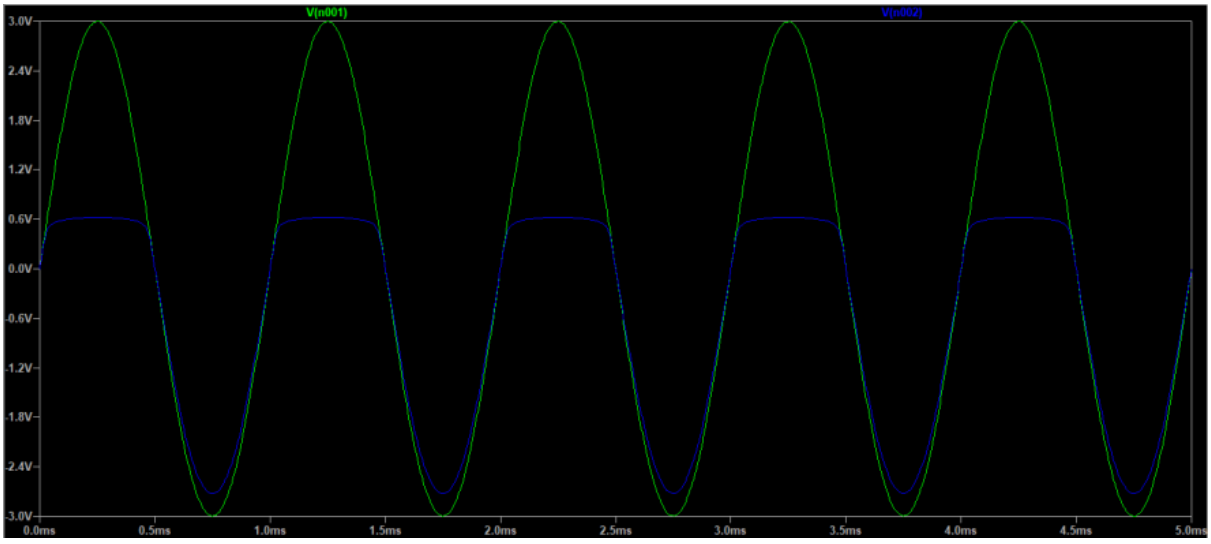
Result of positive clipper :-

Input voltage	Theoritical o/p voltage	Practical o/p	
		+ Half	- Half
5V	-4.7	0.7	-4.34V
10V	-9.08V	2.08V	-9.08V

Positive Clipper without bias:-

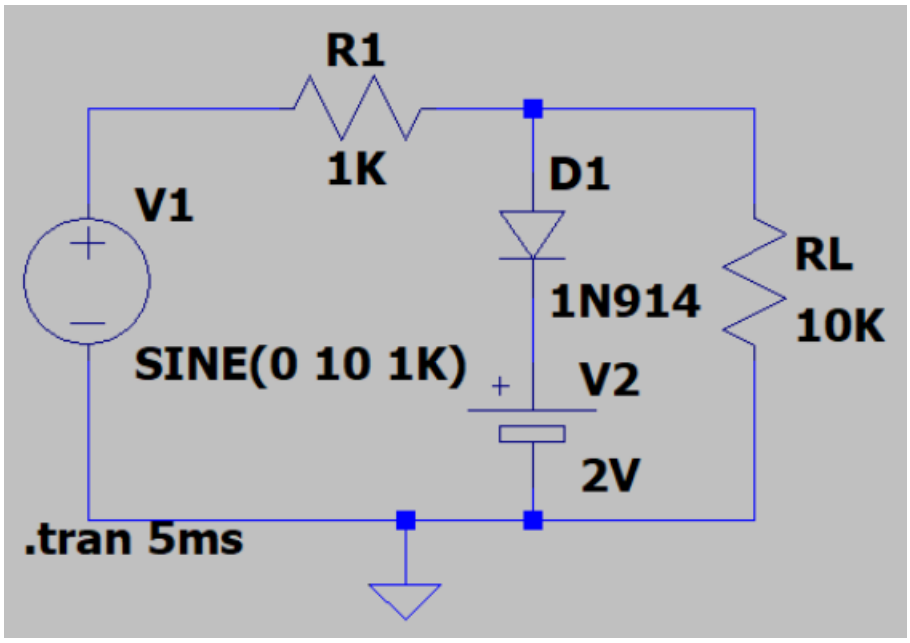
Circuit Diagram with Graph:

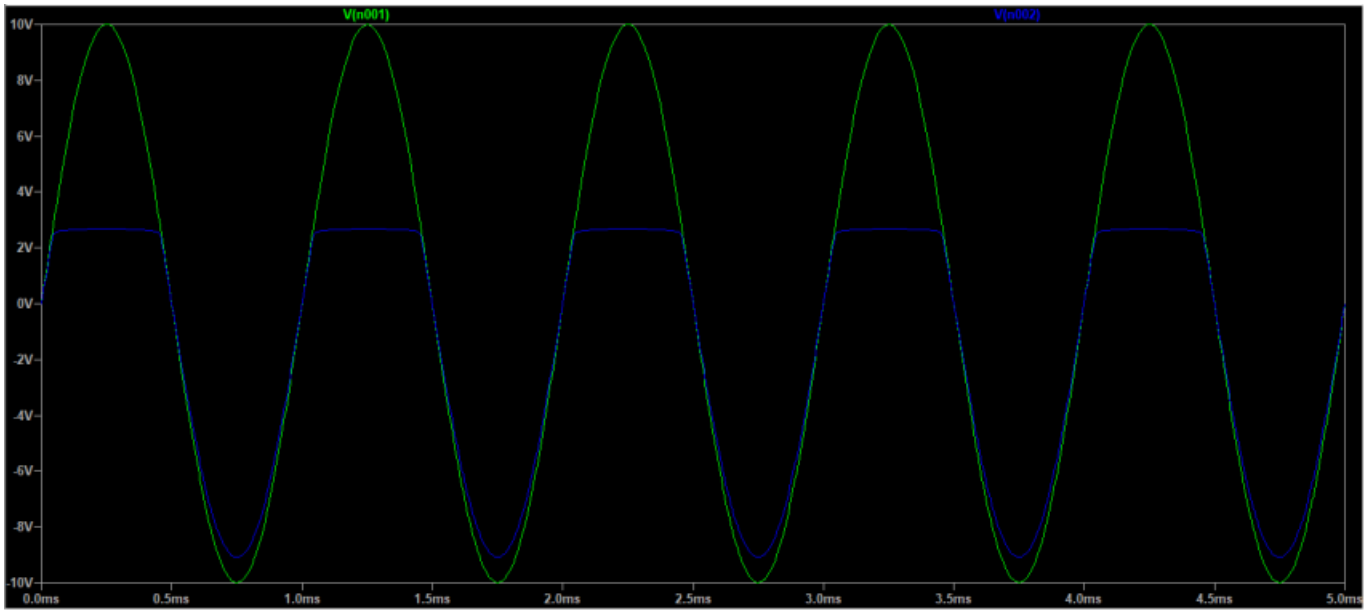




Positive Clipper with Bias

Circuit Diagram with Graph:





Theory of Negative clipper

A negative clipper is that which remove the negative portion of i/p signal voltage. During the +ve half cycle the diode become forward biased and conduct heavily, hence no voltage drop across R_L (load). During the positive half cycle diode is reverse biased and acts as open. So total voltage drop across load resistance R_L. A negative clipper o/p voltage is given by:-

$$V_{out} = \frac{R_L}{R_1 + R_L} \times V_{in}$$

Results of Negative clipper:-

I/p voltage	Theoretical o/p voltage	Practical o/p	
		+ half	- half
5V	4.54V	4.5V	-0.63V

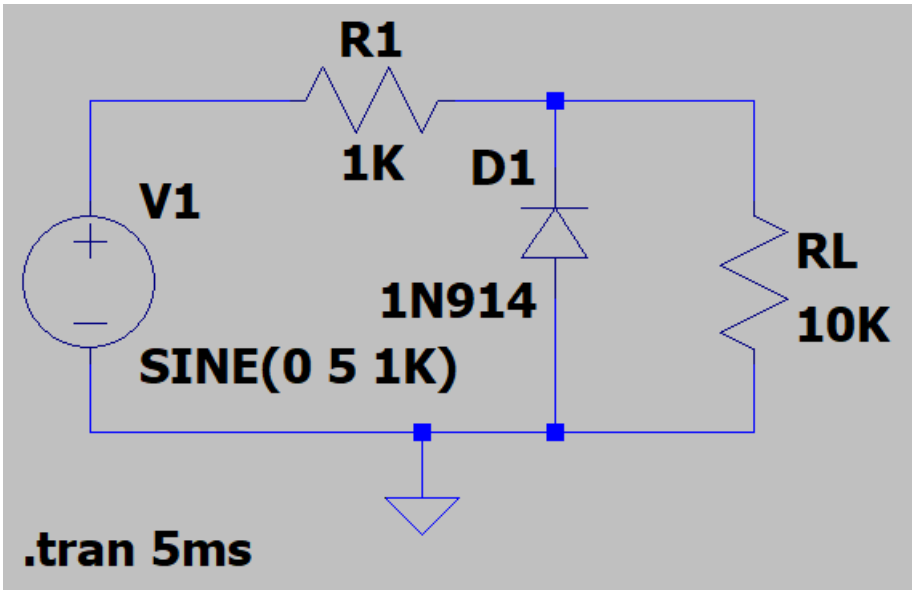
Results of Negative biased clipper-

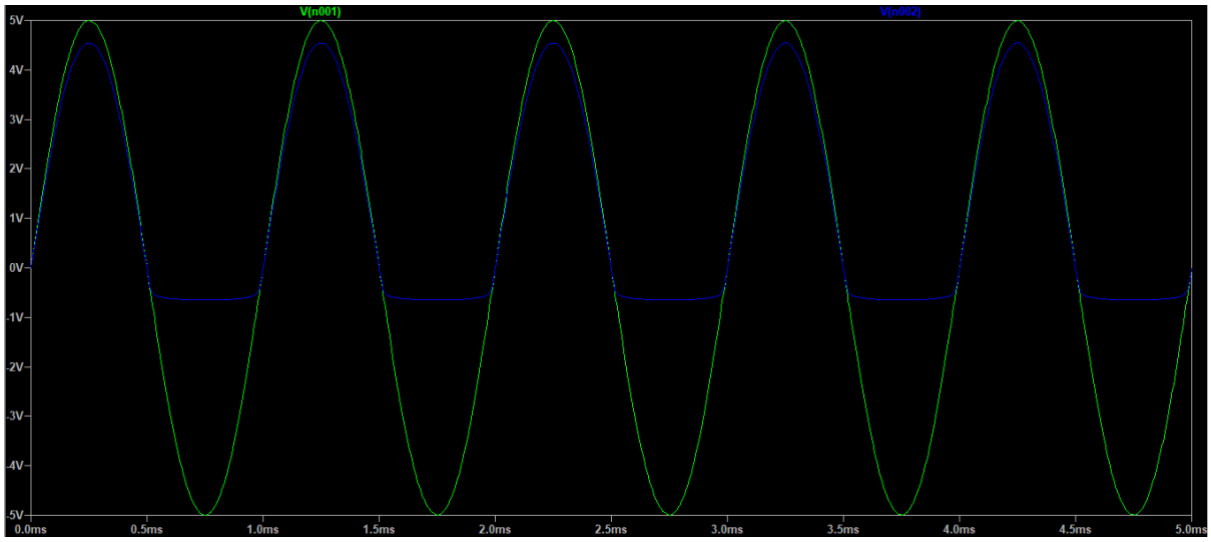
I/p voltage	Practical o/p voltage	
	+ Half	- Half
10V	9.08V	-2.08V

Clippers:- are used for seperation of synchronizing signals for the composite picture signals. The excessive noise spikes also at a certain level can be clipped in FM transmitters.

Negative Clipper without Bias

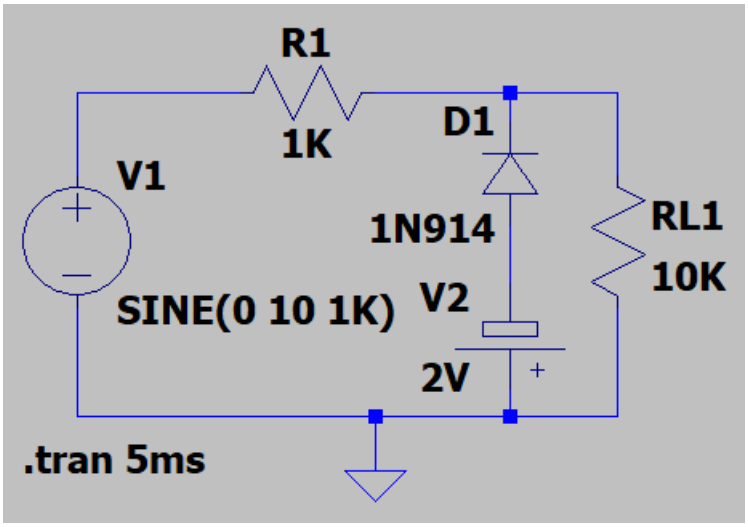
Circuit Diagram with Graph:

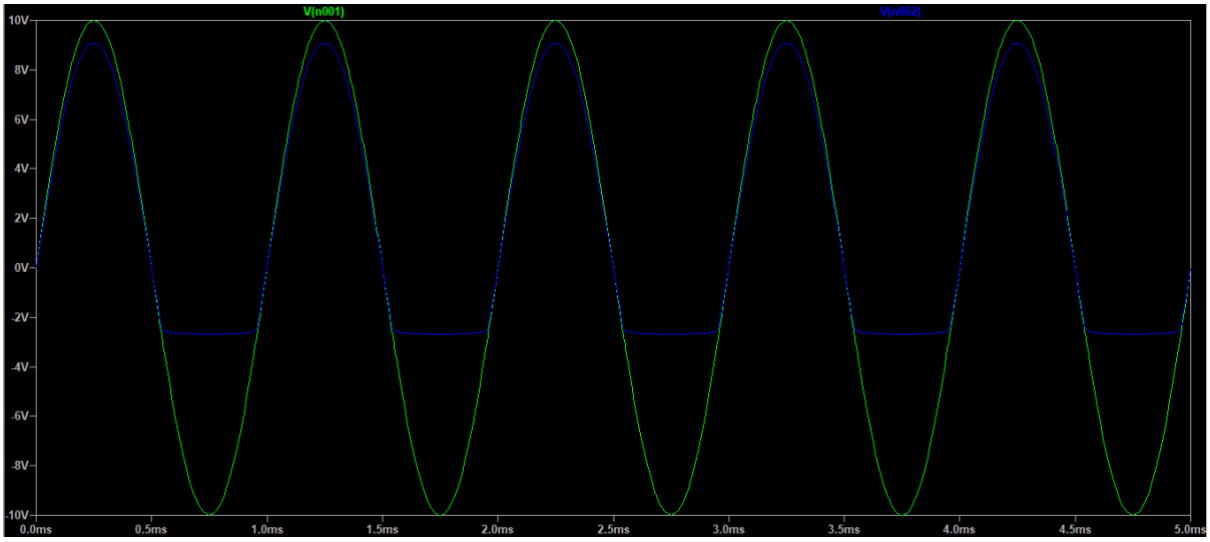




Negative Clipper with Bias

Circuit Diagram with Graph:


R1
1K
D1
V1
1N914
RL1
10K
SINE(0 10 1K)
V2
2V
.tran 5ms


V(n001)
V(n002)
10V
8V
6V
4V
2V
0V
-2V
-4V
-6V
-8V
-10V
0.0ms
0.5ms
1.0ms
1.5ms
2.0ms
2.5ms
3.0ms
3.5ms
4.0ms
4.5ms
5.0ms

Experiment - 2(b)

Title: Conduct an experiment to test diode clamping circuits.

Objective: To actualize the theory of operation of the clamping diode circuits.

Theory of +ve clamper:

The clamper circuit combine of a diode and a capacitor. The clamped o/p is taken across the load R_L. During (+)ve half cycle of i/p voltage. The diode is reversed bias and acts as open. But during (-)ve half cycle of diode, it is forward biased and hence current flown through diode via capacitor. Thus capacitor is charged to input (MAX) voltage and behaves as a voltage source. After (+)ve half cycle, during (+)ve half cycle goes on, the reverse diode voltage increases from its main i/p voltage because two voltages become in series the o/p voltage of a clamper circuit is given as:

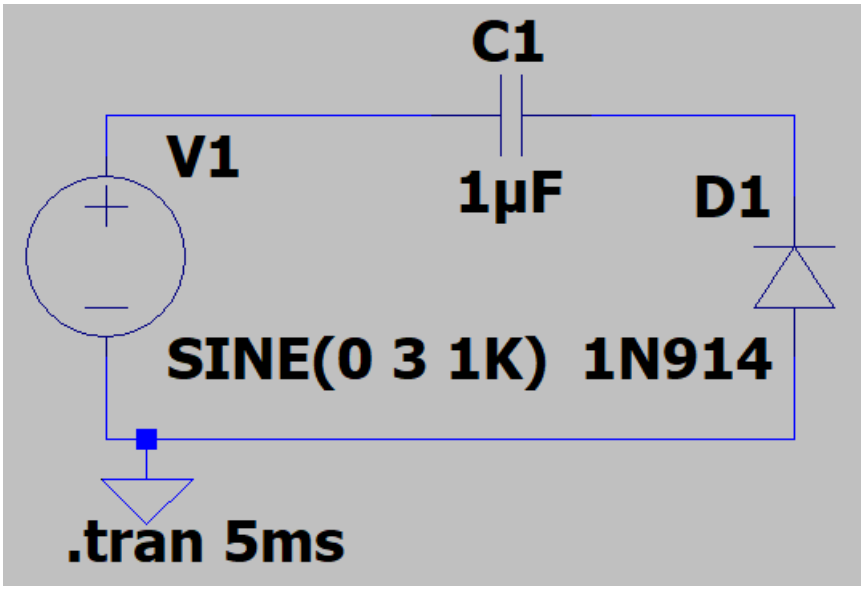
$$V_{out} = 2V_m$$

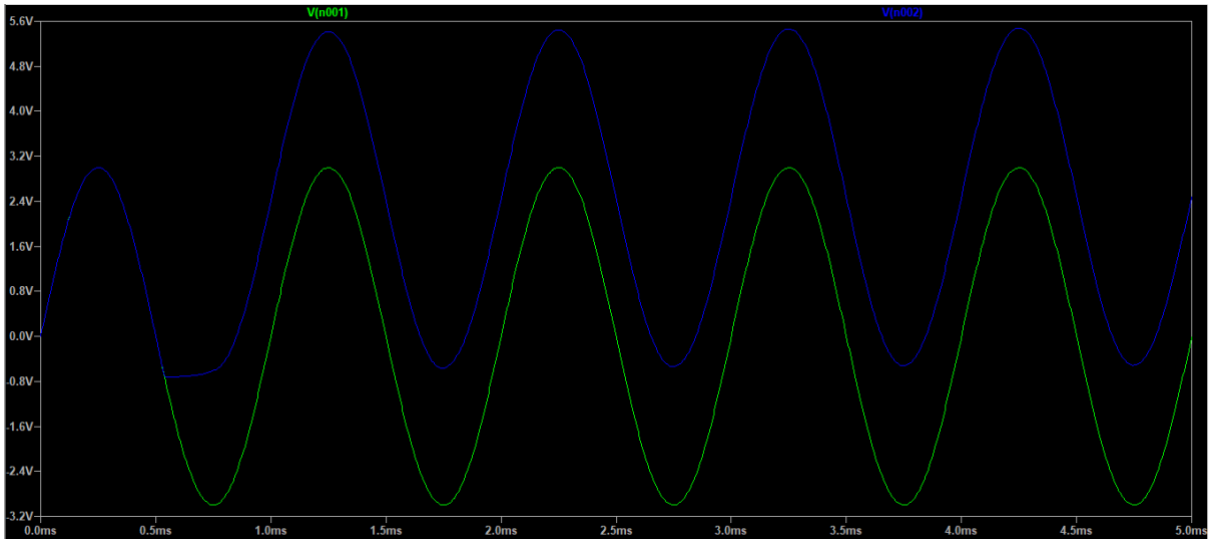
Result of (+)ve clamper

I/p voltage	Theoretical o/p voltage	Practical o/p voltage	
		+ve half	- half
3V	6V	5.44V	-0.54V

Positive Clamper

Circuit Diagram with Graph:





Theory of (-)ve clamper :-

A circuit that plows the (-)ve phase of the i/p signal to a desired d.c level is known as negative clamper circuit. It consists of a diode and capacitor. Capacitor and diode is connected in series with the signal source. The clamping o/p is taken across the diode. During the half cycle, dediode conducts heavily and here capacitor charges to V_m. After that when i/p signal goes (-ve) the diode becomes reverse bias and capacitor charges becomes in series with the signal voltage. The o/p voltage is given as :-

$$V_{out} = -2V_m$$

Result of (-)ve clamper

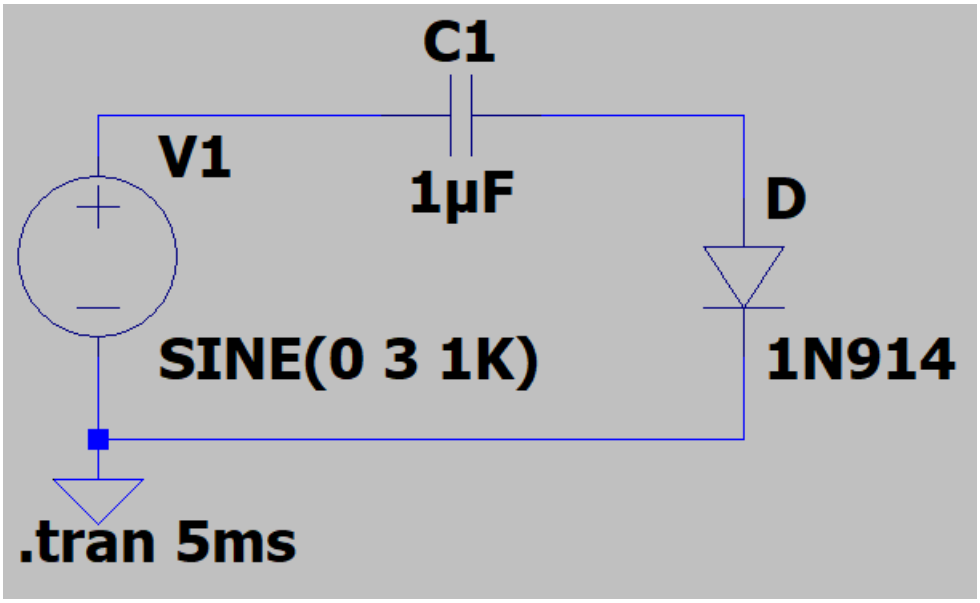
I/p voltage	theoretical o/p voltage	Practical o/p voltage	
		+ Half	- Half
9V	6V	0.54V	-5.40V

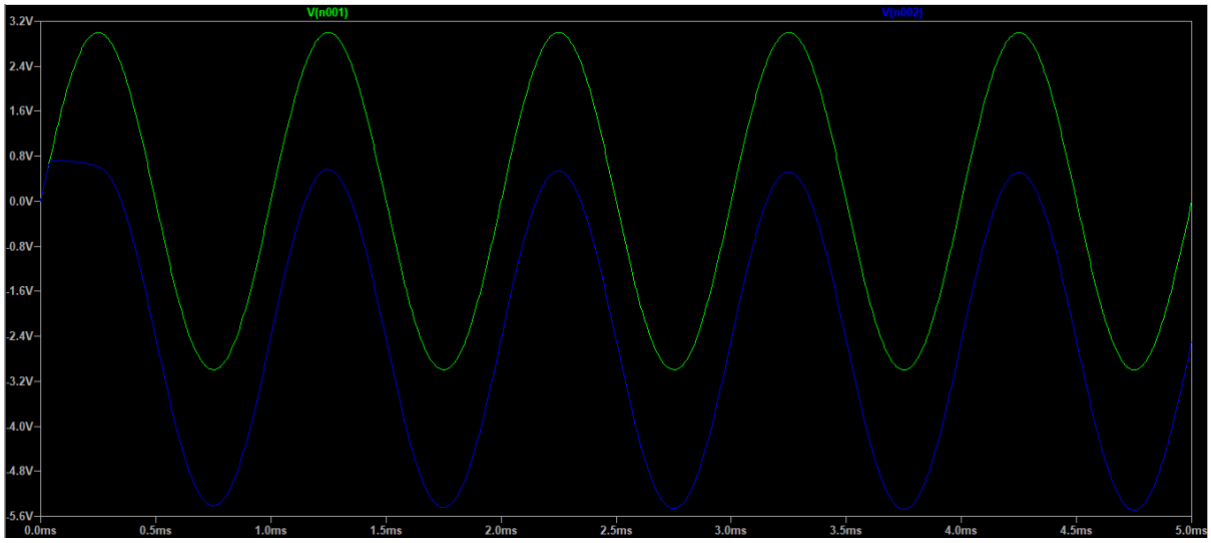
Discussion :-

Clampers are frequently used in removing the distortions and identification of polarity of the circuits. They also used to improve the reverse recovery time. clamping circuits are also used as voltage doublers and for modelling the existing waveforms to a required shape and range

Negative Clamper

Circuit Diagram with Graph:





Questionaries

1. What is the function of a clamper circuit?

Ans) A clamper is an electric circuit that fixes either the +ve or negative peak excursions of a signal, it moves the whole signal up or down so as to place the peaks at reference level.

2. What are biased clippers?

Ans) A biased clipper is a circuit which initially have an operating voltage. It consist a handy when a small portion of +ve or negative half cycles of the signal voltage is to be removed. When a small portion of the +ve half is removed, it is called biased negative clipper. When a positive half cycle portion is removed, it is called biased positive clipper.