Summer 2023

EEE/ETE 111L

Analog Circuits-I Lab (Sec-11)

Faculty: Professor Dr. Monir Morshed (DMM)

Instructor: Rokeya Siddiqua

Lab Report 04: Clipper and Clamper circuits.

Date of Performance:
02 September 2023

Date of Submission:
09 September 2023

Group no.: 05

1. **Mahmudul Hasan- 2011551043**
2. Sabrina Haque Tithi- 2031265642
3. Afrin Akter- 2112246642
4. Joy Kumar Ghosh – 2211424642
5. Sazid Hasan- 2211513642

Experiment NO-04

Name of the Experiment:

Clipper and clamper circuits.

Objective:

Study of clipper and clamper circuits.

Theory:

Clipper and clamper circuits are electronic circuits used in signal processing. A clipper circuit is designed to limit or 'clip' the amplitude of an input signal to a certain range. It can remove or limit portions of the signal above or below a specific voltage level.

There are two main types of clipper circuits. positive and negative clipper circuits. positive clipper circuits clip the signal above a specified voltage level, while negative clipper circuits clip the signal below a specified voltage level.

Clipper circuits are used in audio and video processing, waveform shaping and voltage protection in electronic circuits.

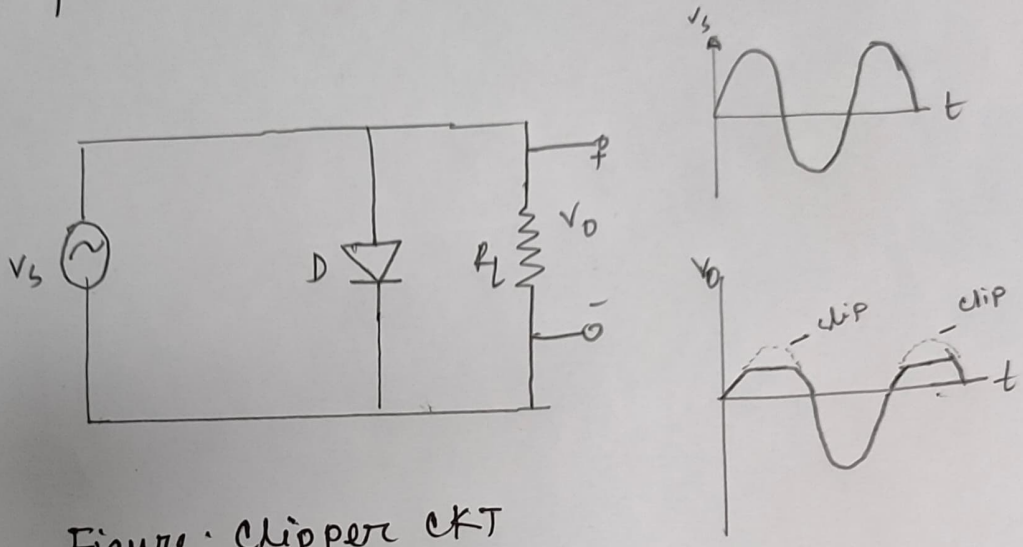


Figure: Clipper CKT

A clamper circuit is used to shift the DC level or bias of a signal. It does not limit the amplitude like a clipper but instead adds a DC offset to the input waveform.

There are two types of clamper circuits. positive clamper and negative clamper. positive clamper adds a positive DC voltage to the input, while negative clamper adds a negative DC voltage.

Clamper circuits are commonly used in electronics to restore a signal to a desired DC level, such as in AC coupling applications and to eliminate distortion in waveforms.

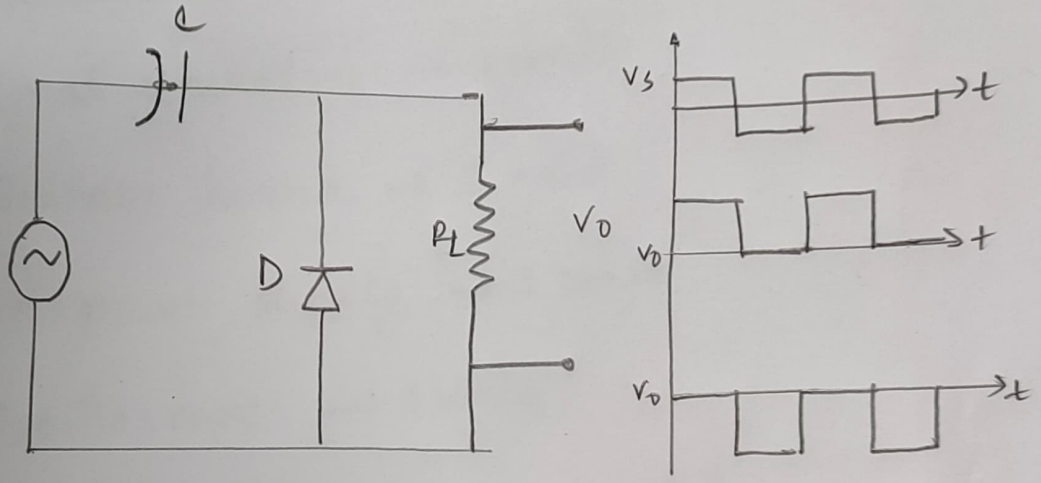


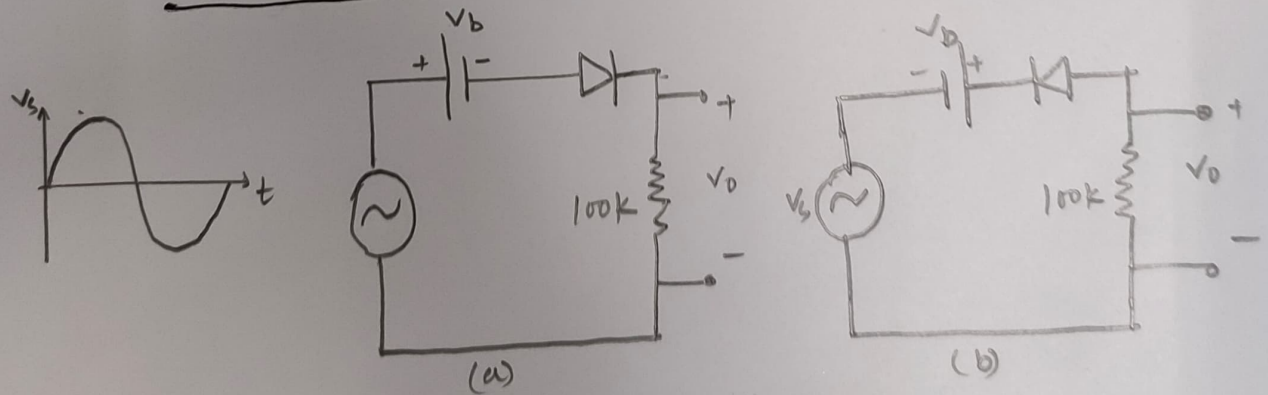
Figure: Clamper CKT

These circuits are essential in various electronic applications for signal ~~coordi~~ conditioning and waveform manipulation. They help control and shape signals to meet specific requirements in electronic systems.

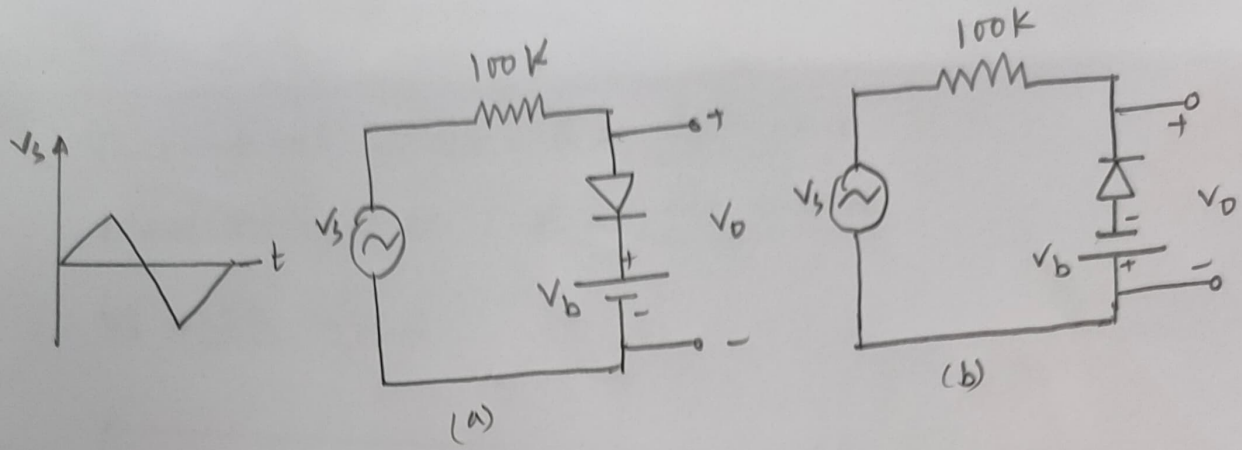
List of Equipment:

1. p-n junction diode → 1N4007 → 1 piece
2. Resistor → 100 kΩ → 1 piece
3. Capacitor → 0.1 MF → 1 piece
4. Signal generator → 1 unit
5. Trainer board → 1 unit
6. DC power supply → 1 unit
7. Oscilloscope → 1 unit
8. Digital Multimeter → 1 unit
9. Chords and wire → as required.

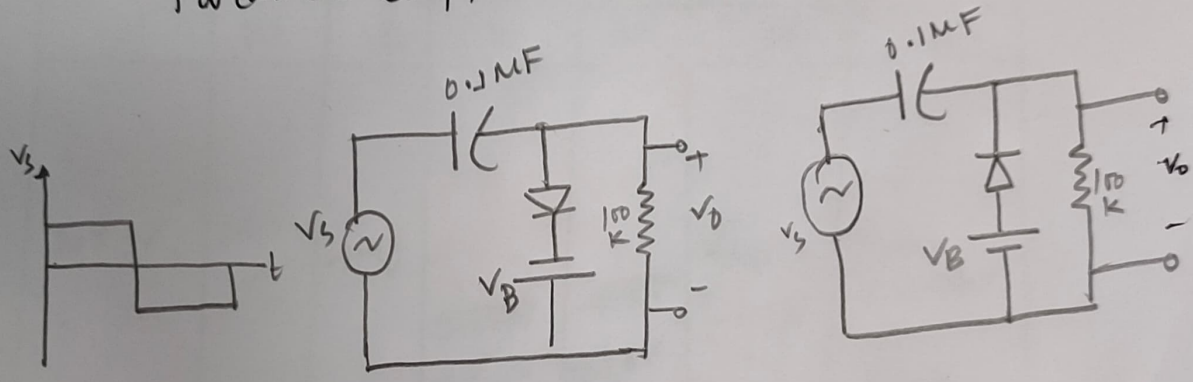
Circuit diagram:



Series Clipper Circuit



Paralleer clipper circuits



Clamper circuit

Data table:

Theoretical value: R = 100 kΩ

Measured value : R = 100.4 kΩ

V_S = 10 $V_{(P-P)}$

V_b (V)	V_O (P-P)					
	3.6		3.7		3.8	
	(a)	(b)	(a)	(b)	(a)	(b)
2.5 V	2.40 V	-2.40 V	~~3.20 V~~ 7.40 V	~~2.80 V~~ 7.60 V	V_{max} = -1.02 V V_{min} = -11.63 V	V_{max} = 12.24 V V_{min} = 1.22 V

Discussion:

In our 4th experiment, (clipper and clamper circuit), we learnt about clipper and clamper circuit. In the theory part, we saw types of clipper circuit : series clipper circuit and parallel clipper circuit. We also saw a clamper circuit. After buiding the series clipper circuit, we observed the output signal first from oscilloscope for positive half cycle. Then we turned the diode opposite direction and input voltage also, we observed the output signal from oscilloscope for negative half cycle.

We repeated this for six times for six different circuits. and observed the output signal from oscilloscope. For clipper circuit, we observed that the output voltage signal was clipped. For clamper ckt we observed the output signal shifted the DC level or bias of a signal.

Contribution:

1. Sabrina Haque Tithi (2031265642) → Operating Function Generator & DC Power Supply
2. Sazid Hasan (2211513642) → 1st circuit build & took measurements
3. Afrin Akter (2112246642) → 2nd circuit build & took measurements & drew graphs
4. Joy Kumar Ghosh (2211424642) → 3rd circuit build & took measurements
5. Mahmudul Hasan (2011551043) → Report writing, simulation, helped in 2nd circuit building.

Attachment:

* Graphs
* Simulation
* oscilloscope
* Data table

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02.09.23

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Experimental Setup:

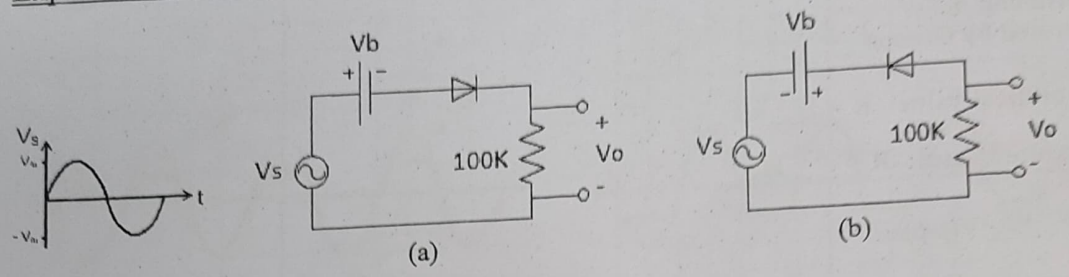

Figure 4.6: Series Clipper Circuit

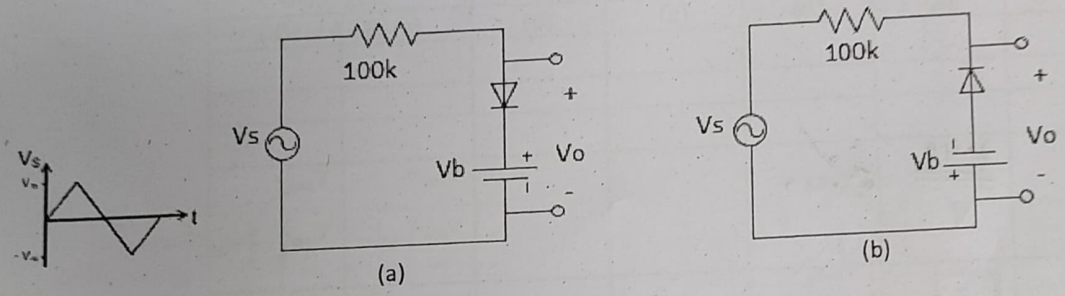

Figure 4.7: Parallel Clipper Circuits

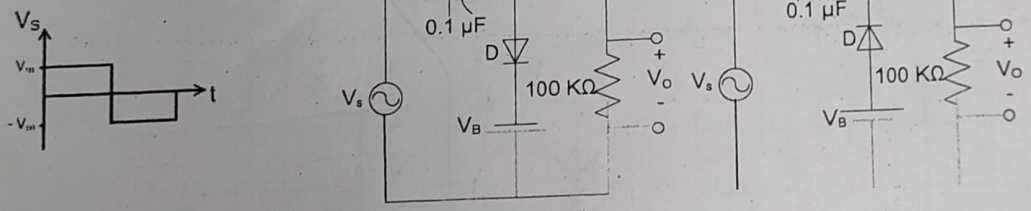

Figure 4.8: Clamper circuit

Procedure:

1. Connect the circuit as shown in the figure 4.6.
2. Using Signal generator, apply a 1kHz $10V_{p-p}$ sinusoidal voltage source input ($V_m = 5V$)
3. Fix V_b to 2.5V and In the same graph paper, Draw V_s and V_o.
4. Decrease the value of V_b from 2.5V to 0V, and observe the output wave shapes
5. Increase the value of V_b from 2.5V to 5V, and observe the output wave shapes
6. Repeat step 2-4 for figure 3.7 and figure 3.8
7. Record V_{max} and V_{min} for the output wave for the clamper circuit only for V_b=2.5V.

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Data Collection:

Signature of instructor:

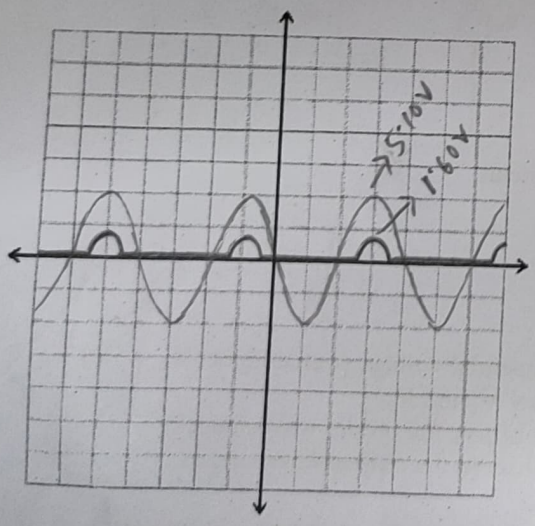
Experiment: 4,
Performed by Group# 5

Theoretical value: R = 100 kΩ

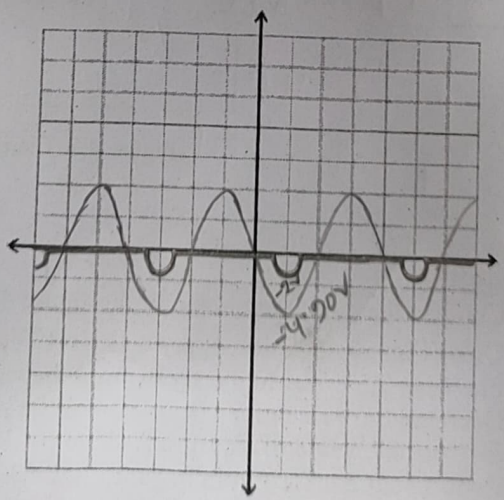
Measured value: R = 100.4 kΩ

Vs = 10 V(p-p).

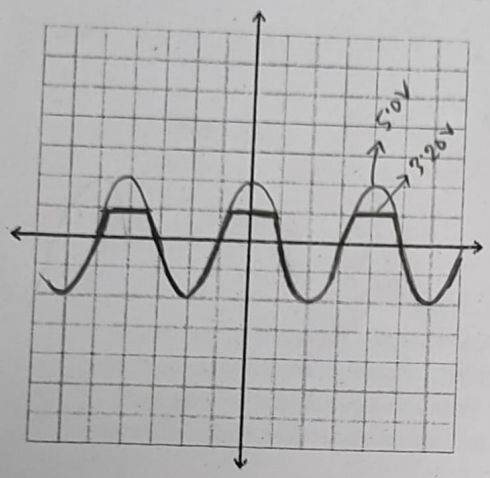
V_b (V)	Vo (p-p) (V)					
	Fig 3.6		Fig 3.7		Fig 3.8	
	(a)	(b)	(a)	(b)	(a)	(b)
0						
1						
2						
2.5	2.40 ~~10.20~~ V	2.40			V_{max}= V_{min}=	V_{max}= V_{min}=
3						
4						
5						



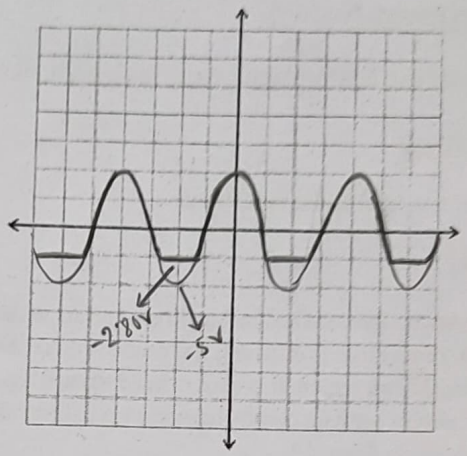
Input-output Fig 4.6 (a)



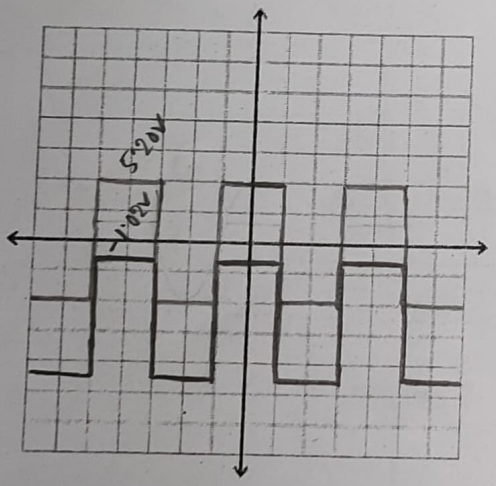
Input-output Fig 4.6 (b)



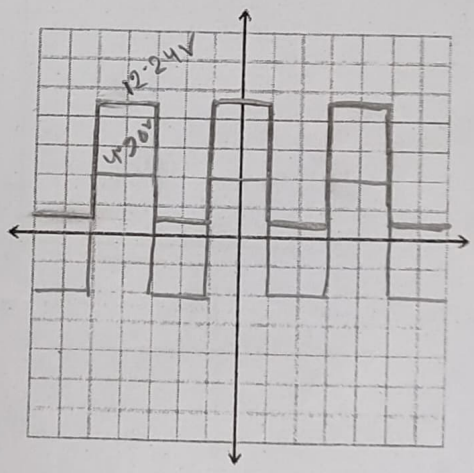
Input-output Fig 4.7 (a)



Input-output Fig 4.7 (b)



Input-output Fig 4.8 (a)

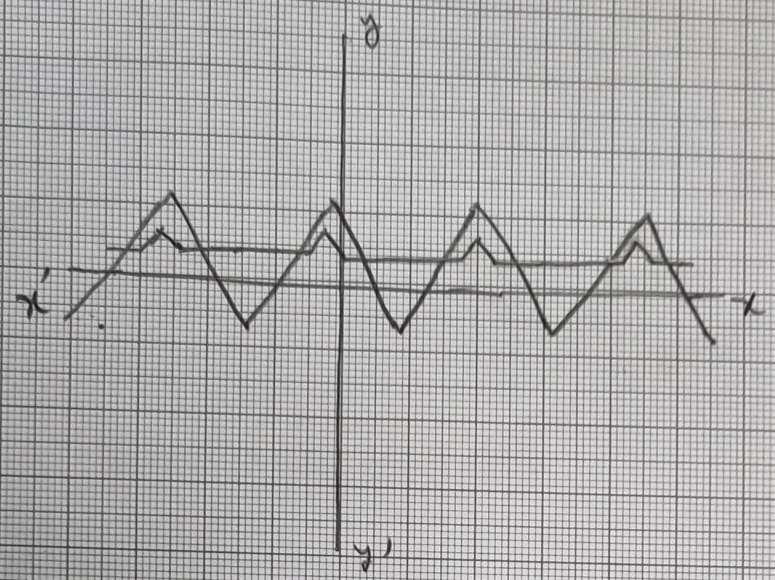


Input-output Fig 4.8 (b)

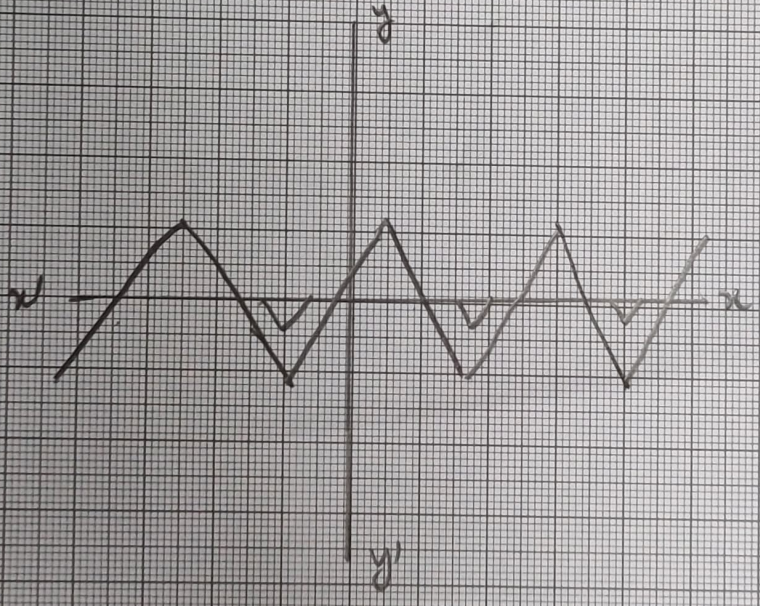
Report:

1. Using values from your data table, for all the circuit diagrams plot the input-output waveforms observed on the oscilloscope for V_b=2.5V.
2. For Fig 4.6(a &b), Fig4.7 (a & b) and Fig 4.8 (a & b) what change did you observe in the output voltage, In procedure-4? *Explain the reason behind such a change.*
3. For Fig 4.6(a &b), Fig4.7 (a & b) and Fig 4.8 (a & b) what change did you observe in the output voltage, In procedure-5? *Explain the reason behind such a change.*

Roll No. .....

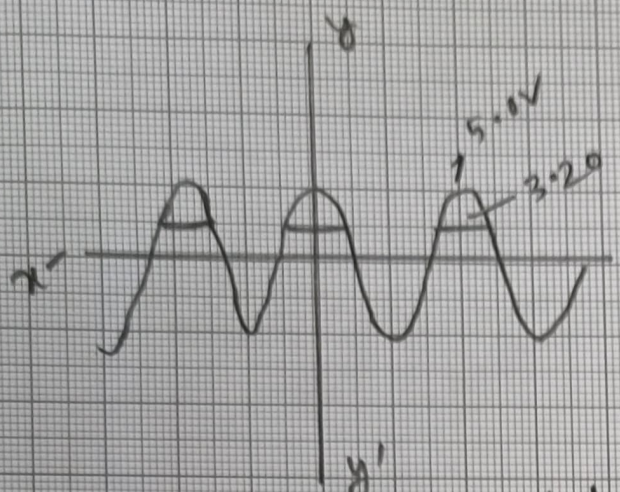


4·6 Input - output (a)

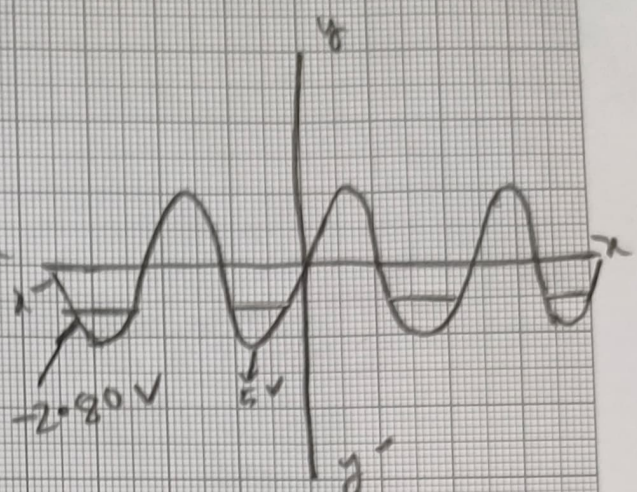


4·6 input - output (b)

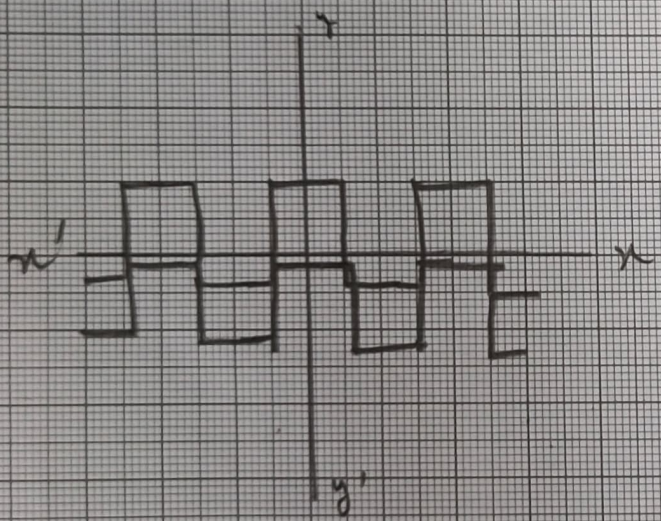
Roll No. .....



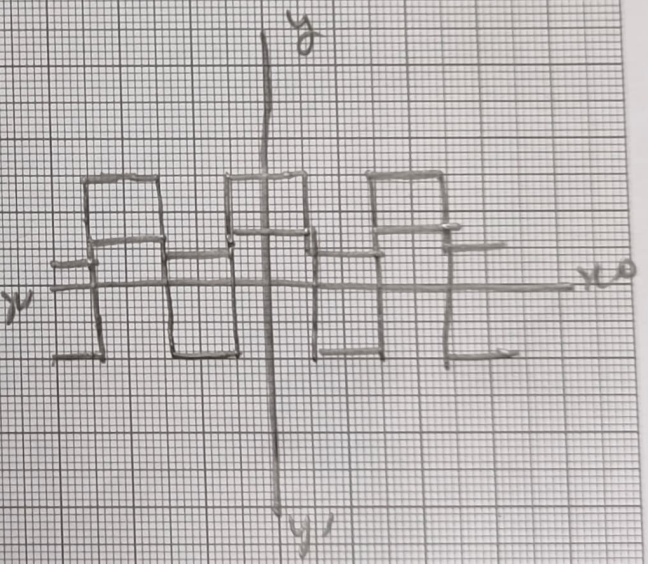
input fig 4.7 (a)



4.7 (b)
input output



4.8 (a)
input - output
(a)



4.8 (b)
input - output