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EXPERIMENT NO: 3

Design and Troubleshooting of Clippers and Clampers

Aim: To design clippers and clampers circuit using LTSpice tool.

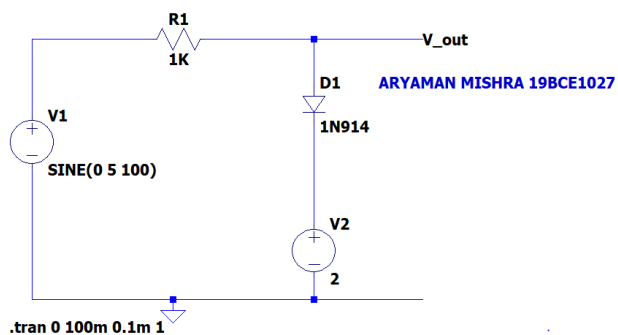
Software used: LTSpice

Components required: Resistors, voltage source, capacitors, diode.

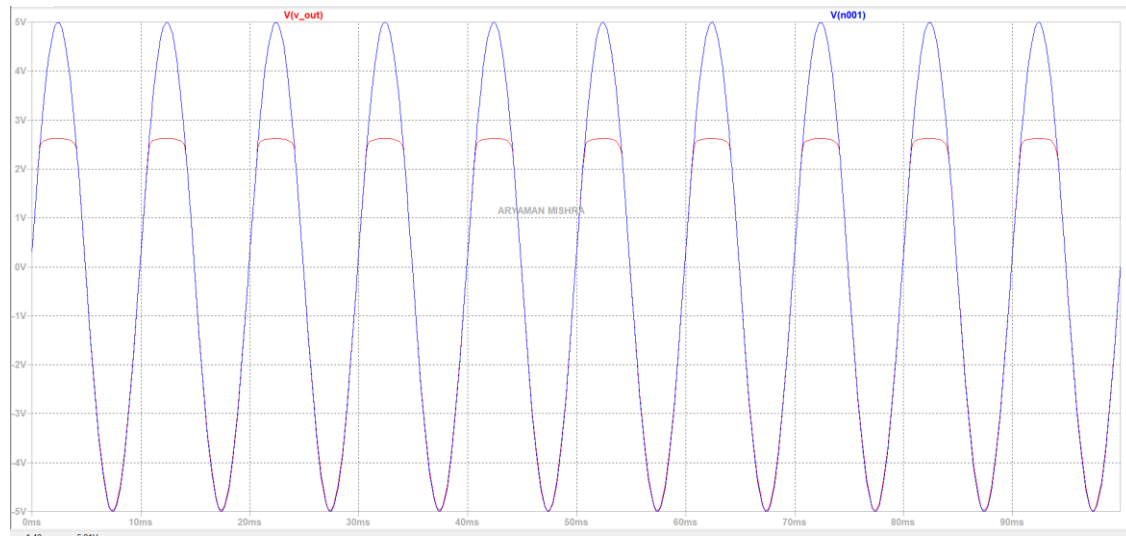
Clipper:

Task 1: +ve clipper at 2V

Circuit:



Output:



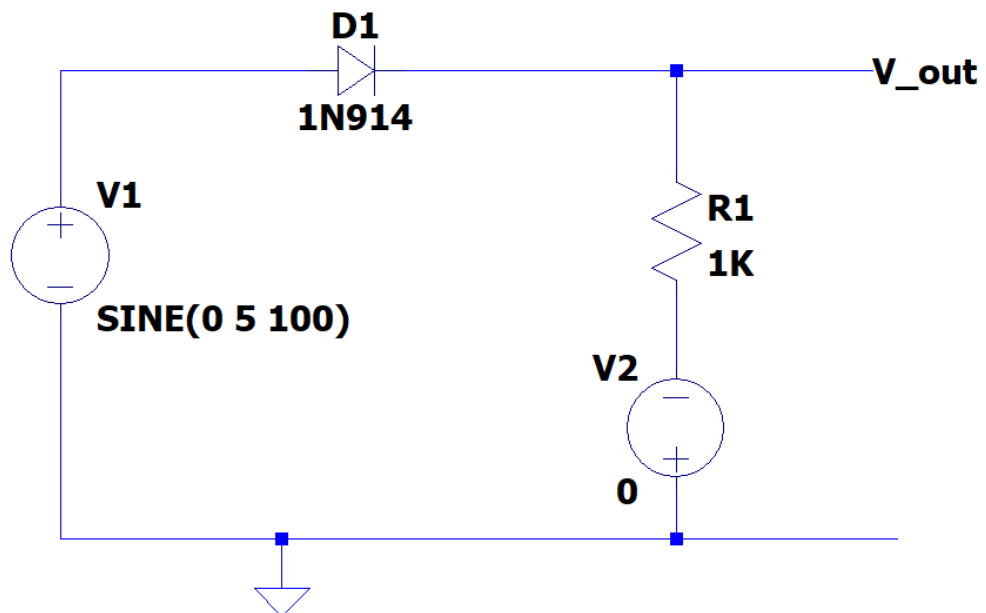
Task 2: Clip complete +ve cycle

Circuit:

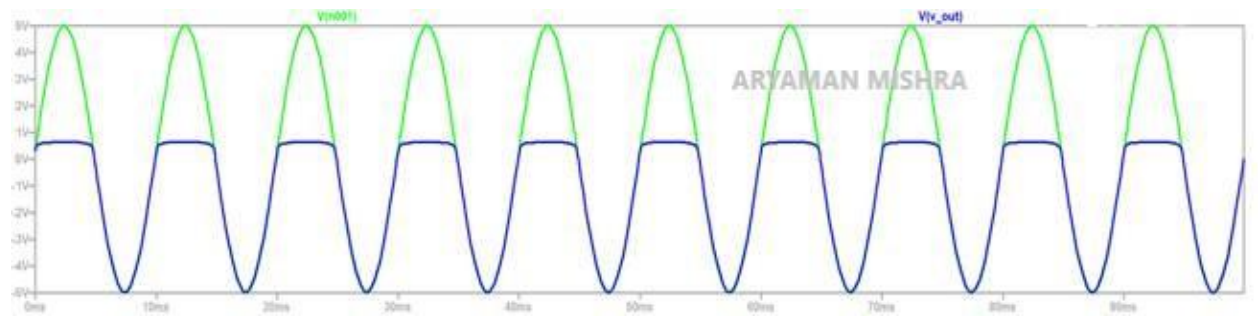
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.tran 0 100m 0.1m 1



Output:



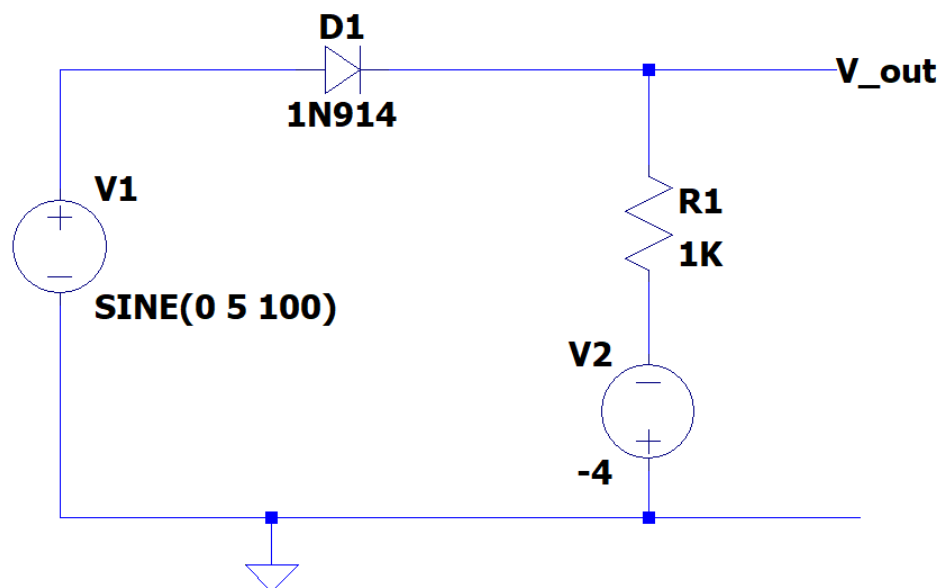
Task 3: -ve clipper at -4V

Circuit:

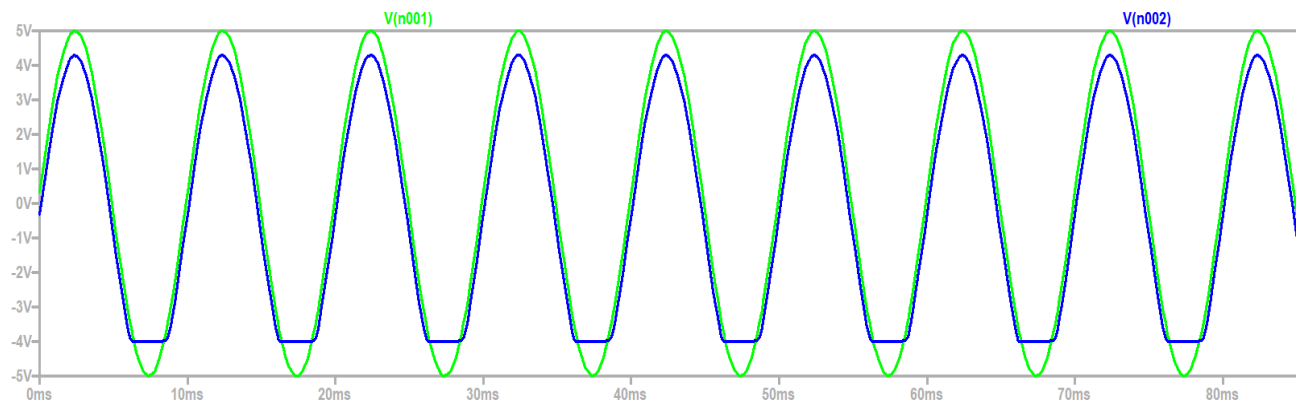
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.tran 0 100m 0.1m 1



Output:



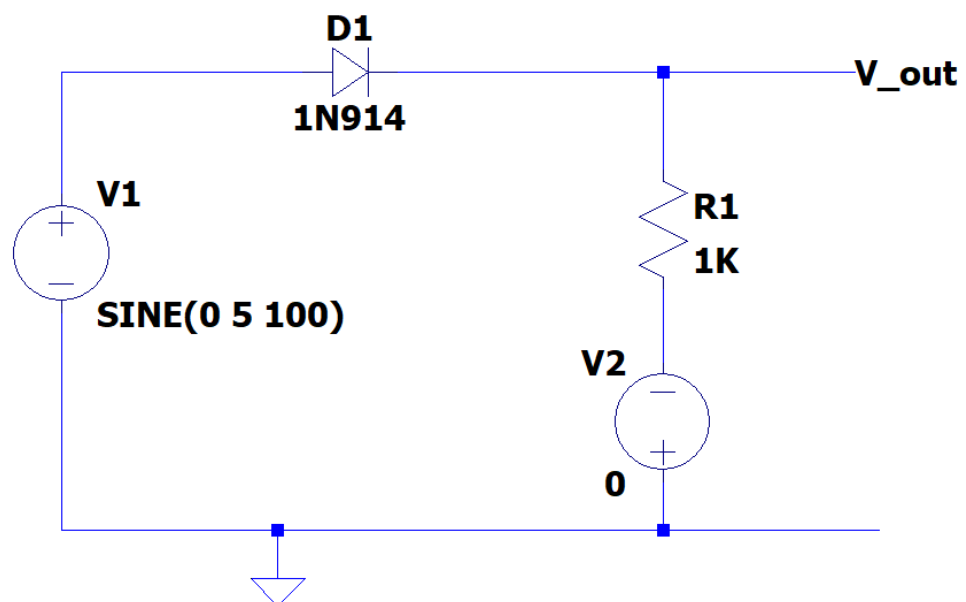
Task 4: Clip complete –ve cycle

Circuit :

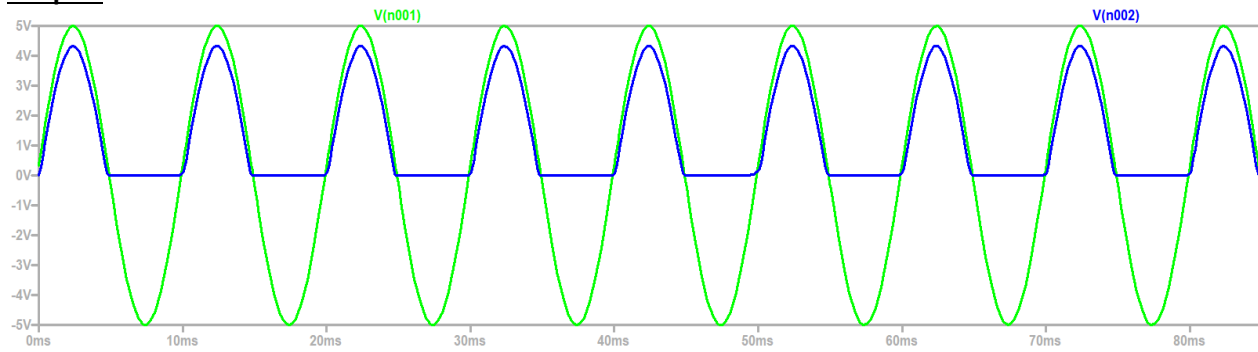
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.tran 0 100m 0.1m 1



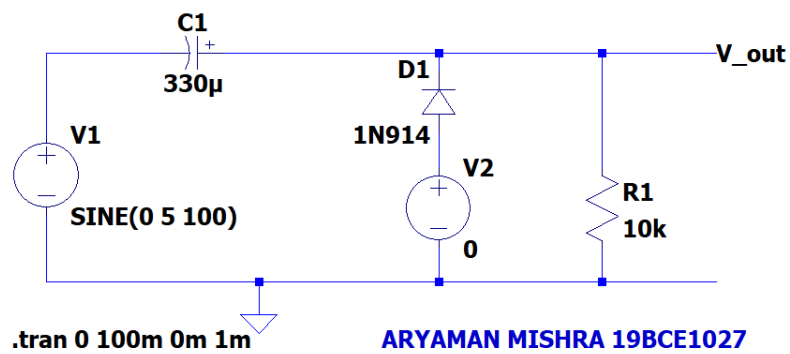
Output:



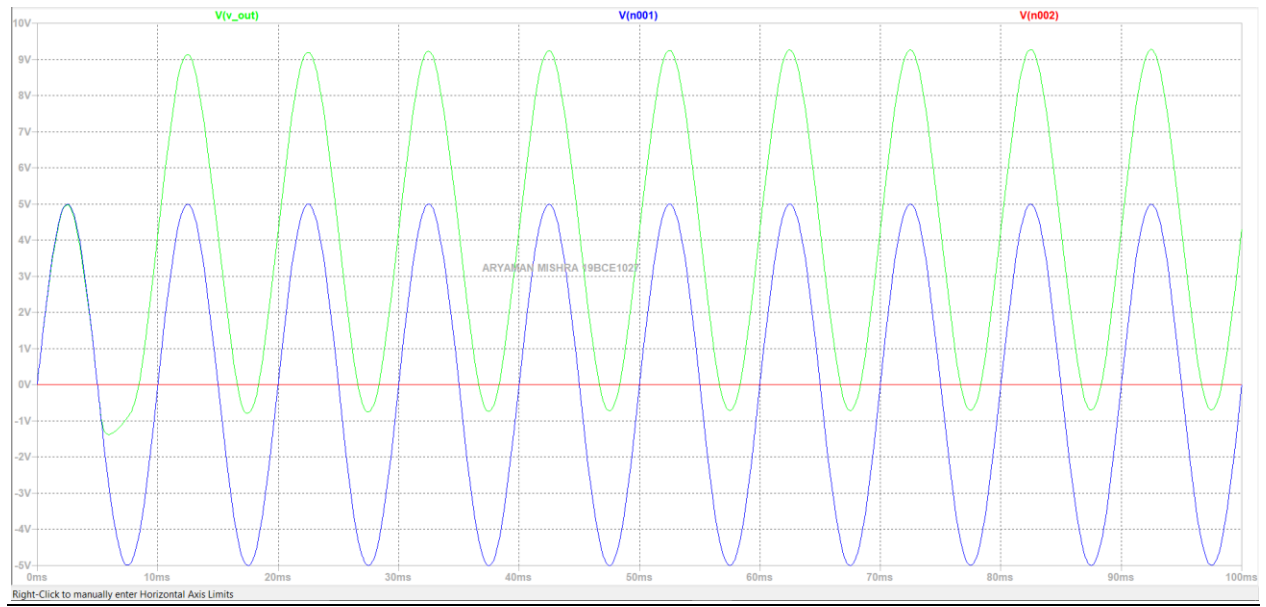
Clampers:

Task 1:

Circuit :



Output:

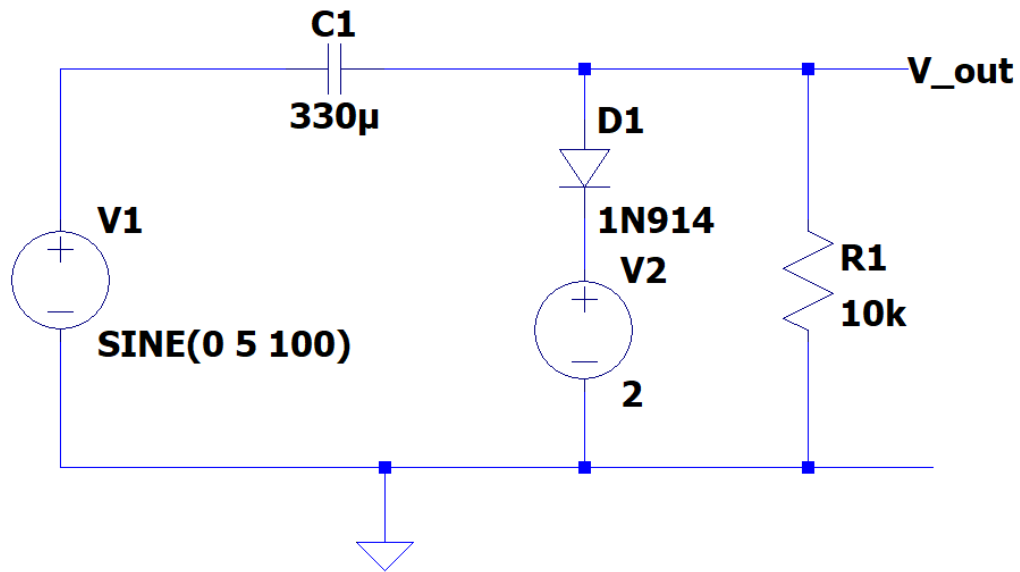


Task 2:

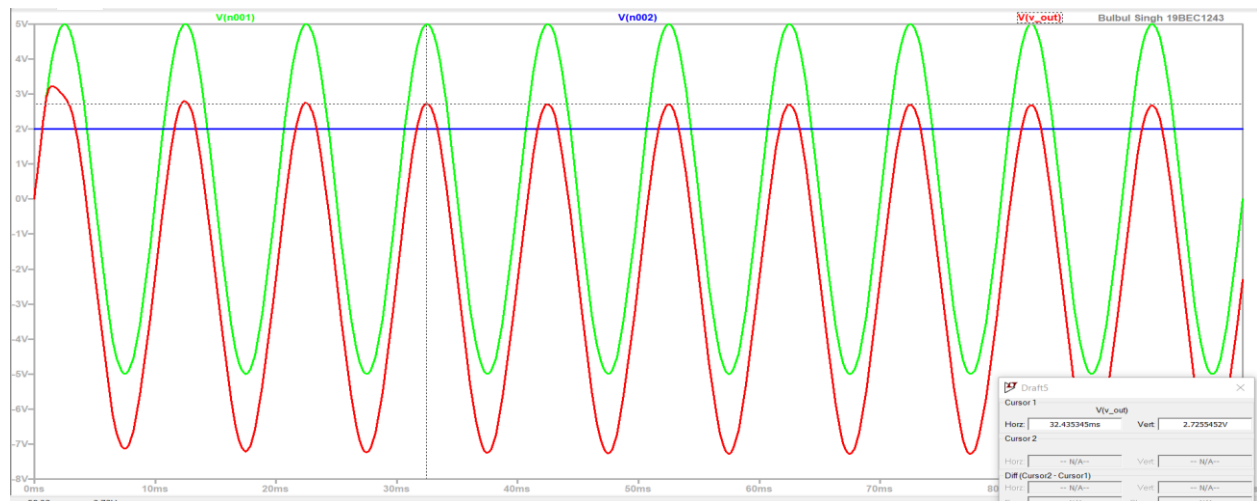
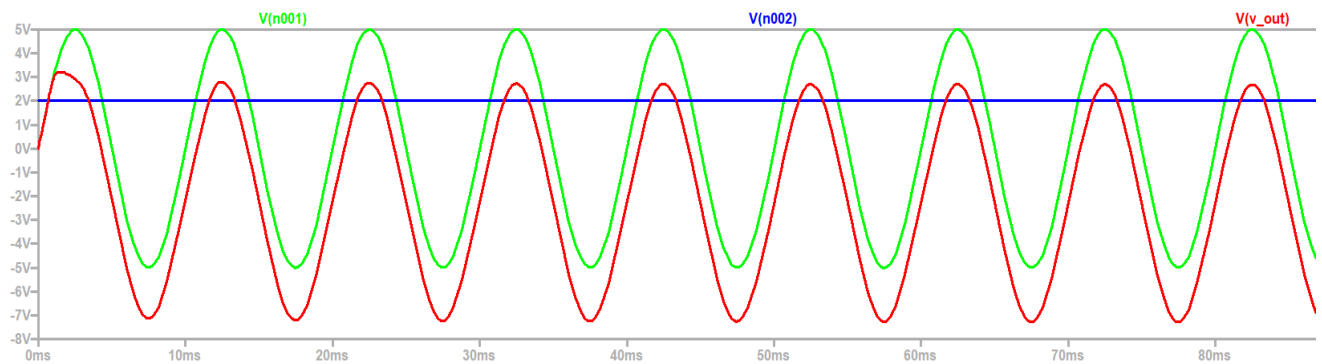
Circuit :

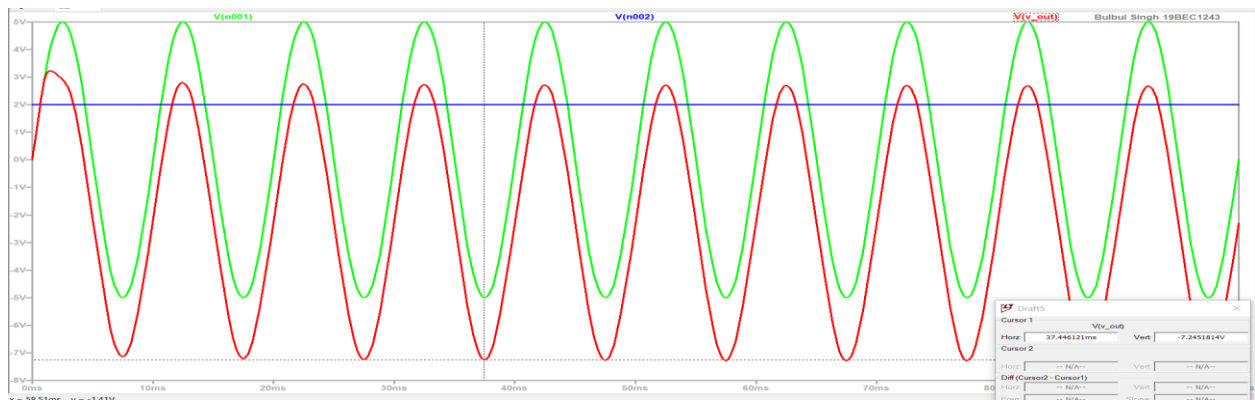
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.tran 0 100m 0m 1m



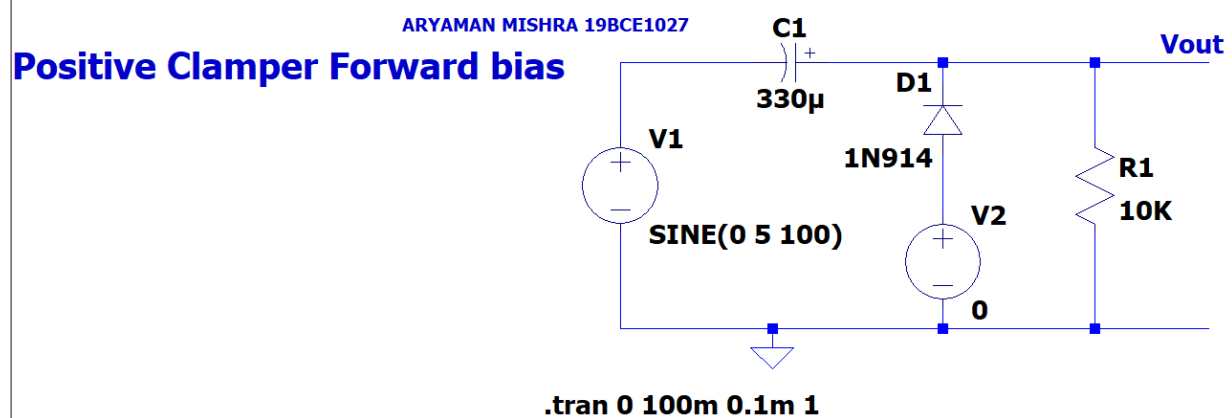
Output:



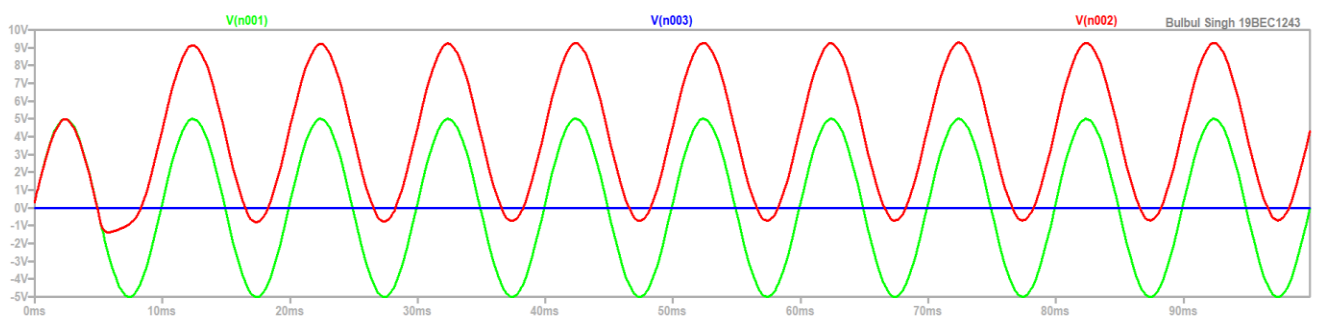


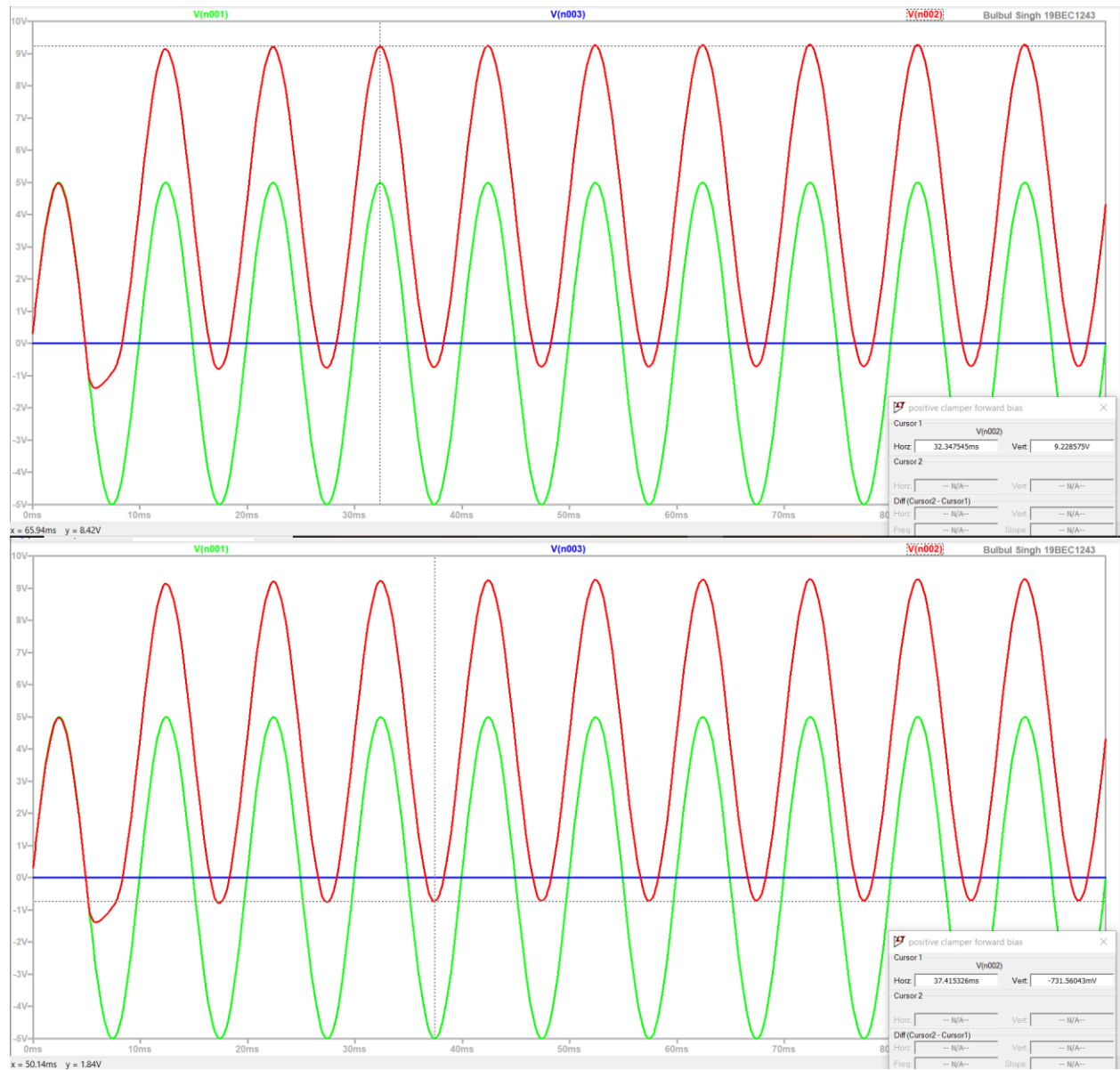
Task 3:

Circuit :



Output:



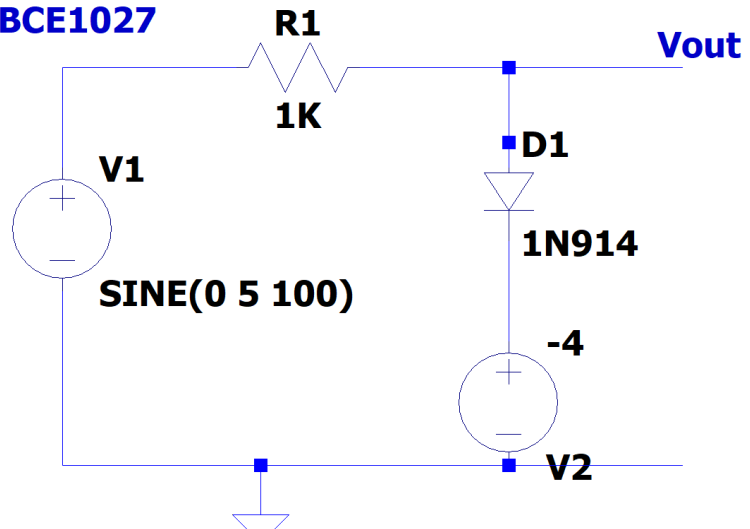


Task 4:
Circuit :

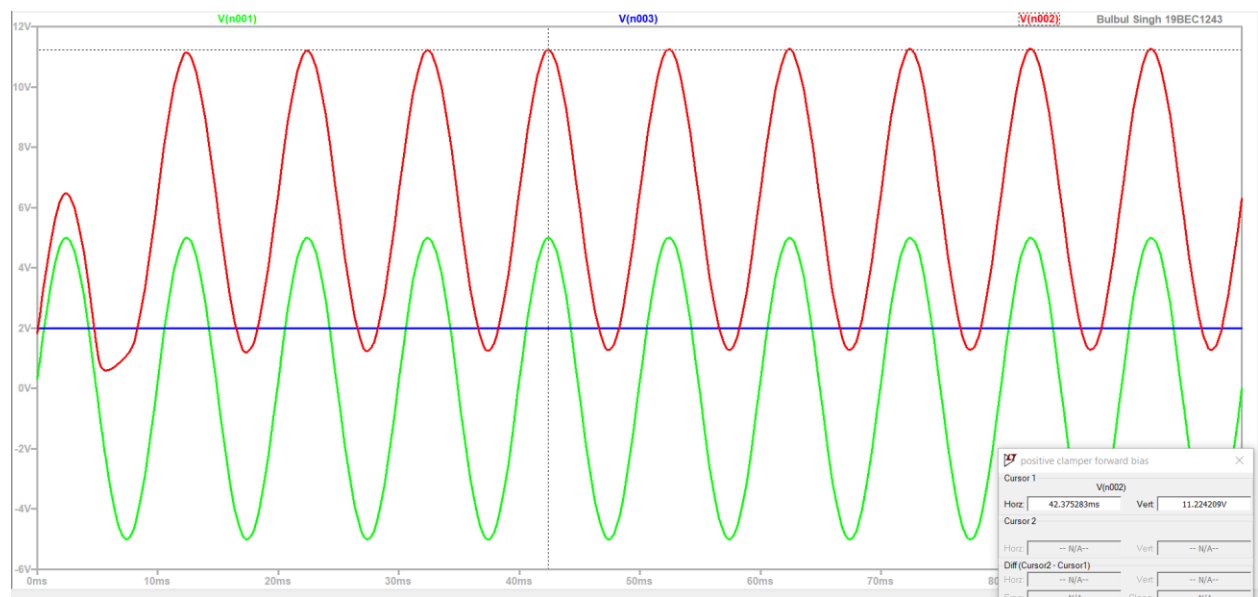
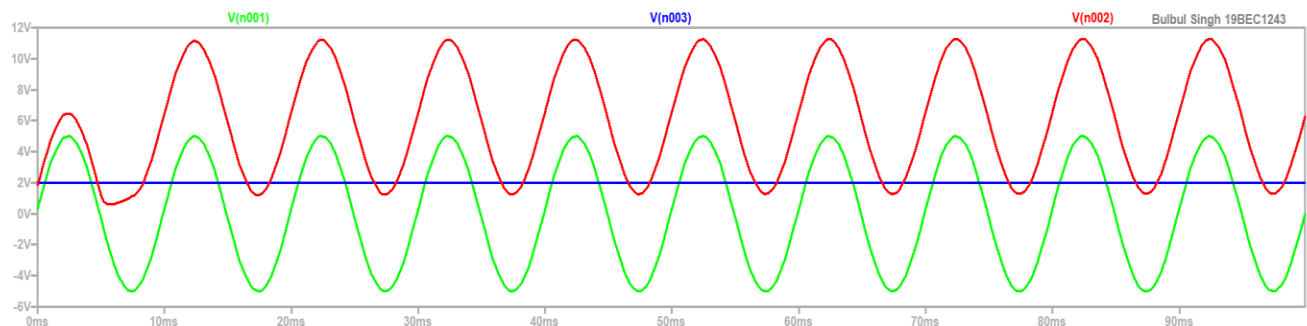
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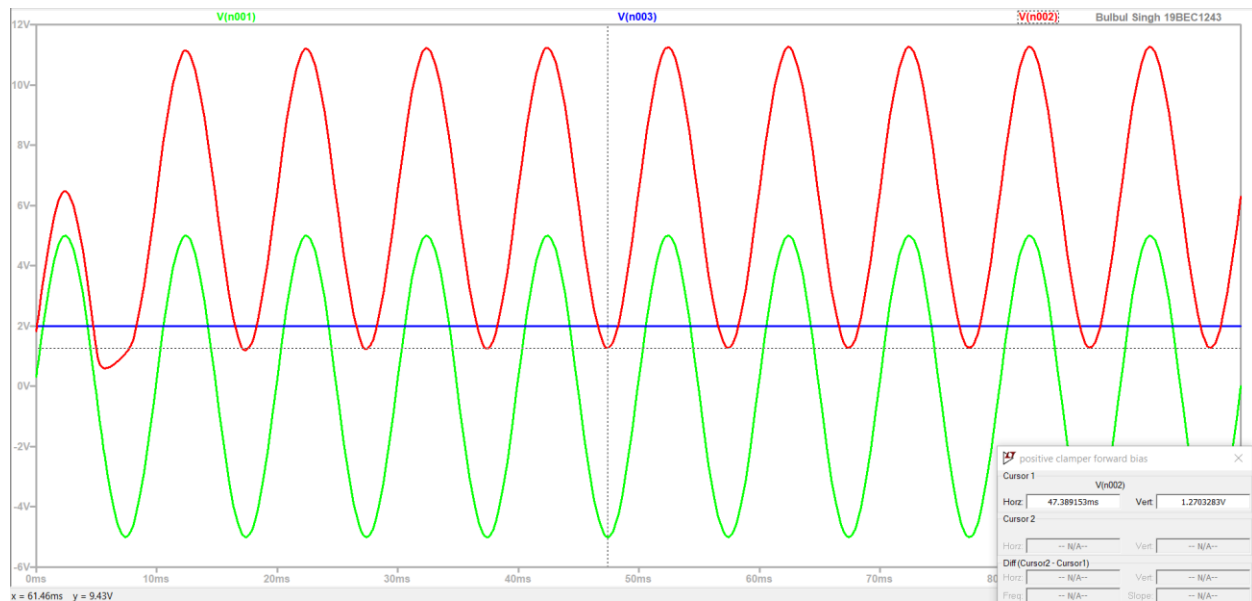
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Negative Clipper Forward Bias



Output:





Observation (Clampers):

Task 1:

Change in reference value = $0.73\text{V} - 5\text{V}$
 $= -4.27\text{V}$

Task 2:

Change in reference value = $2.75\text{V} - 5\text{V}$
 $= -2.25\text{V}$

Task 3:

Change in reference value = $9.24\text{V} - 5\text{V}$
 $= 4.24\text{V}$

Task 4:

Change in reference value = $11.22\text{V} - 5\text{V}$
 $= 6.22\text{V}$

Task	Clamper	+ve Peak of V_{in}	+ve peak of V_{ref}	+ve peak of V_{out}	-ve peak of V_{out}	How much the reference level was shifted (volts)
1	Negative	5V	0V	0.73V	-9.24V	-4.27V
2	Negative	5V	2V	2.75V	-7.24V	-2.25V
3	Positive	5V	0V	9.24V	-0.72V	4.24V
4	Positive	5V	2V	11.22V	1.27V	6.22V

Conclusion:**Clippers:**

Positive clipper: From graph we can observe that the clipper circuit clips off the some part of the waveform depend on the applied reference voltage. A positive clipper clips only the positive portion(s) of the input signal.

Negative clipper: From the graph we can observe that a negative clipper clips only the negative portion(s) of the input signal.

Clampers:

Negative clamper: In negative clamper reference voltage will be added to the output to raise the clamped level. During the negative half cycle, the voltage across the capacitor appears at the output. Thus the waveform is clamped towards the negative portion.

Positive clamper: In positive clamper a diode, a resistor and a capacitor and that shifts the output signal to the positive portion of the input signal

We designed and simulated the clippers and clampers circuits using LTspice tool. Thus experiment is successfully completed.