# Lab Report 4.3

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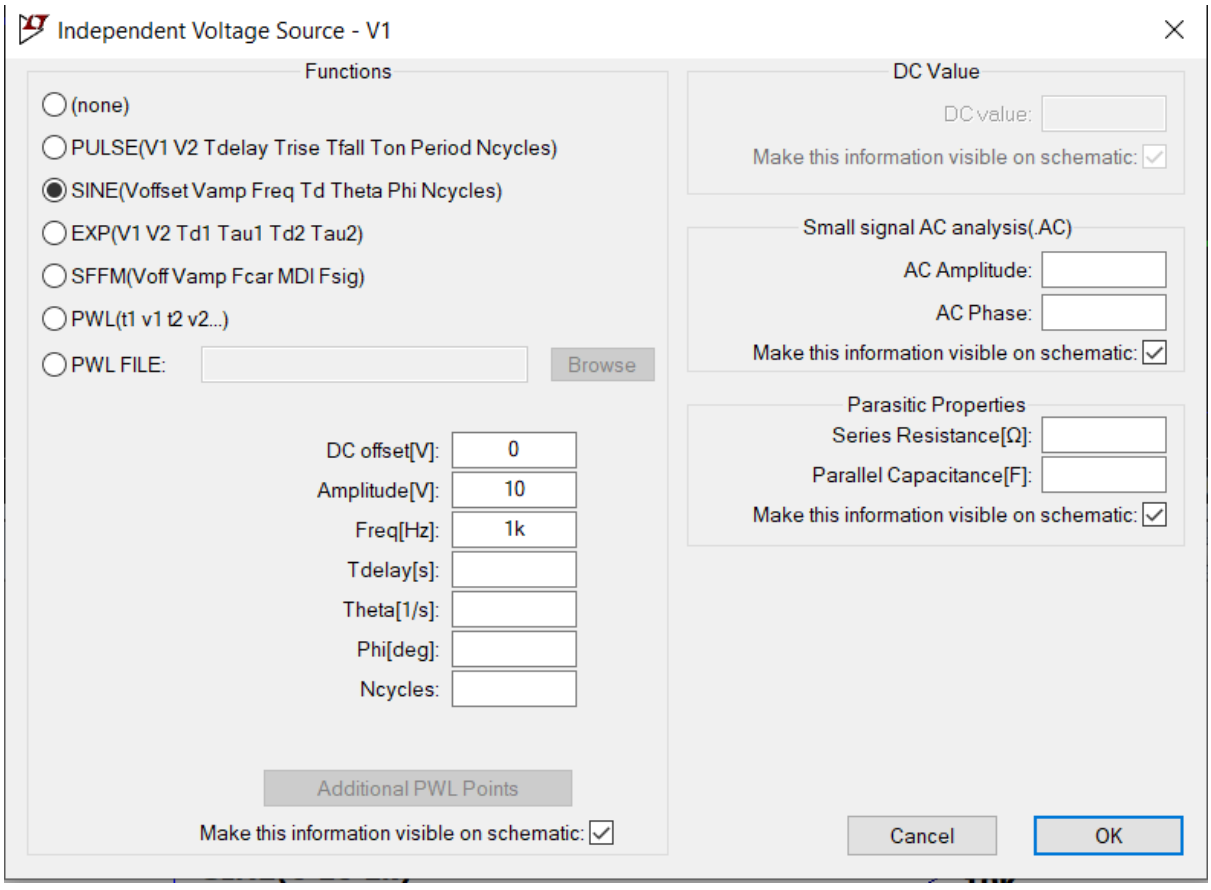
**Title of Experiment: Objective 4.3: Study of Clipper and clamper circuit.**

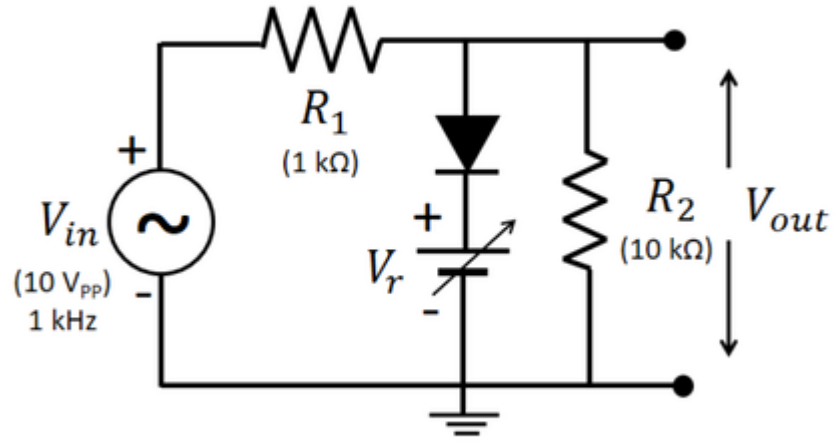
### Brief Description:

In this experiment, we simulated a circuit in LTSpice to depict the output waveforms of the clipper and clamper circuits . Clipping circuits are used to remove a part of a signal which is above or below a reference level. A clamper circuit, on the other hand, shifts a signal to a defined value. Basically, this circuit adds a DC component to the input signal. Clipping circuits are also known as limiters, amplitude selectors, or slicers. Half-wave rectifier is also a good basic example of clipper circuit where the reference level is zero and the signal below zero voltage (i.e. negative) are not allowed to pass through.

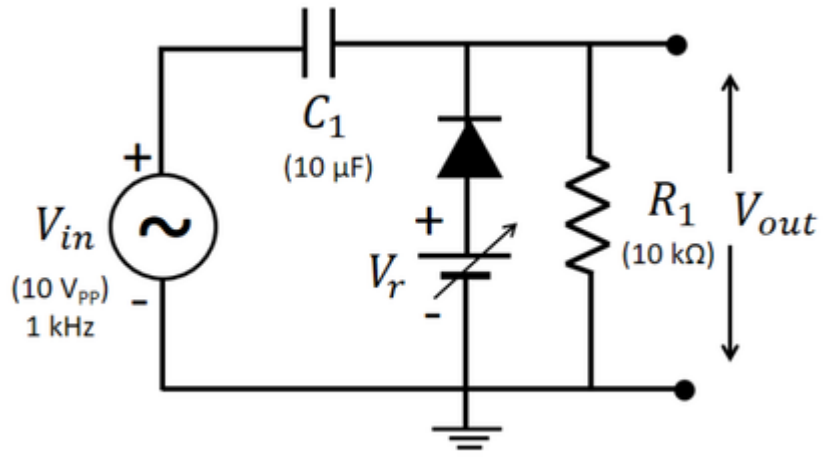
### Schematic diagram:

We examine the following two set-ups (including reversing the polarity of the diodes)





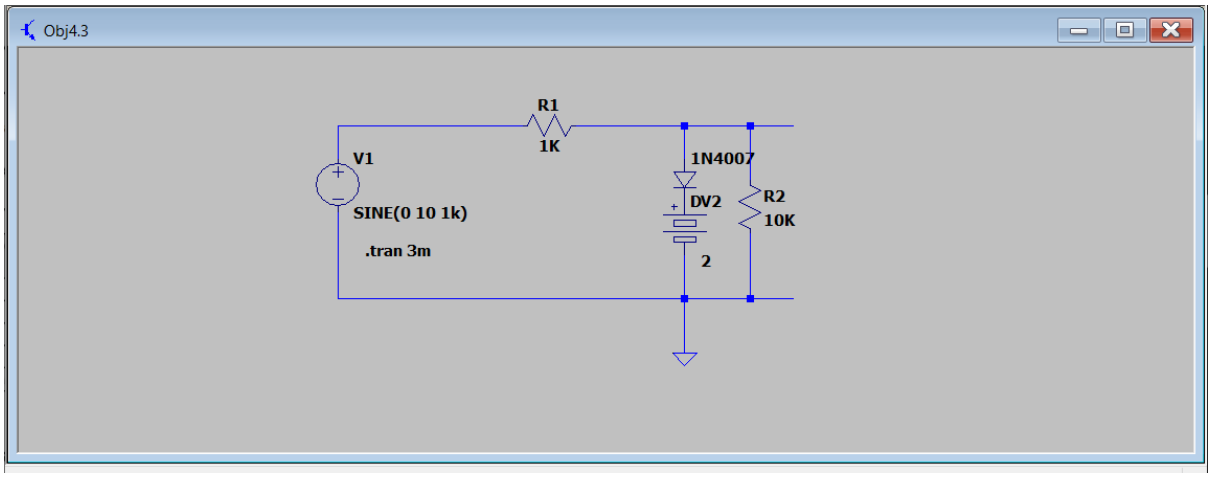

Clipper Circuit



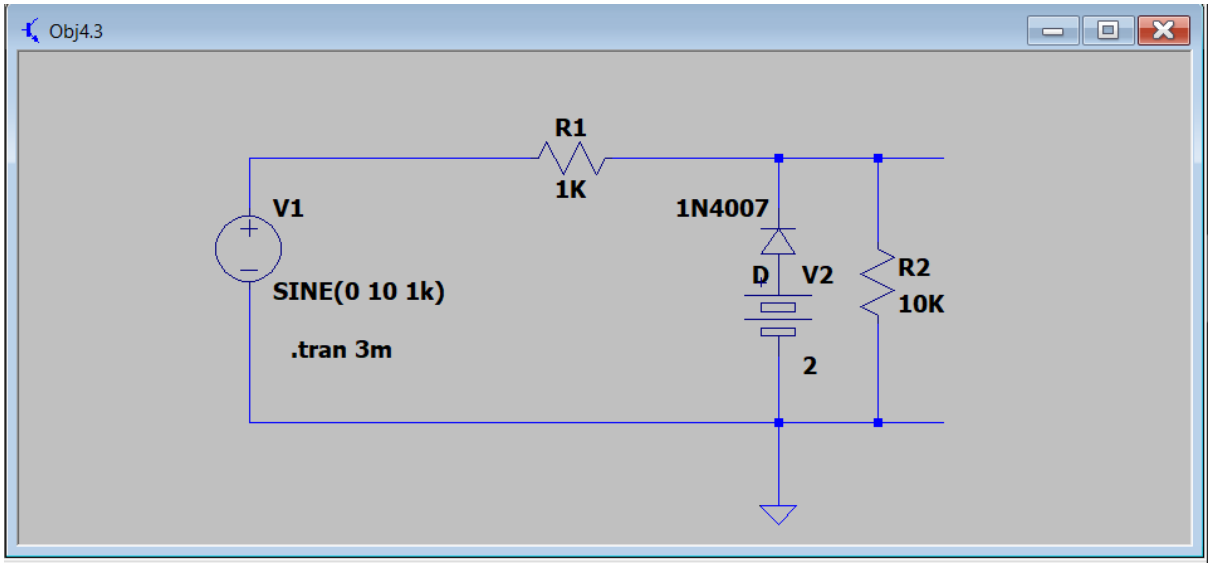

Clamper Circuit

Following are the set-ups we considered:

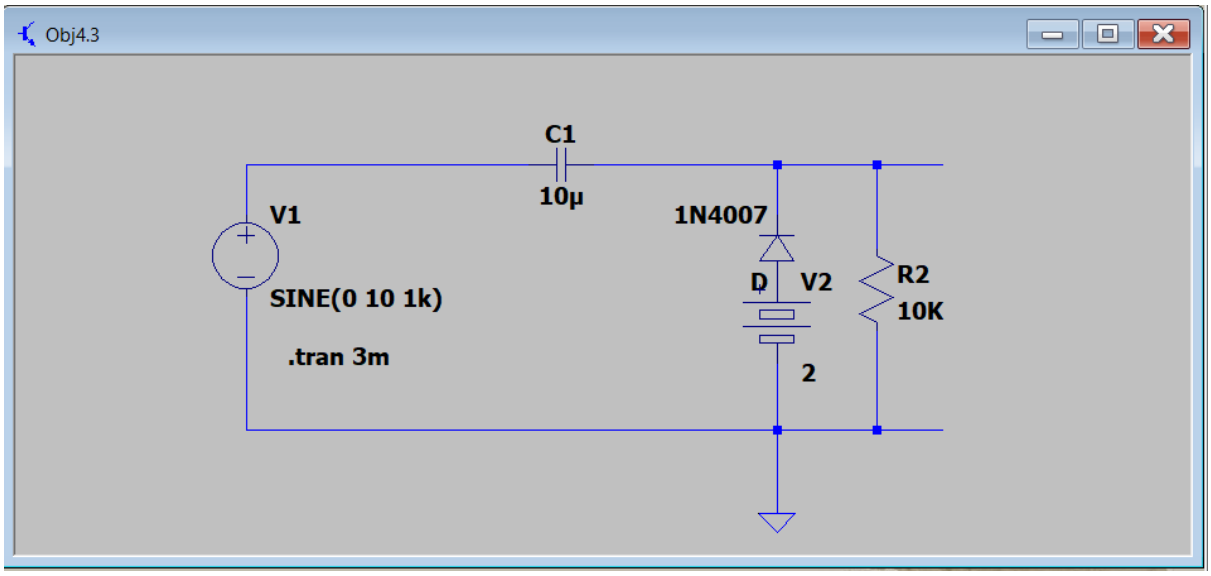
Case 1: Clipper Circuit



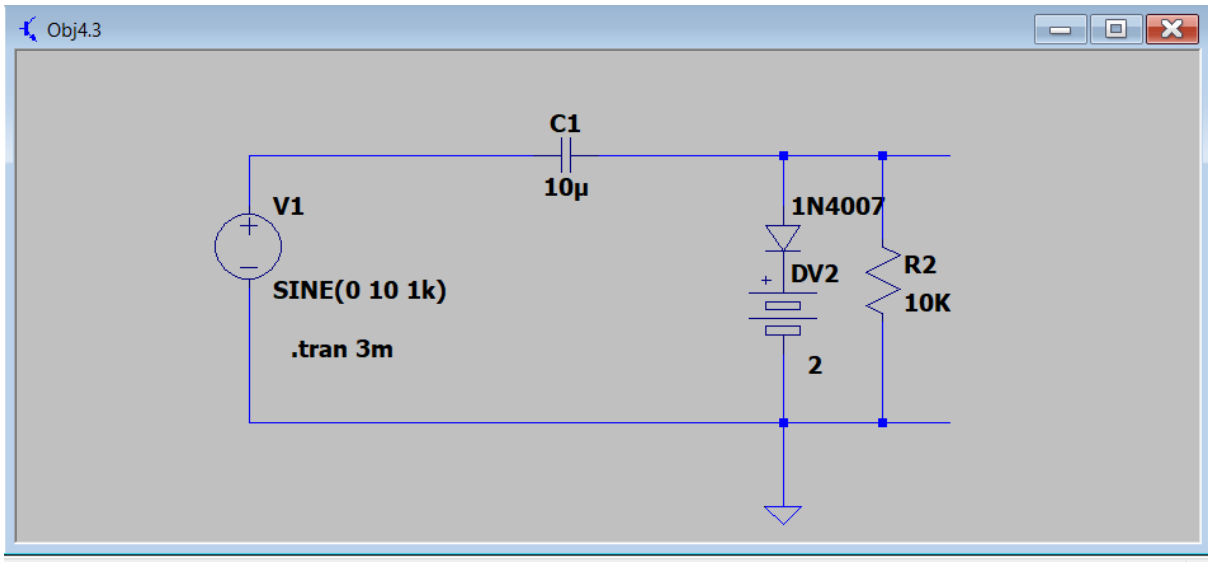

Case 2: Clipper circuit with reversed diode



Case 3:  Clamper circuit



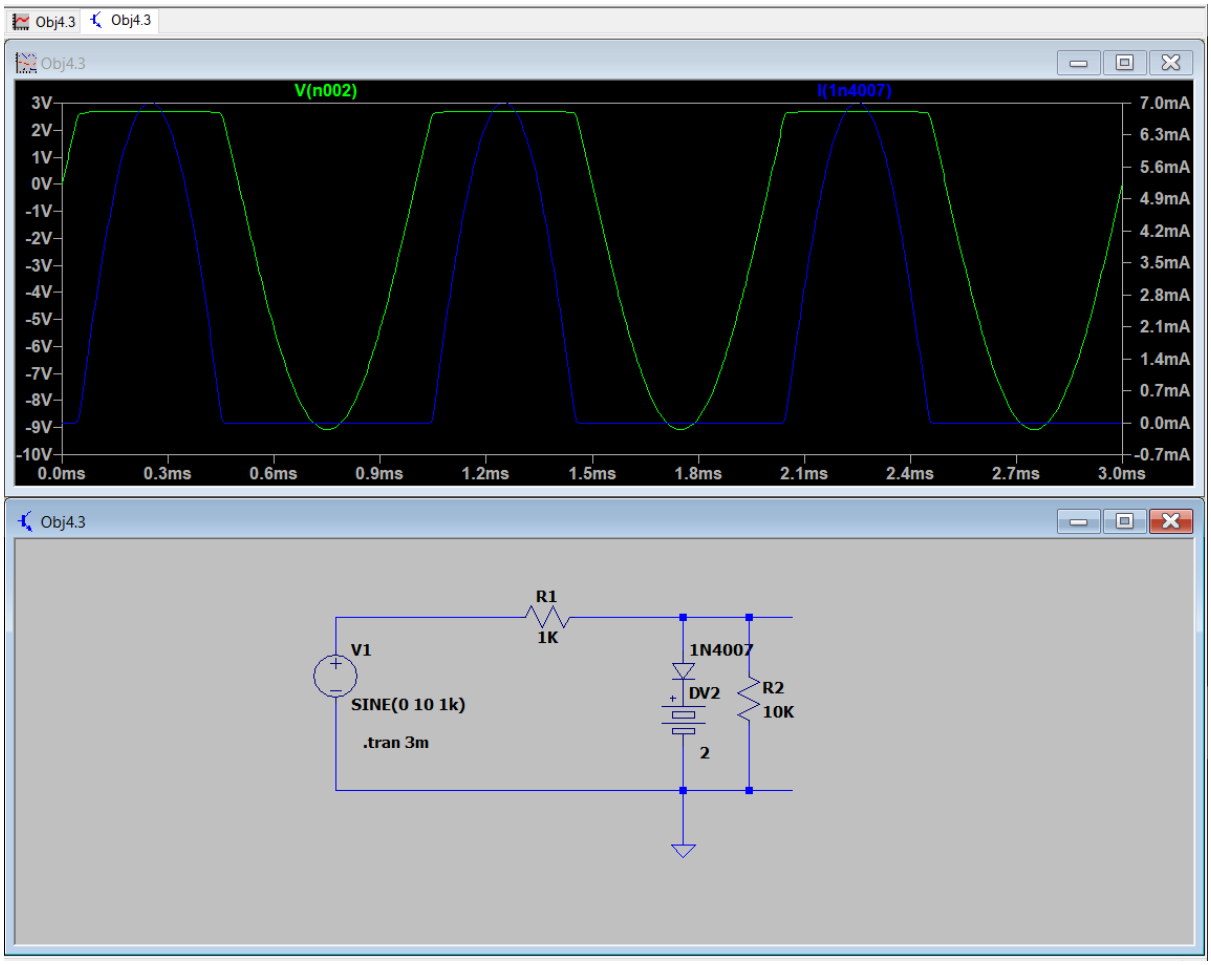

Case 4: Clamper circuit with polarity reversed



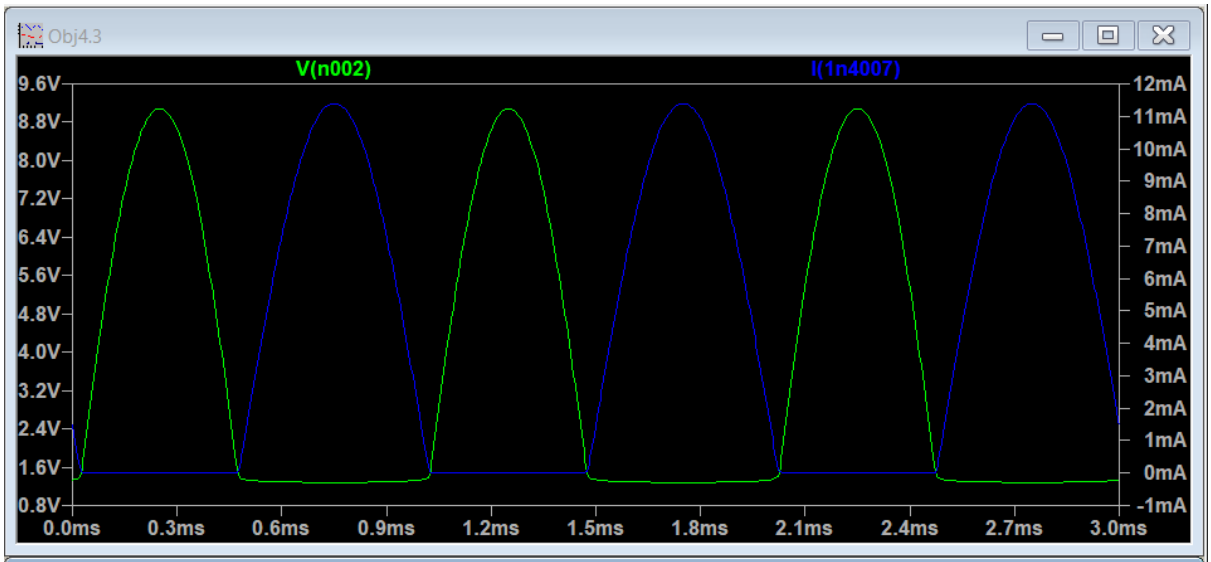

**Results:**

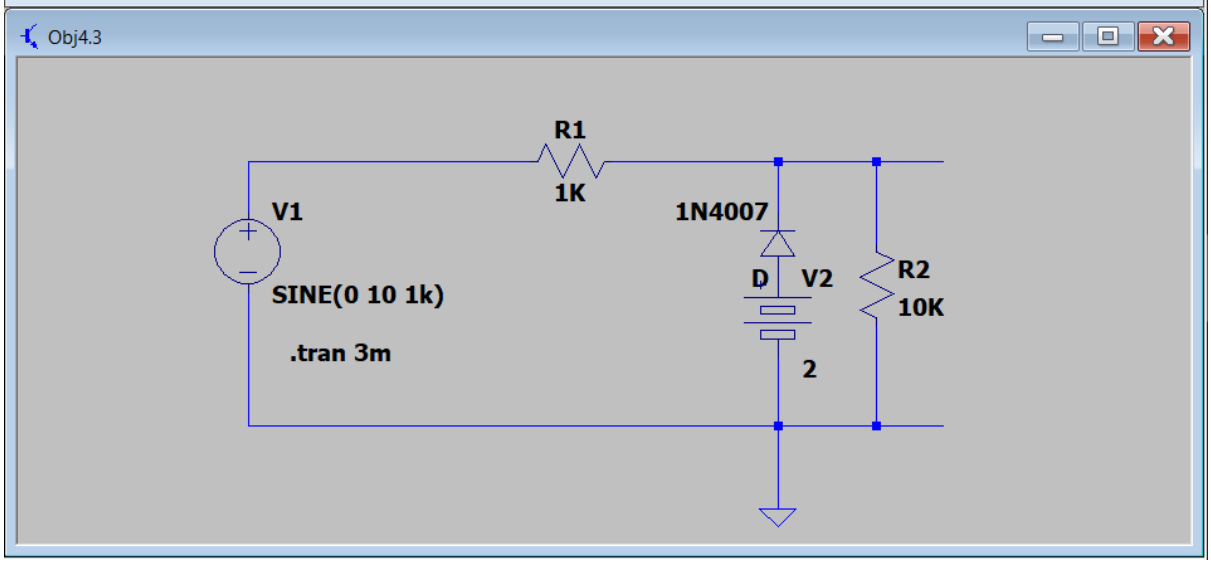
**The following are the output clippings of waveforms obtained corresponding to the above cases.**

Case 1:

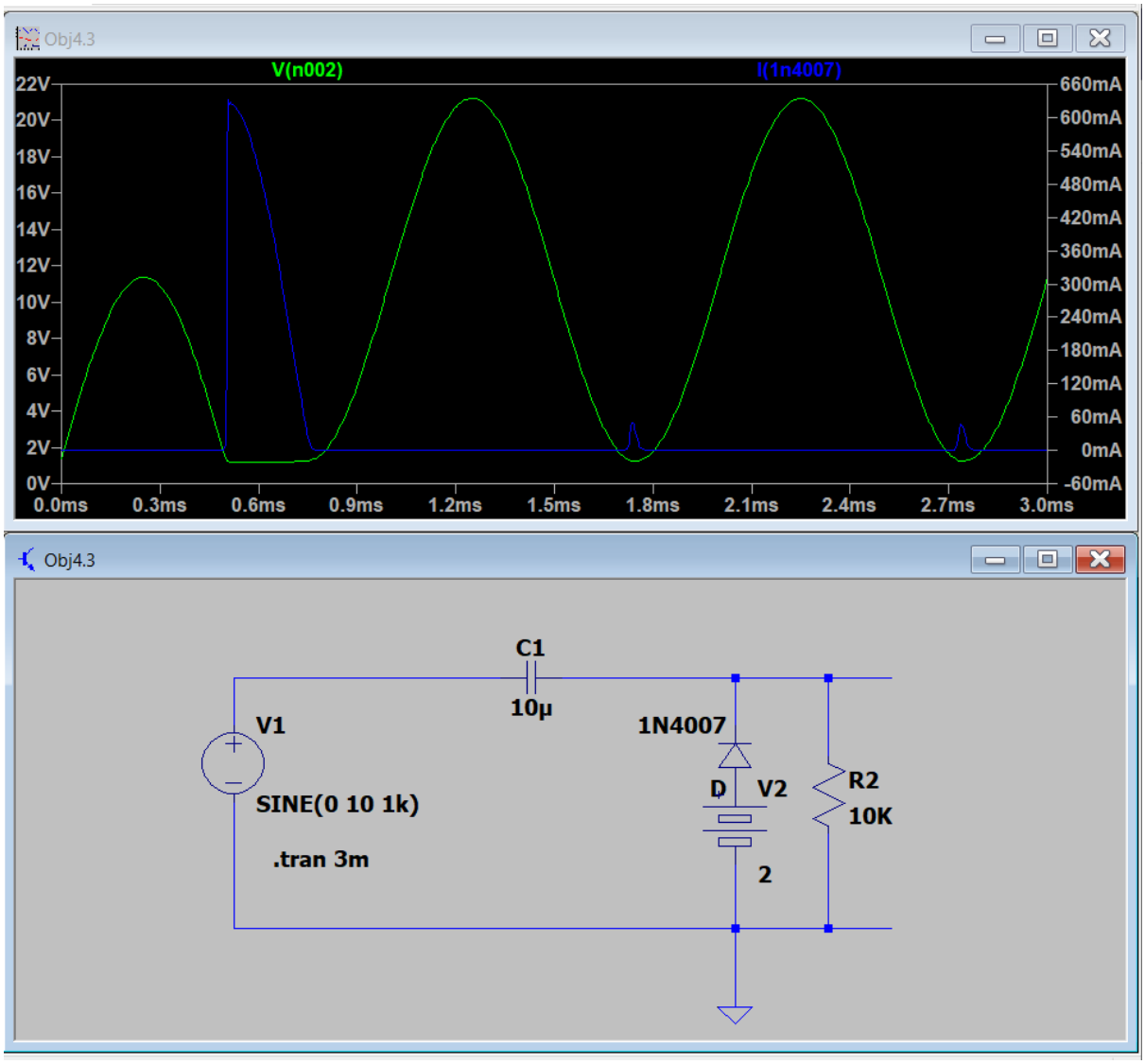


Case 2:

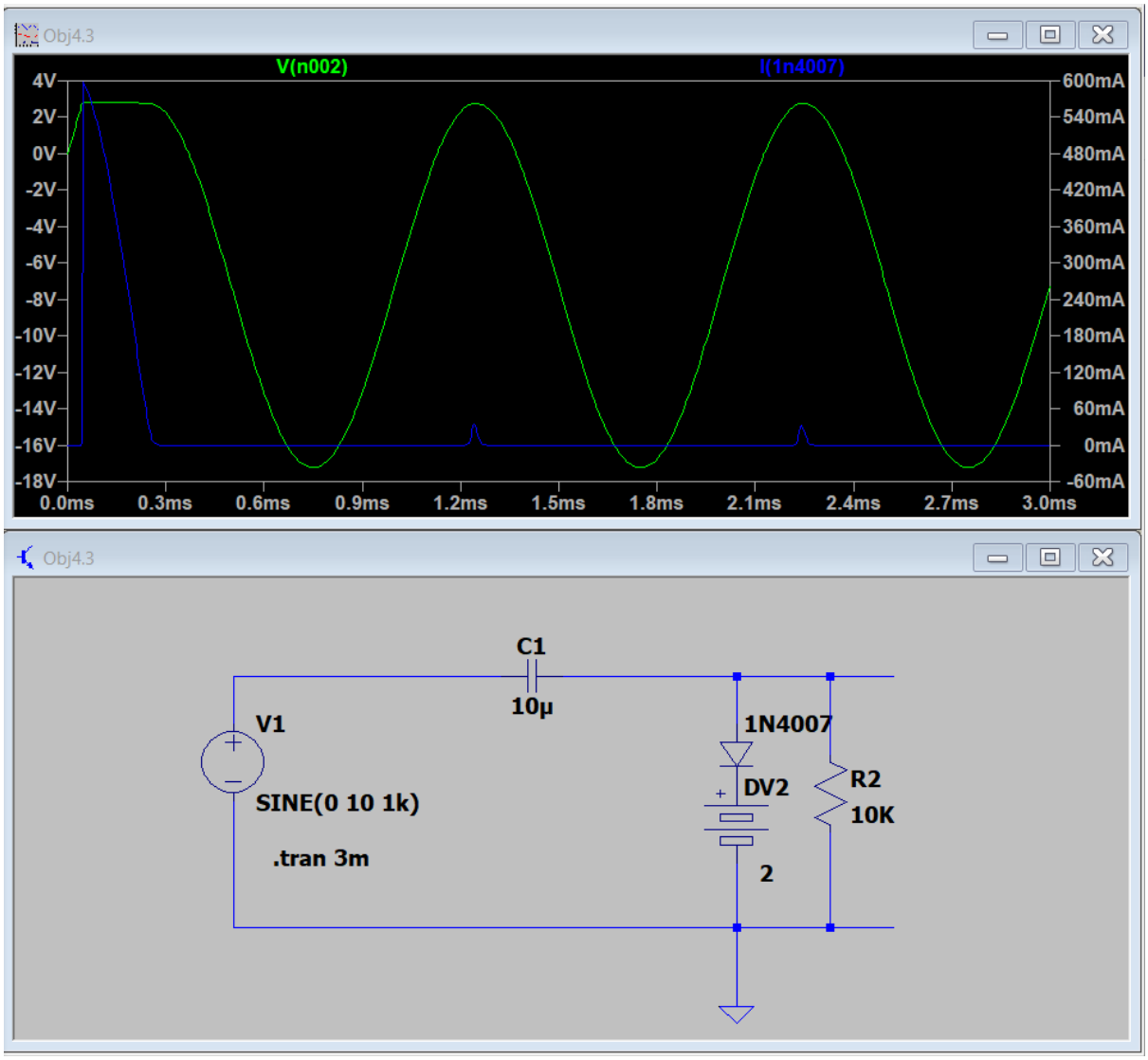

Obj4.3
V(n002)
I(1n4007)
9.6V
8.8V
8.0V
7.2V
6.4V
5.6V
4.8V
4.0V
3.2V
2.4V
1.6V
0.8V
12mA
11mA
10mA
9mA
8mA
7mA
6mA
5mA
4mA
3mA
2mA
1mA
0mA
-1mA
0.0ms
0.3ms
0.6ms
0.9ms
1.2ms
1.5ms
1.8ms
2.1ms
2.4ms
2.7ms
3.0ms


Obj4.3
R1
1K
V1
SINE(0 10 1k)
.tran 3m
1N4007
D
V2
2
R2
10K

Case 3:


Obj4.3
V(n002)
I(1n4007)
22V
20V
18V
16V
14V
12V
10V
8V
6V
4V
2V
0V
660mA
600mA
540mA
480mA
420mA
360mA
300mA
240mA
180mA
120mA
60mA
0mA
-60mA
0.0ms
0.3ms
0.6ms
0.9ms
1.2ms
1.5ms
1.8ms
2.1ms
2.4ms
2.7ms
3.0ms
Obj4.3
C1
10µ
V1
SINE(0 10 1k)
.tran 3m
1N4007
D
V2
2
R2
10K

Case 4:


Obj4.3
V(n002)
I(1n4007)
4V
2V
0V
-2V
-4V
-6V
-8V
-10V
-12V
-14V
-16V
-18V
600mA
540mA
480mA
420mA
360mA
300mA
240mA
180mA
120mA
60mA
0mA
-60mA
0.0ms
0.3ms
0.6ms
0.9ms
1.2ms
1.5ms
1.8ms
2.1ms
2.4ms
2.7ms
3.0ms
Obj4.3
C1
10µ
V1
SINE(0 10 1k)
.tran 3m
1N4007
DV2
2
R2
10K

**Discussion:**

If the positive (negative) terminal of a voltage source is connected to P-side (N-side) of the diode then the diode is said to be in forward bias or ON, otherwise it is reverse biased or OFF. A real semiconductor diode made of Si needs approximately 0.7 V forward bias before it starts conducting current. In reverse bias, it conducts a negligible current which ideally should be zero. The forward current flows from p to n region.

The diode set-ups for the clipper and clamper circuits can be seen in the above schematics.

Clipping circuits are used to remove a part of a signal which is above or below a reference level. Clipping circuits are also known as limiters, amplitude selectors, or slicers.

In a clipper circuit, To alter the reference level to a desired value, a DC voltage source is put in series with the diode. Depending on the polarity of DC source and direction of diode the circuit will clip the input signal above or below the reference level set by the user.

A clamper circuit, on the other hand, shifts a signal to a defined value. Basically, this circuit adds a DC component to the input signal. The circuit can work with a bias or no-bias condition. If the signal shifts above the central line of a input wave, then it calls a positive clamper circuit and if it shifts downwards, then it is called a negative clamper circuit.