EXPERIMENT - 3

AIM: Design the double diode clipper circuit Positive clamper and negative clamper.

APPARATUS: Ac supply (12V ← 0 → 12V), P-N Diode, Capacitor 47 to 1μF, connecting wire, resistor (10kΩ) breadboard, multimeter.

THEORY:

Clipper - The diode clipper is a wave shaping circuit that takes an input waveform and clips or cuts off its top half, bottom half or both halves together. This clipping of input signal produces an input waveform that resembled a flattened version of the input. For example, the half wave rectifier is a clipper circuit. Since all voltage below zeros are eliminated

Clamper - A clamper circuit that can be defined as the circuit that consist of a diode, a resistor and a capacitor that shift the waveform to decline DC level without changing the actual appearance of the waveform, the time must be greater than half the period, discharging time of the capacitor should be slow.

$T = RC$

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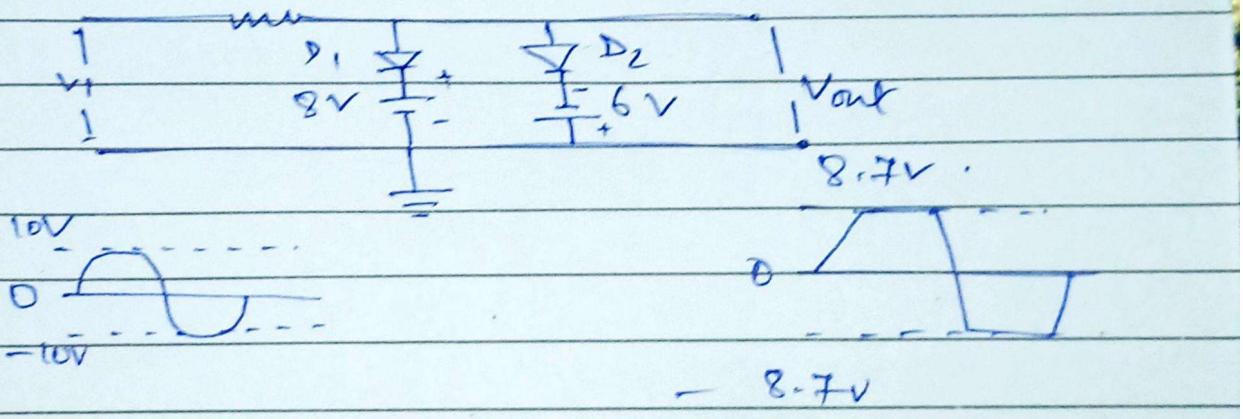
R = resistance of the resistor

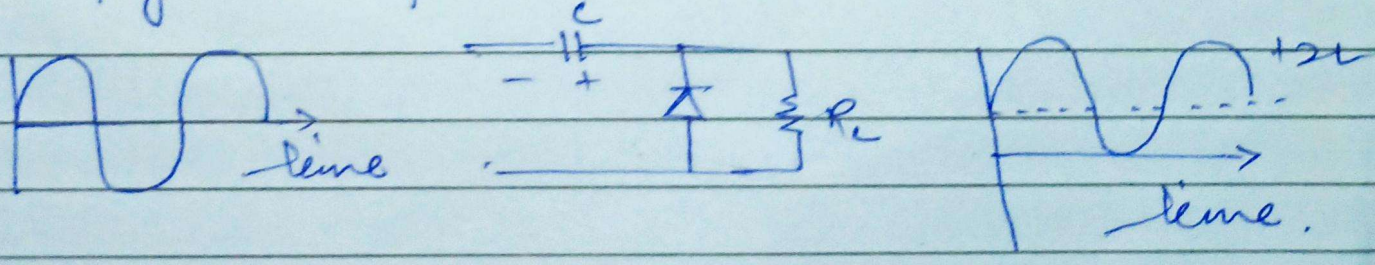
C = capacitance of the capacitor used.

- Double diode clipper: A circuit that can be used to limit the peaks of both half cycle of an A.C input signal is called double end clipper.



A circuit diagram from the circuit is shown. Notice that this circuit contains a shunt positive clipper with positive clipper biased and shunt negative clipper with negative biased.

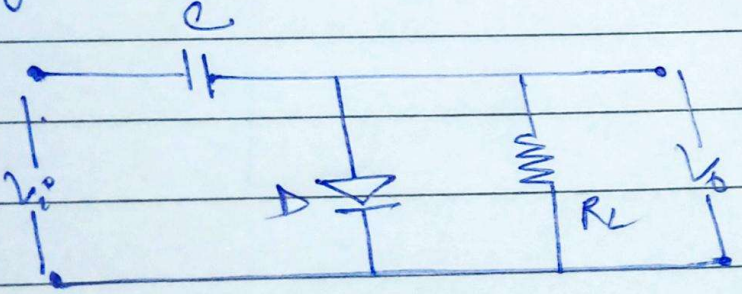
Positive clamper circuit: Diode clamping circuit simply consist of a diode D and capacitor C.

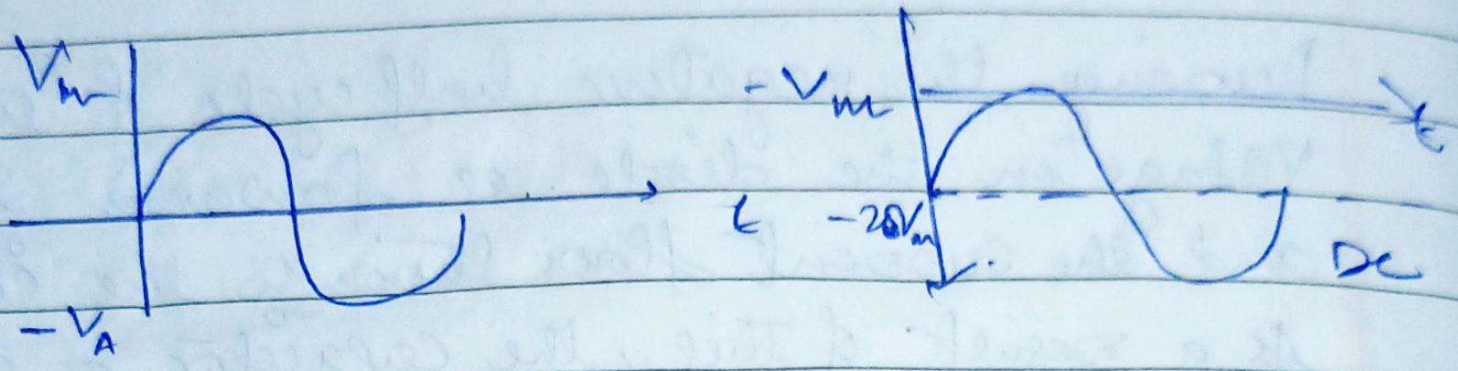


Duzing the negative half cycle of input voltage en the diode is forward biased and the current flows through the circuit As a result of this, the capacitor c charged to a voltage equal to the negative Peak value i.e $-V_m$ once capacitor charge to $-V_m$ it cannot discharge because the diode cannot conduct the reverse direction. It means that this capacitor acts as a battery with an emf equal to the $-V_m$. the Polarity of the voltage is such that it adds to the input signal then the output voltage is equal to the sum of the A.C signal and the capacitor voltage V_m. i.e $V_{in} + V_m$.

- <u>negative clamped circuit</u>

If we change the Polarity of the diode and capacitor, then the circuit becomes negative clamper.





Procedure –

(i) Connecting the circuit as per the given circuit diagram.

(ii) Calculating the values of output theoretically.

(iii) Set the input signal voltage (say 5V, 1KHz) using signal generator

(iv) Observe the output waveform using CRO (DC-mode)

(v) The graph is formed

Observation

(1) Double diode clippers —

S.no	Time(ms)	Voltage input (mV)	voltage output (mV)
1	532.76	-4.9924	-2.8745
2	532.91	-2.5452	-2.5452
3	533.13	3.7245	3.7245
4	533.26	4.6048	4.9924
5	533.35	3.9341	3.9341
6	533.50	-2.8122	-2.8122
7	533.76	-4.9924	-2.8745
8	533.91	-2.5452	-2.5452
9	534.13	3.7245	3.7245
10	534.26	4.0045	4.9924

② Positive clamper

S.no	time (ms)	Input voltage (mV)	output voltage (mV)
1.	91.517	-519.32	692.20
2.	91.767	-4.9730	-605.86
3.	92.235	4.9787	7.5354
4.	92.548	-1.4794	-274.52
5.	92.735	-4.9787	-686.28
6	92.923	-2.3311	1.9748
7.	93.079	2.3826	6.0531
8.	93.235	4.9787	7.5354
9.	93.392	3.1492	4.7013
10.	93.485	460.92	1.7099

3) Negative clamper

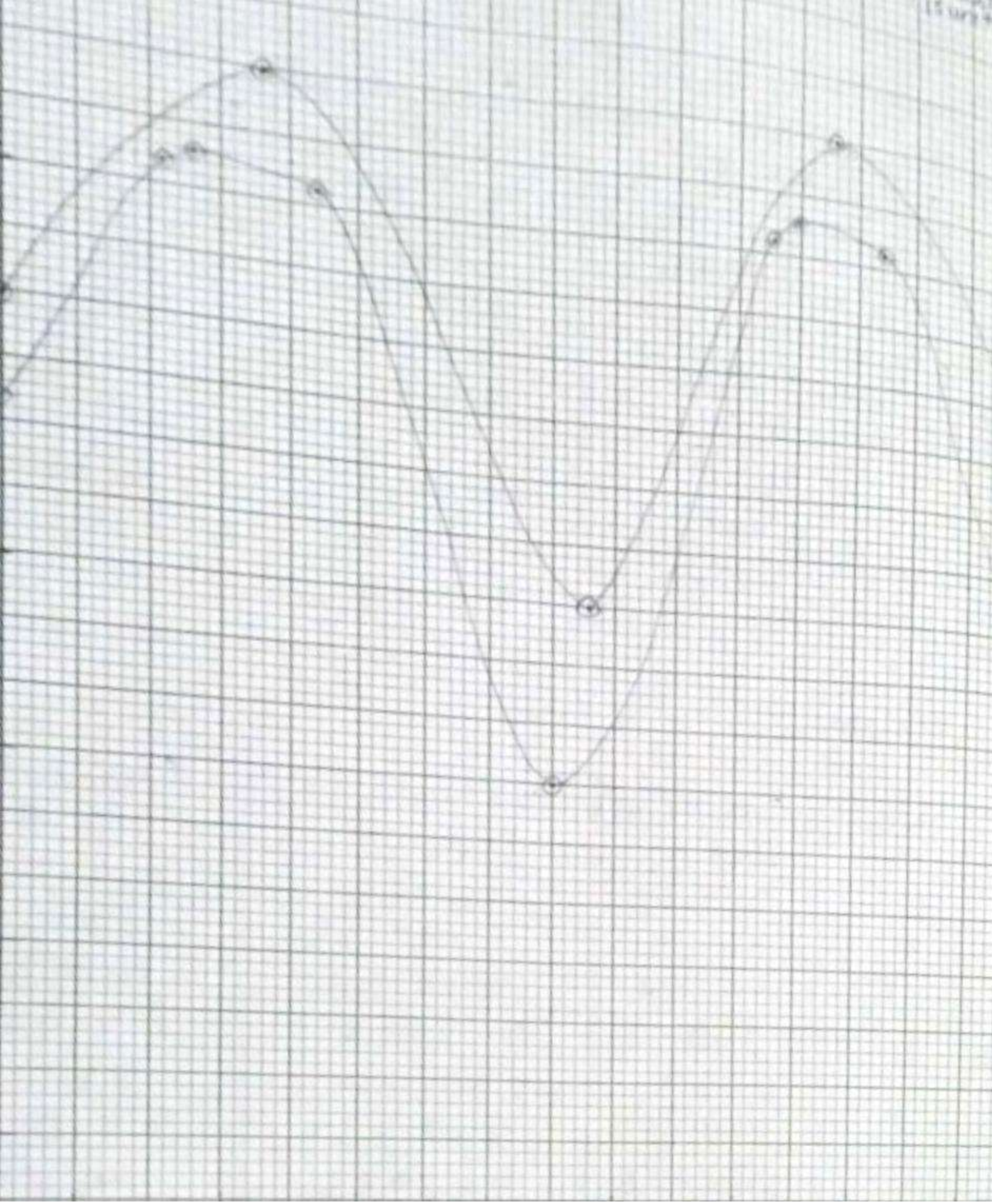
S.No.	Time (ms)	Input voltage (mV)	Output voltage (mV)
1.	116.96	-1.3800	-2.6931
2.	117.05	1.5225	318.64
3.	117.08	742.55	2.4224
4.	117.24	4.9827	679.01
5.	117.64	-3.9119	-7.1554
6.	117.74	-4.9827	-7.5166
7.	118.08	2.4227	742.55
8.	118.27	602.94	4.9681
9.	118.49	-3.7063	415.69
10	118.64	-3.9119	-7.1554

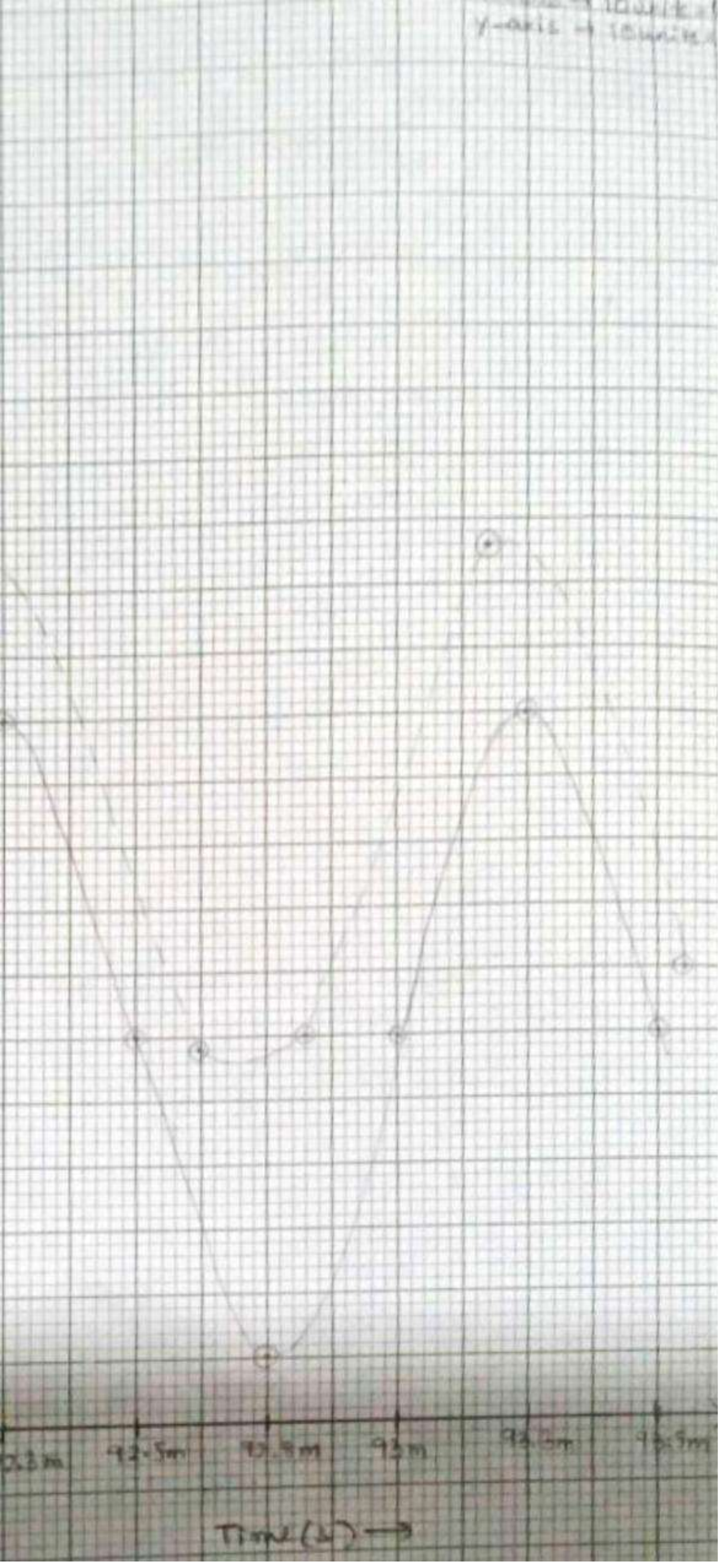
PRECAUTIONS:

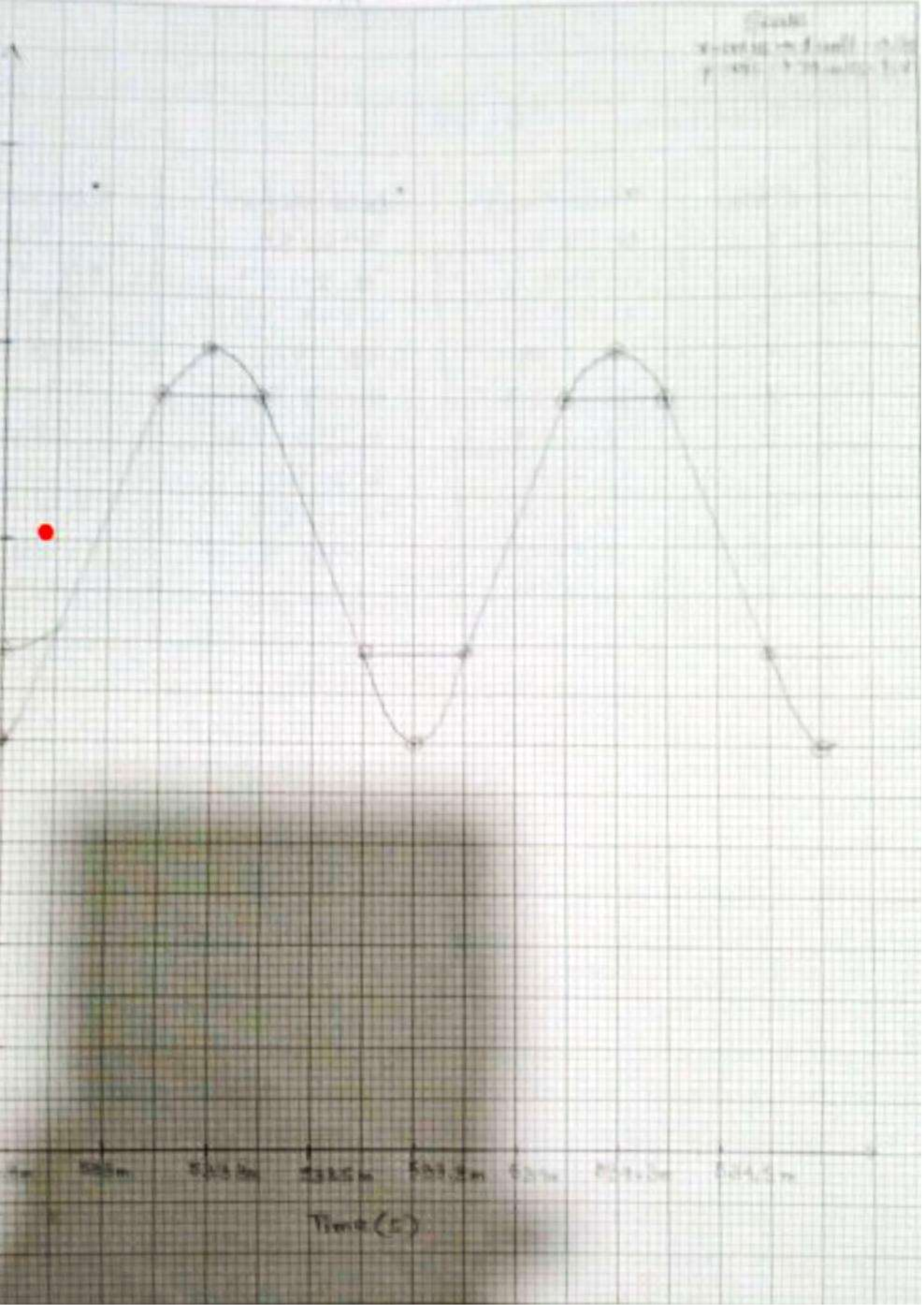
- The device should be checked properly to avoid wrong reading.
- Graph should be formed carefully.
- Readings should be cross-checked to avoid error.
- The curves of graph should be hand-drawn.

Result -

The observations are taken and the waveform of the double clipper and clamper circuit waveform are obtained.




Time (t) →


Time (t)