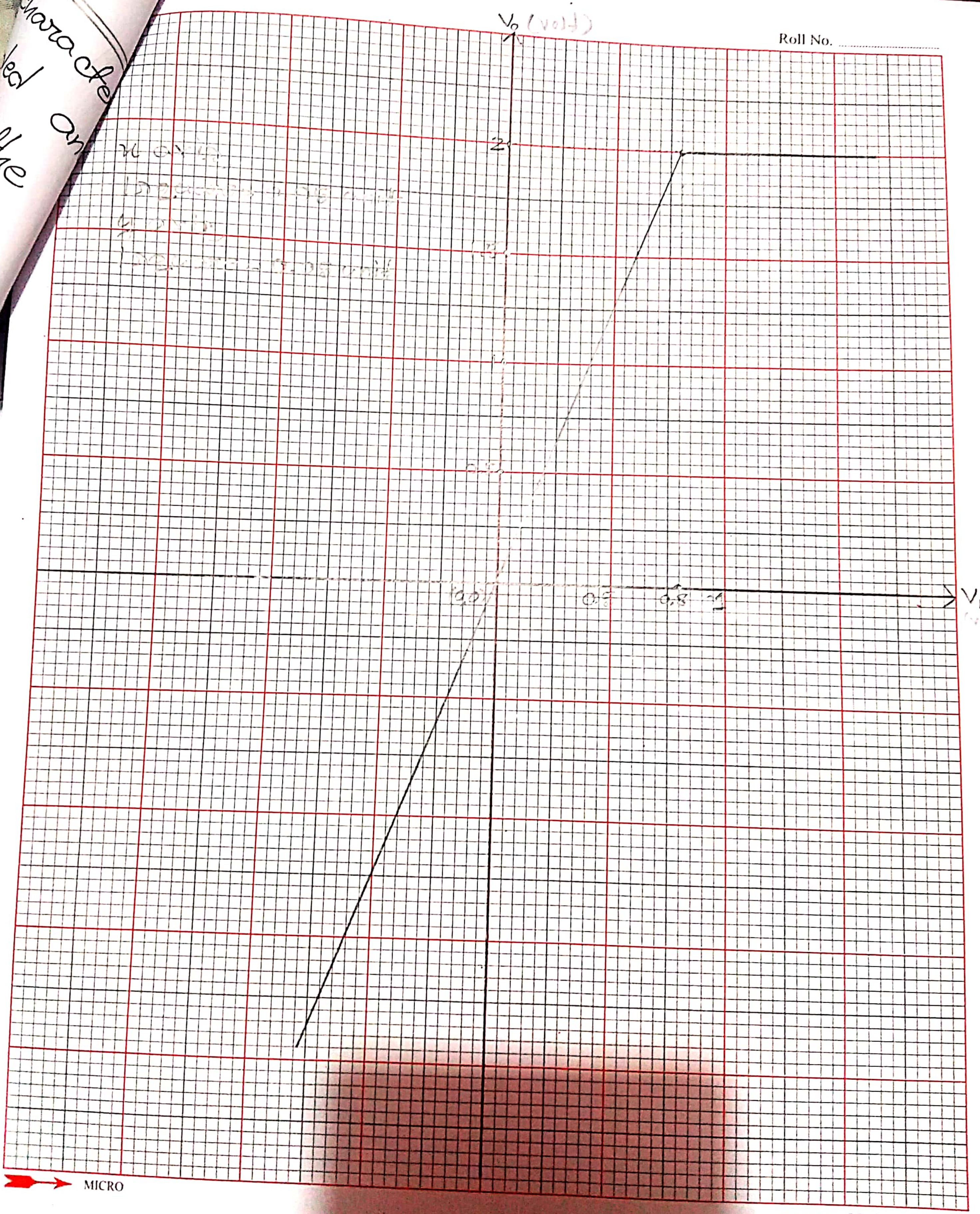
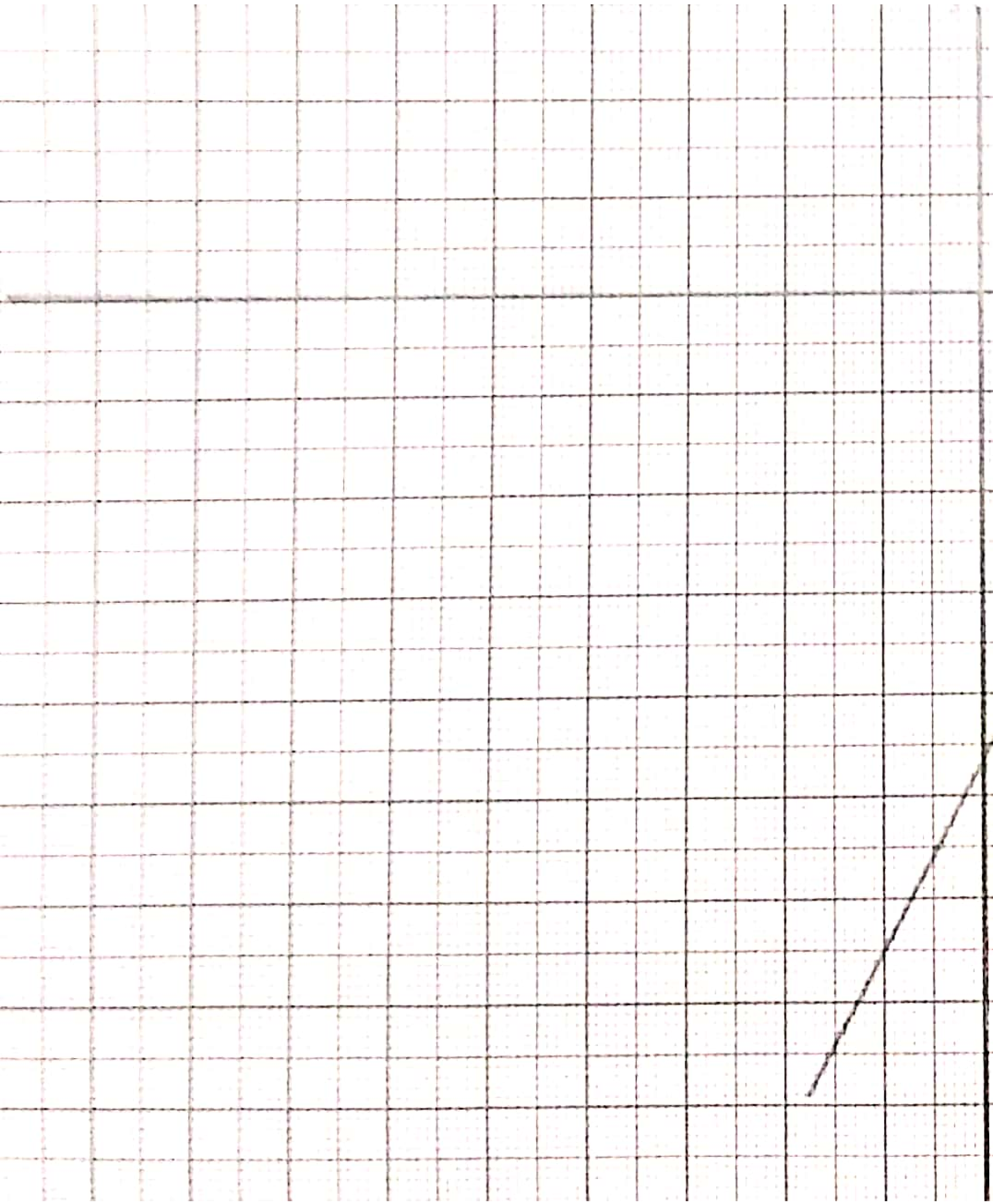
…uits Sessional)

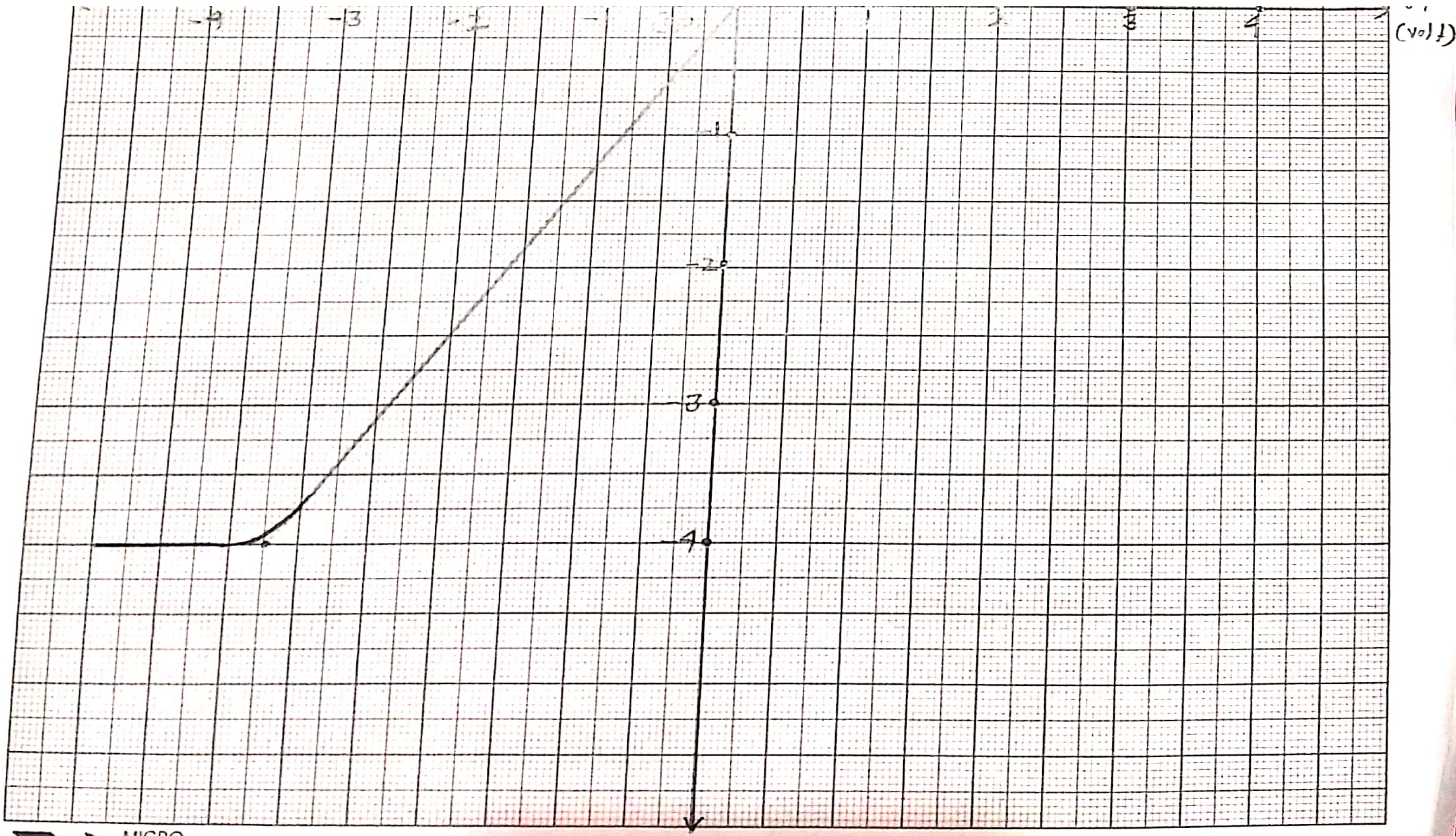
Roll No. ....



MICRO

8 Inch x 10 Inch





MICRO

N.P. 20 cm x 25 cm

-ssional)

Report:

Ques 1:

what is a clipping circuit? Explain the operation of the circuit in Fig. 1.

Ans: clipping circuit is a circuit which uses diodes in order to clip a part of a signal. It can cut any portion of the input signal but rest of the waveform remains unchanged. It contains of a diode, a resistor and a constant DC voltage source.

The circuit in Fig.1 is clipping circuit. ~~we~~ It can be repl the diode with an ideal one by adding 0.7V dc source.

In the positive half cycle, as long as V_i is smaller than 3.2V, the diode becomes reverse biased.

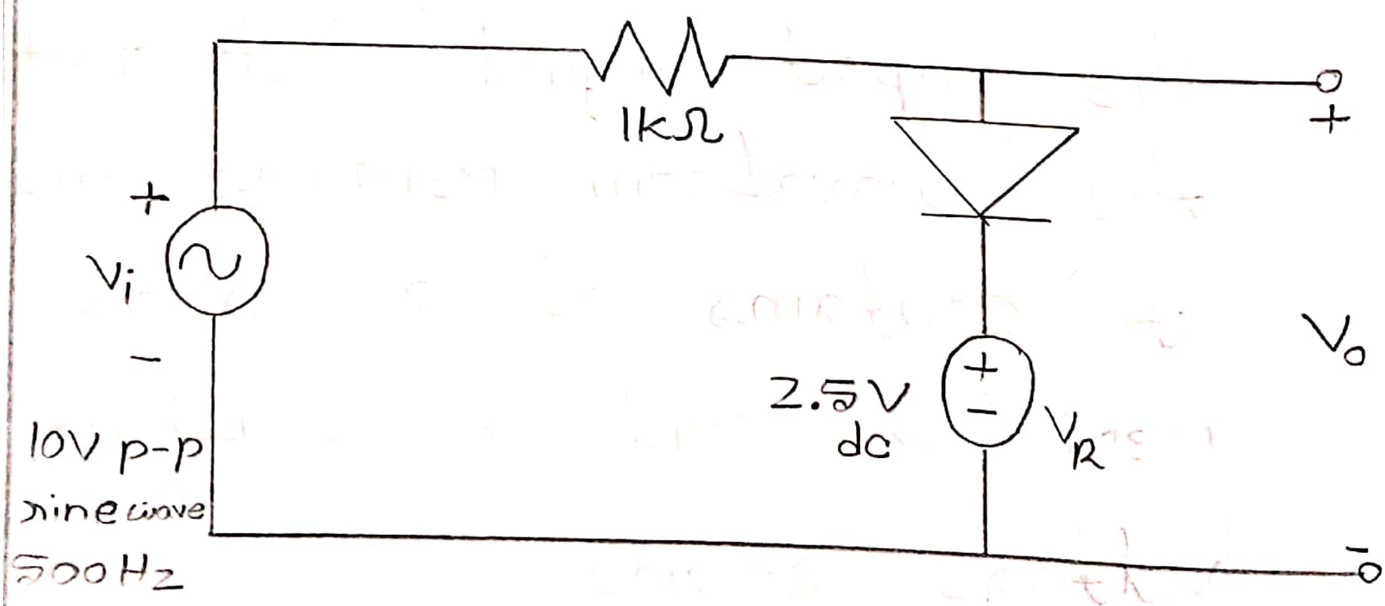


Fig: positive half cycle.

So no current flows through it. And V_i is same as V_o. But when V_i gets larger than 3.2V the diode becomes a short circuit and V_o gets equal to 3.2V.

In the negative cycle, the diode is always reversed biased.

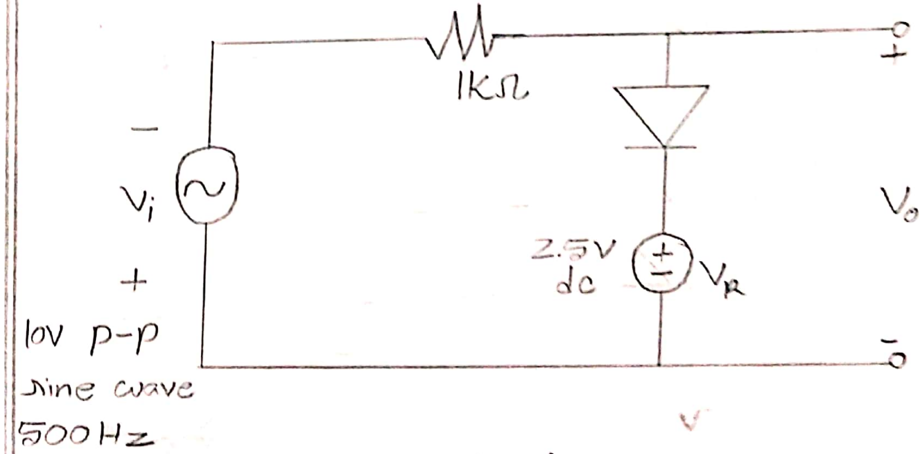
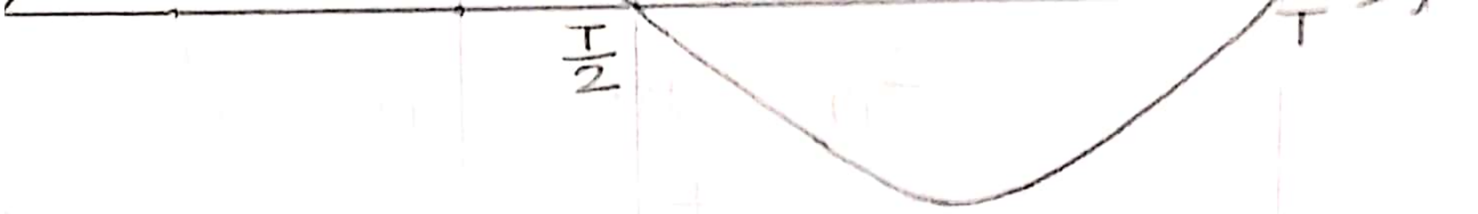
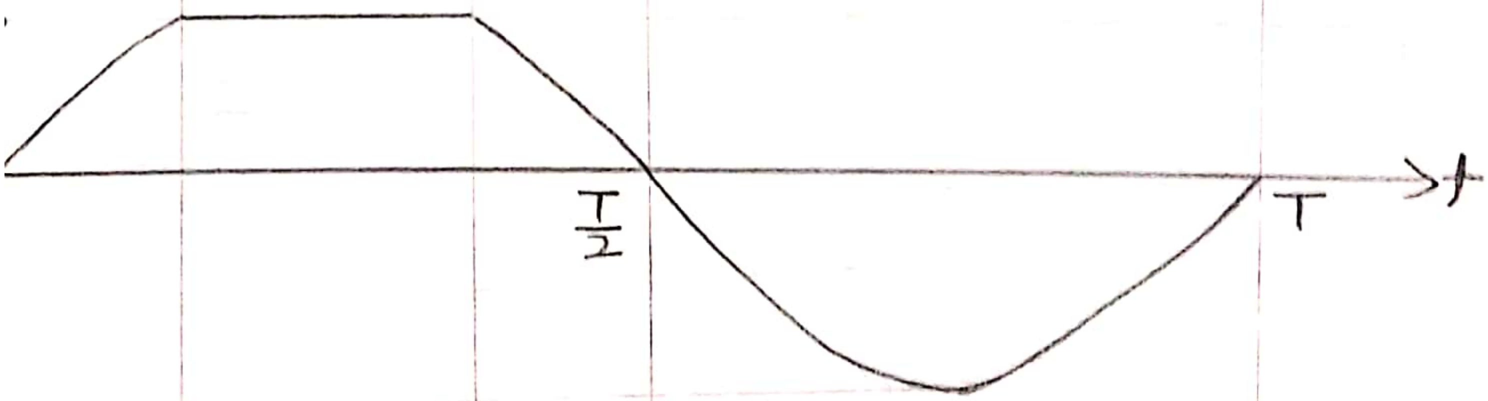


Fig: negative half cycle.



output signal



Ques 2:

Design a circuit in which the input voltage $V_i = 5\sin\omega t$ and the output should be limited between +2.5V and −3.5V. Assume that the diodes are ideal.

Ans: To limit the output between +2.5V and −3.5V, ~~we~~ two ideal diodes D_a and D_b are added parallely. Then two 2.5V and 3.5V dc sources are added with them.

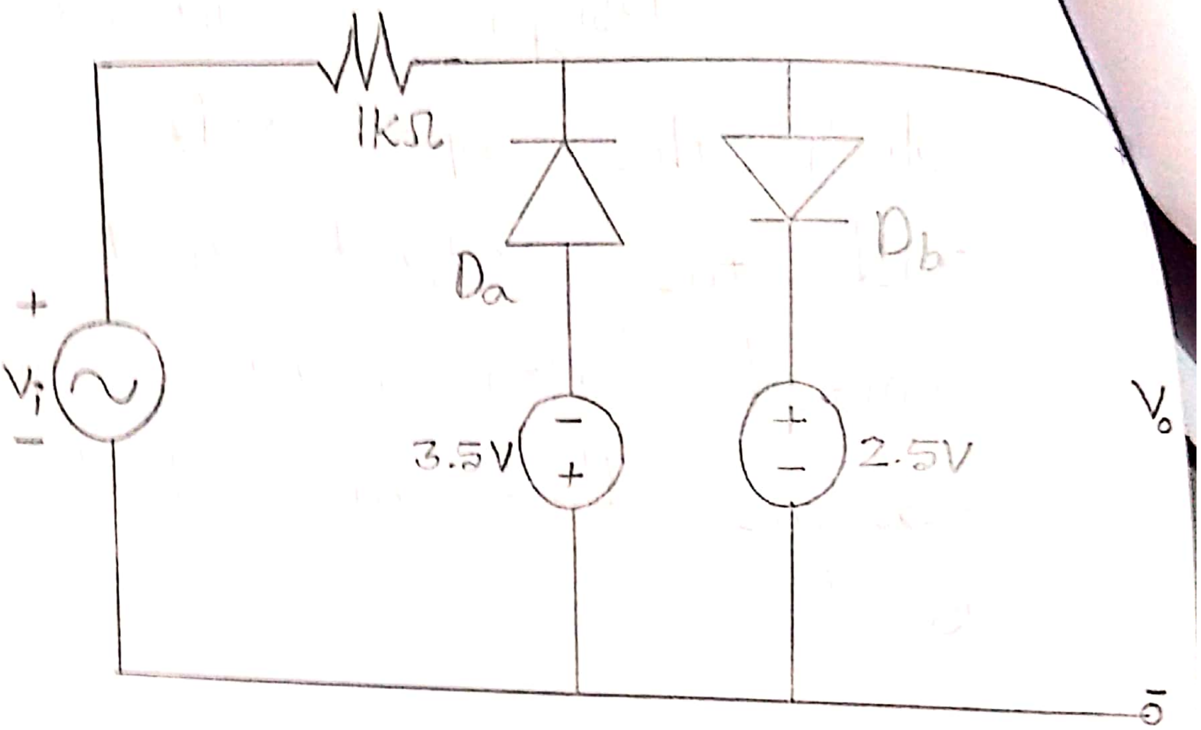


Fig: 2.1

In positive half cycle Da will be on reverse bias but when $V_i > 2.5V$, Db will be on forward bias. So at $V_i < 2.5V$ V_o will follow V_i and at $V_i > 2.5V$ then V_o will be $2.5V$.

In negative half cycle. D_b will always be reversed biased. when $V_i < -3.5V$, D_a will be on forward bias. So, at $V_i > -3.5V$, V_o will follow V_i and at $V_i < -3.5V$, V_o will be $-3.5V$

So, between $-3.5V < V_i < 2.5V$, both diodes will be reversed bias and open circuit. So the output voltage is same as input.

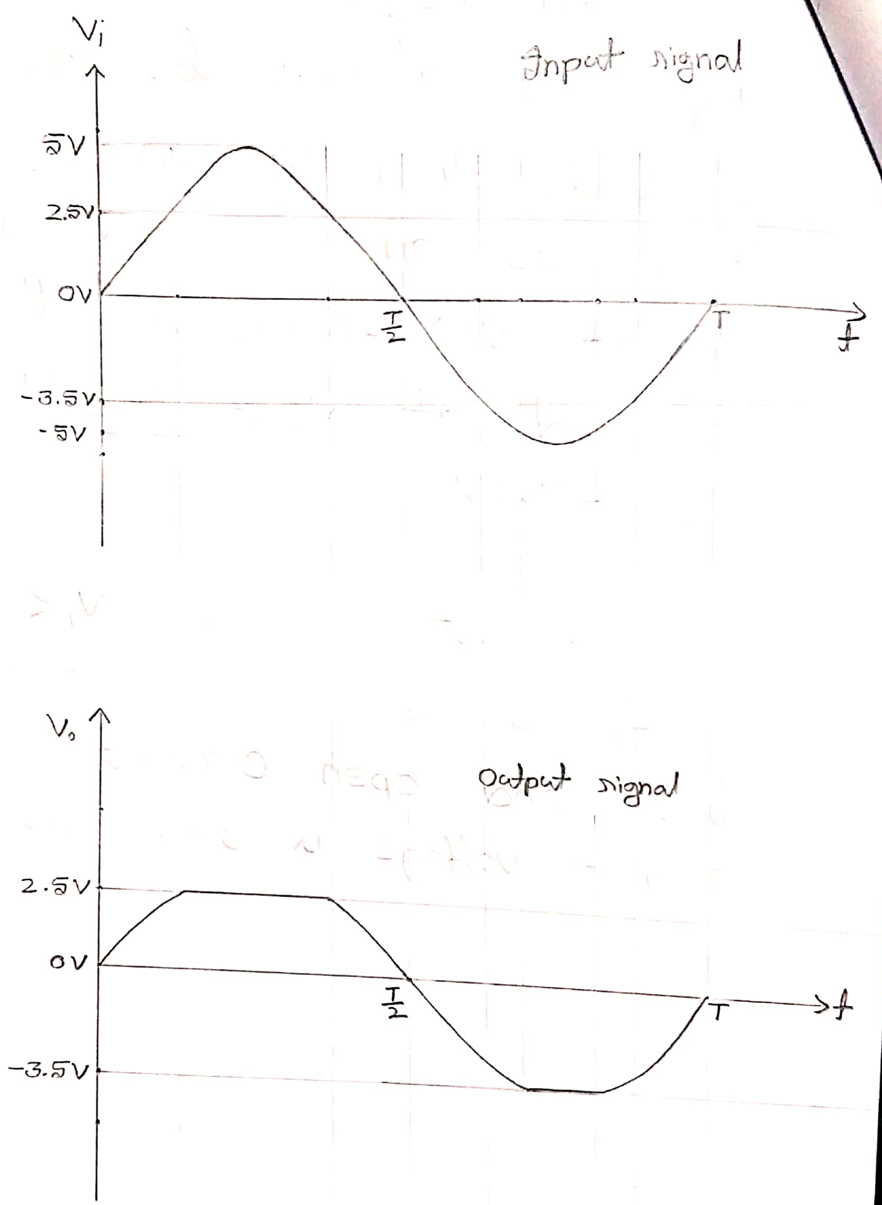

Input signal
V_i
5V
2.5V
0V
-3.5V
-5V
$\frac{T}{2}$
T
t
Output signal
V_o
2.5V
0V
-3.5V
$\frac{T}{2}$
T
t

Fig: 2.2

Ques 3:

What is a clamping circuit? Explain the operation of the circuit in Fig.2

Ans: A clamping circuit is a circuit which clamps a signal to a different dc level. It doesn't change the shape of the signal, it just increases or decreases the dc part. Clamp circuit consists of a capacitor and a diode parallel with a resistor.

The circuit in Fig 2 is a clamping circuit. we can replace

the diode with a 0.7V do sow[illegible]
and an ideal diode.

For the positive half cycle, the diode will always remain forward biased. The capacitor will be charged and the output will be 0.7V.

here by KVL

$$-V_i + V_c + .7 = 0$$

$$\therefore V_c = 4.3V$$

for the negative cycle, the diode will be open circuit So the capacitor will discharge.

by KVL

$$V_i + V_C + V_o = 0$$

$$\therefore V_o = -9.3V$$

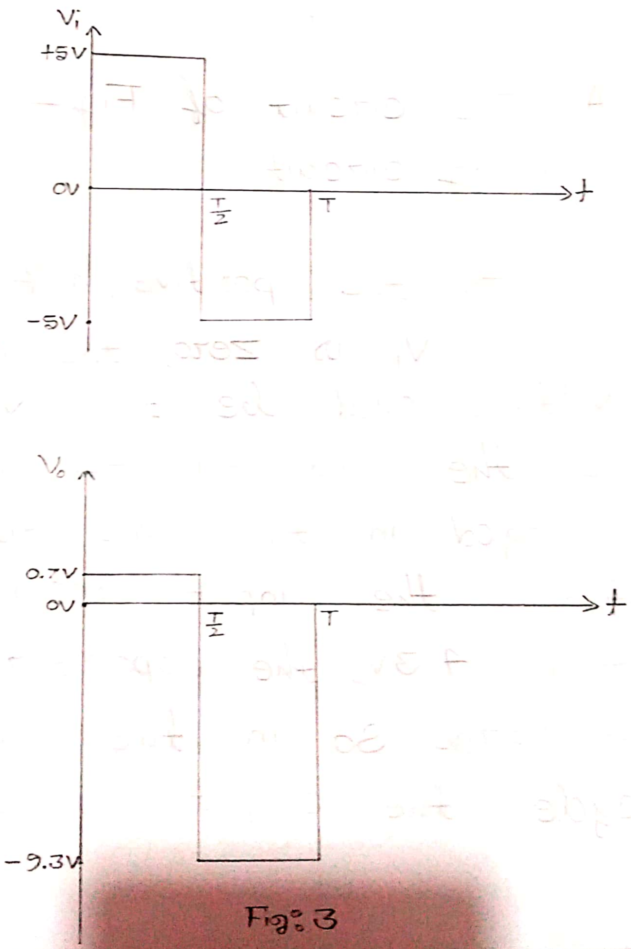


Fig: 3

with a 0.7V dc sour
ideal diode.
half cycle,
ain

Ques 4:

Sketch the output voltage of the circuit of Fig.2 if
$V_i = 5\sin(2\pi 1000t)$

Ans: The circuit of Fig 2 is a clamping circuit.

In the positive half cycle when V_i is zero, the output voltage will be the voltage of the capacitor. It will be charged in this time till 4.3V. After the input becomes less than 4.3V, the capacitor will discharge. So in the negative cycle the output will be -9.3V.

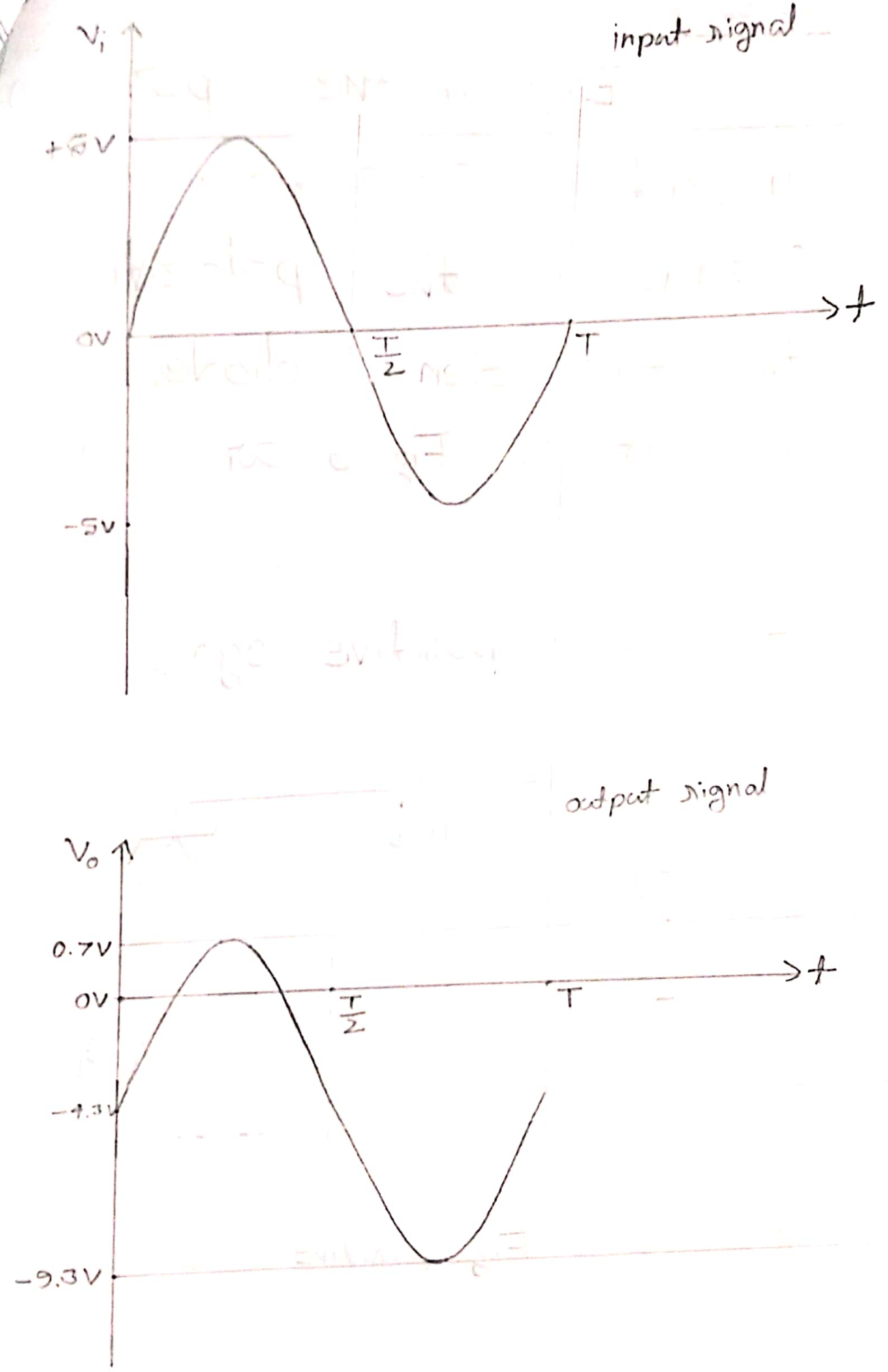


Fig: Input, output for 4

Ques 5:

Explain the operation of circuit in Fig.3. How will V_o change if the polarities of the two Zener diodes in the circuit of Fig. 3 are reversed?

Ans: for positive cycle

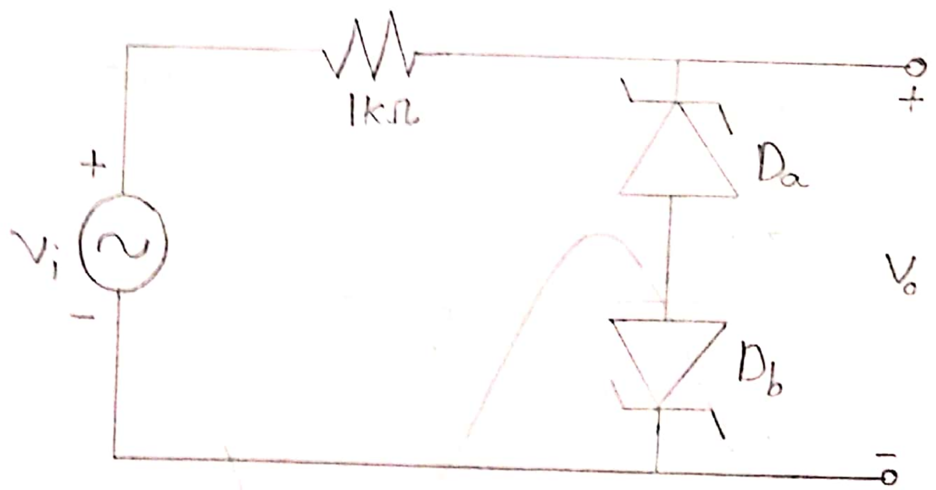


Fig: positive cycle.

During positive cycle, D_b is forward biased and D_a becomes reverse biased. So, D_b works like a normal diode and as soon as the voltage V_i exceeds the breakdown voltage, the output becomes $V_{Da} + V_b$.

Here V_{Da} is the Zener voltage of D_a and V_b is the voltage drop across D_b.

In the negative cycle, D_b becomes reverse biased, D_a works normally. So the output voltage becomes $V_{Db} + V_a$. It will be the peak value by clipping the voltage.

Changing polarities:

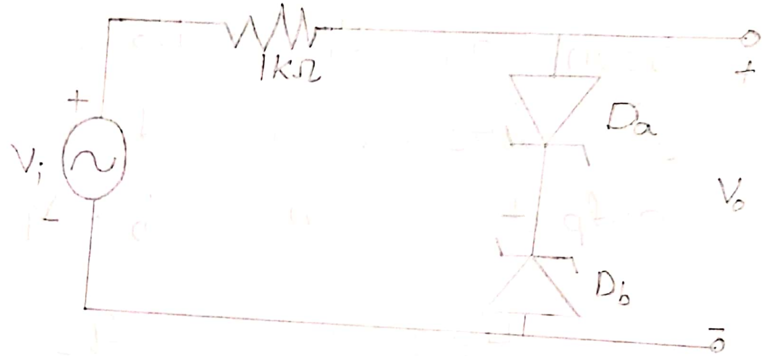


Fig: Changing polarities.

If we change the polarities, when V_i will cross the break-down voltage of D_b, the output voltage will be clipped to a peak value of $V_{Db} + V_a$, where

V_a is the voltage drop across D_a and V_{Db} is the breakdown voltage of D_b.

In the negative cycle, V_o will be limited to a peak value of $V_{Da} + V_b$.

fig-1

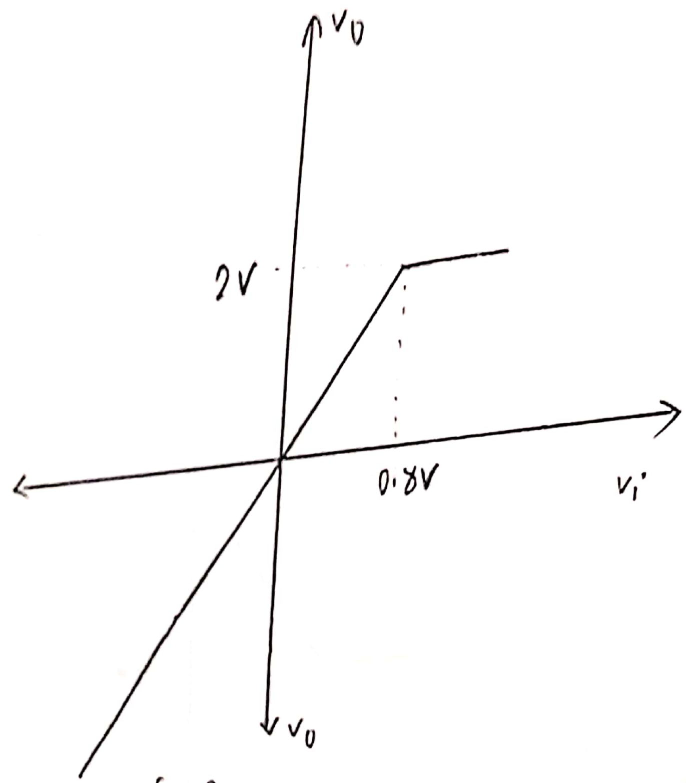


fig-2

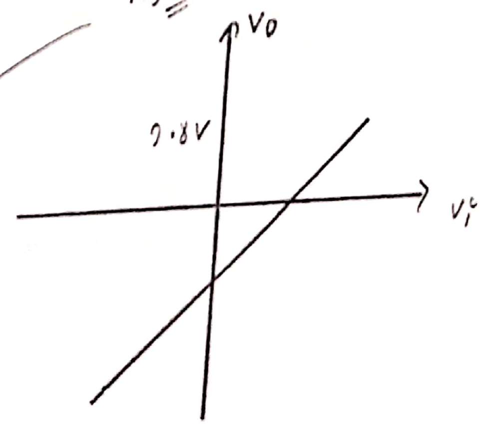


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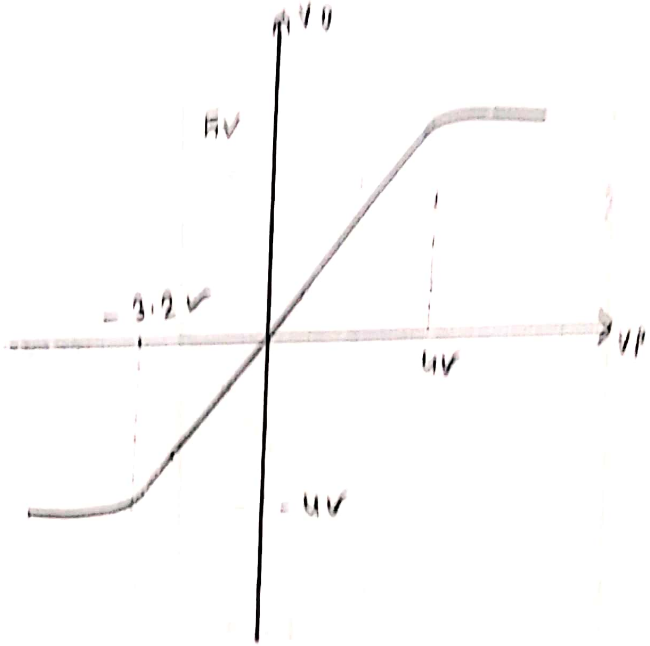
Fig. 4



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