display was loaded. Proper connection (according to Fig-4) was made and the output was observed.

4. Step 3 was repeated by increasing supply frequency to 5 KHz.

Report:

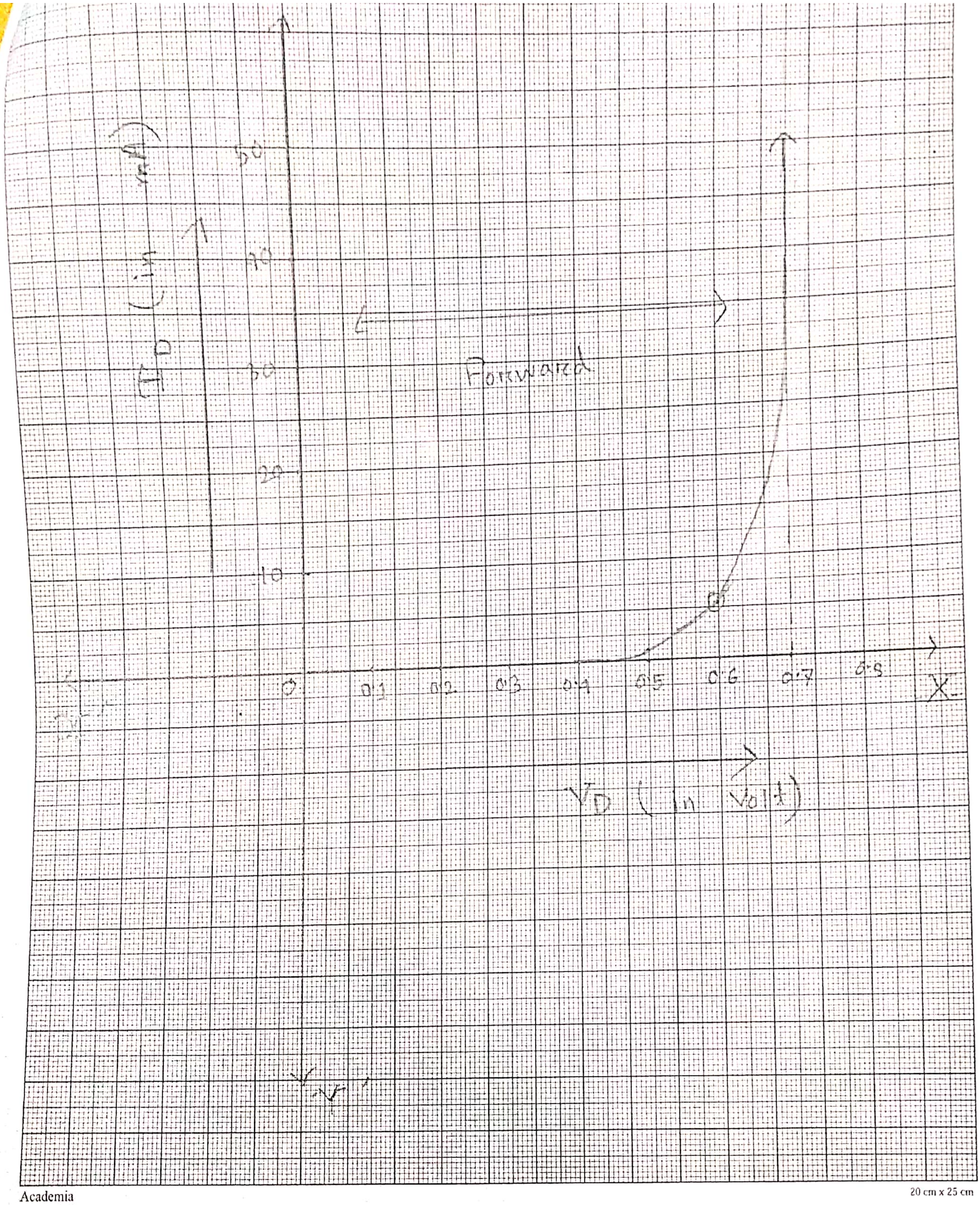
1/ The readings obtained for the circuit diagram in Fig-2 are as follows:

V_D (V)	V_{dc} (V)	V_R (V)	I_D (Amp)
0·1	0·1	0	0
0·2	0·2	0	0
0·3	0·3	0	0
0·4	0·4	0	0
0·5	0·9	0·5	5×10^{-4}
0·6	6·1	5·8	$5·8\times10^{-3}$
0·7	11·3	10·6	0·0106
0·7	17·1	16·2	0·0162
0·7	25·0	24·6	0·0246

The readings obtained for the circuit diagram in Fig-3.

V_D (V)	V_{dc} (V)	V_R (V)	I_D (Amp)
0·5	0·5	0	0
1·0	1·0	0	0
1·5	1·5	0	0
2·0	2·0	0	0
2·5	2·5	0	0
3·0	3·0	0	0
3·5	3·5	0	0
4·0	4·0	0	0
4·5	4·58	0·08	8×10^{-5}
5·0	5·16	0·18	$1·8\times10^{-4}$
5·15	25·0	19·8	0·0198

10

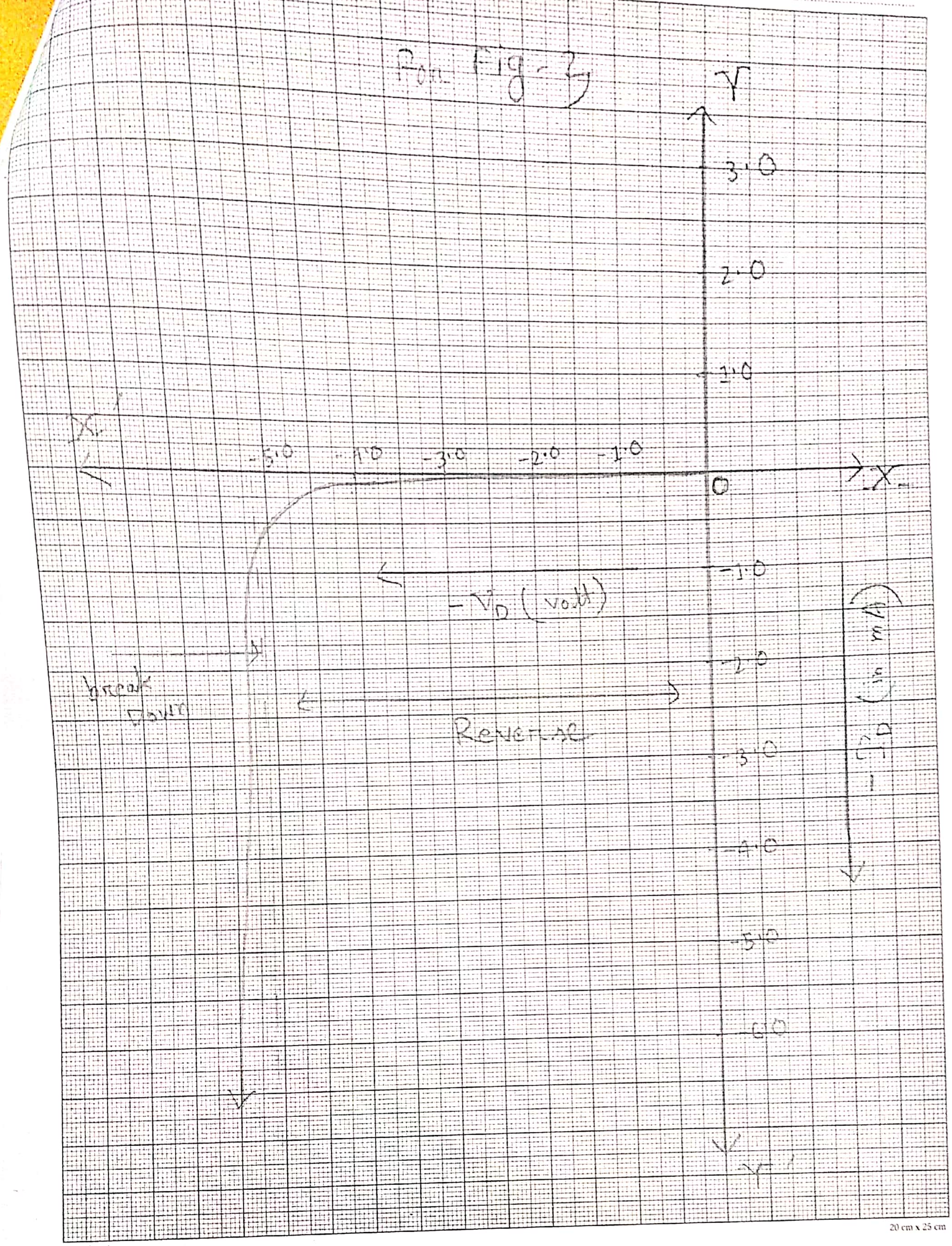


Academia

20 cm x 25 cm

10×10^{-3}

Roll No. 1705026



20 cm x 25 cm

Academia

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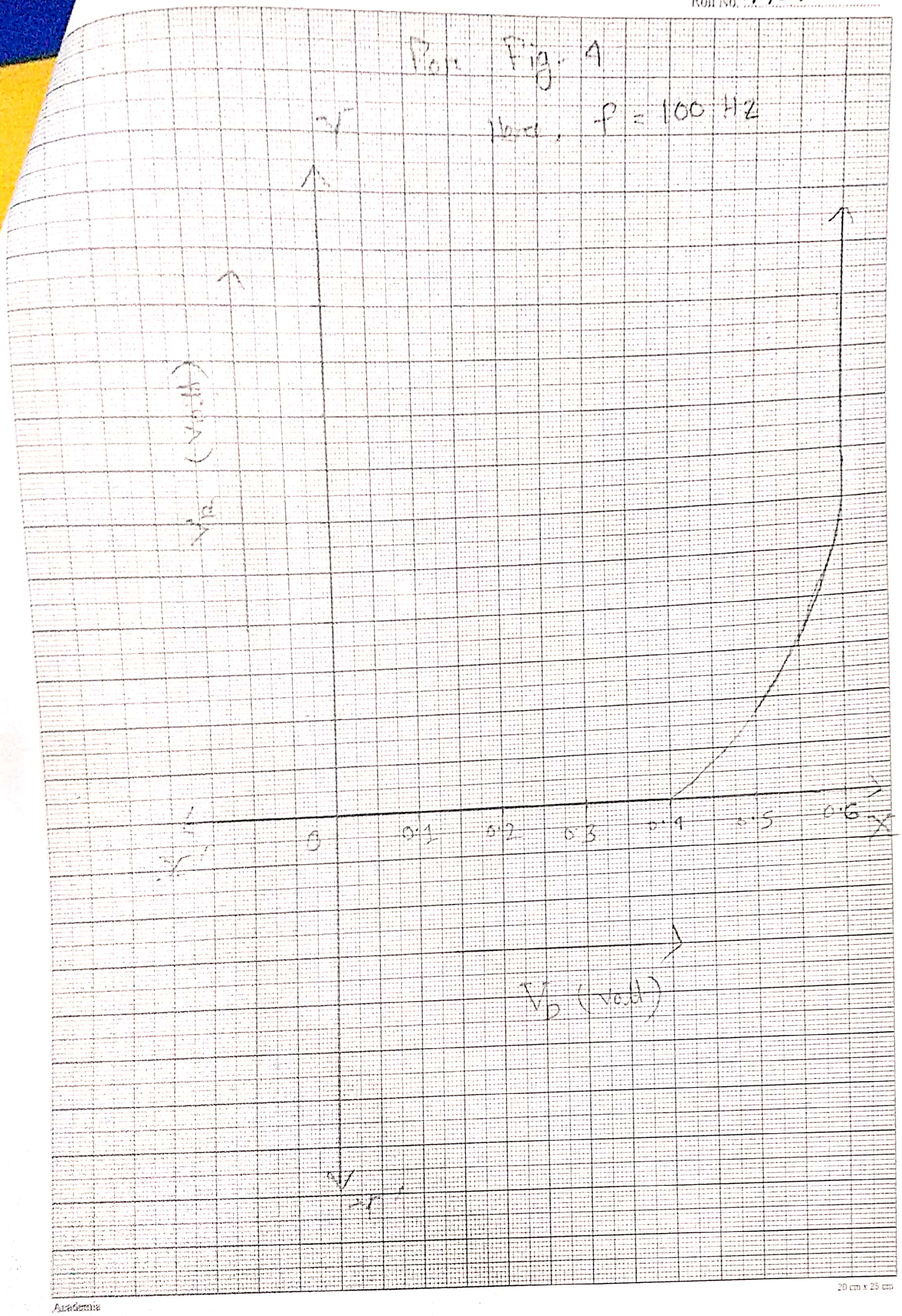

$D.R., \; R_d = \frac{n \times 0.026}{10 \times 10^{-3}} = (2.6n)\ \Omega$

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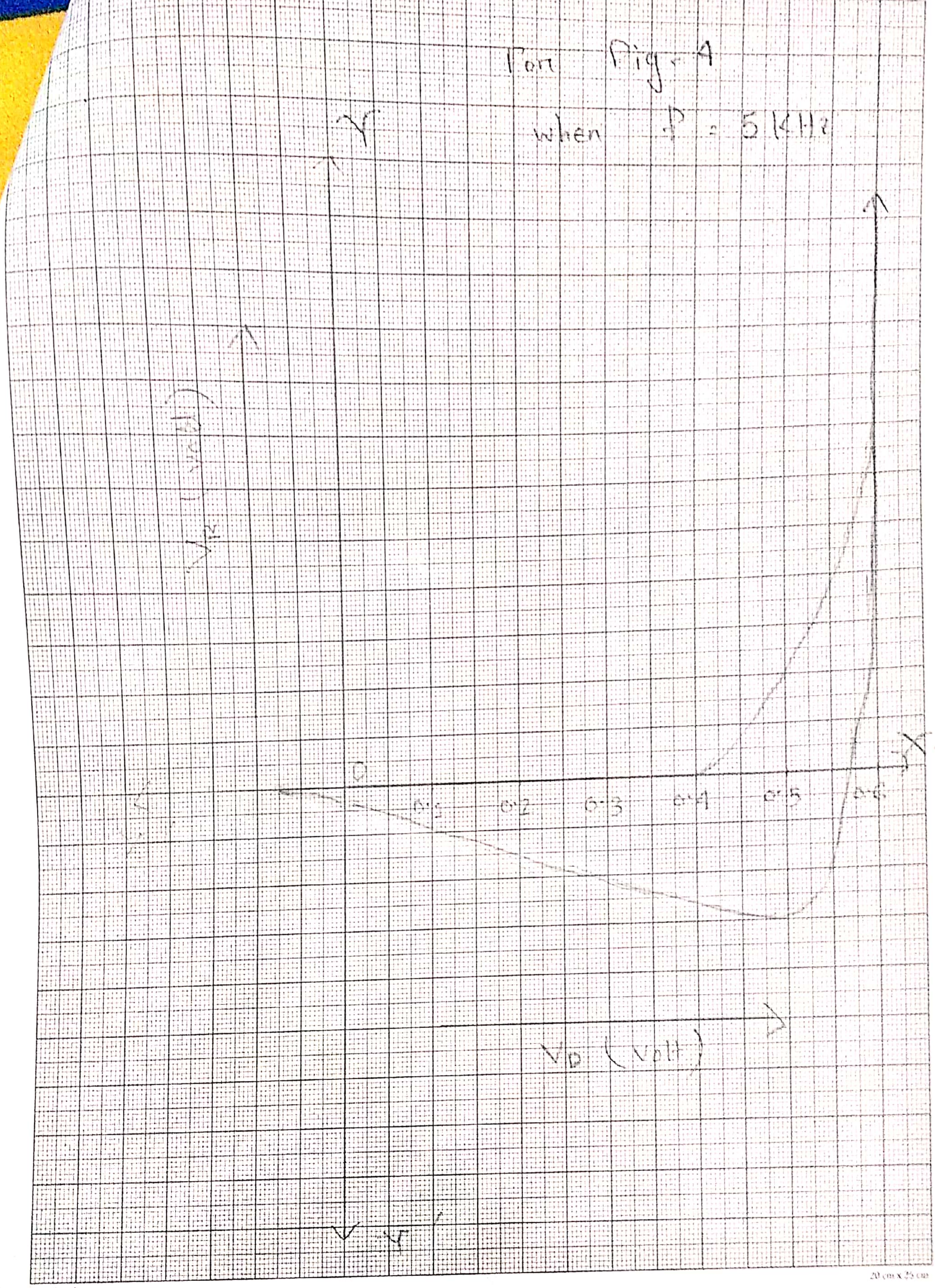

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20 cm x 25 cm

D.R., $R_d = \frac{\ldots}{10\times10^{-3}} = (2.6n)\ \Omega$

2/

Calculate static and dynamic resistance for I_D = 5 mA, 10 mA and also for V_D = 0.6 V, 0.72 V for circuit in fig-2

Solution:

We know,

Static resistance, $r_D = \frac{V_D}{I_D}$

and dynamic resistance, $r_d = \frac{n V_T}{I_D}$

where n is identity factor

$1 \leq n \leq 2$

For $I_D = 5\,mA$ and $V_D = 0.59V$

S.R., $r_D = \frac{0.59}{5\times10^{-3}} = \cancel{120}\ \Omega$ 118 Ω

D.R., $r_d = \frac{n \times 0.026}{5\times10^{-3}} = (5.2n)\ \Omega$

For $I_D = 10\,mA$ and $V_D = 0.72V$

S.R., $r_D = \frac{0.72}{10\times10^{-3}} = 72\ \Omega$

D.R., $r_d = \frac{n \times 0.026}{10\times10^{-3}} = (2.6n)\ \Omega$

When $V_D = 0.6\text{ V}$, $I_D = 5.8\text{ mA}$

S.R , $r_D = \dfrac{0.6}{5.8 \times 10^{-3}} = 103.45\,\Omega$

D.R. , $r_d = \dfrac{n \times 0.026}{5.8 \times 10^{-3}} = (4.48n)\,\Omega$

When $V_D = 0.72\text{ V}$, $I_D = 10\text{ mA}$

S.R. , $r_D = \dfrac{0.72}{10 \times 10^{-3}} = 72\,\Omega$

D.R , $r_d = \dfrac{n \times 0.026}{10 \times 10^{-3}} = (2.6n)\,\Omega$

3/ Determine the Q point for the circuit in fig-2 when $V_{dc} = 15$ volt

Answer:

Here, $V_{dc} = 15\text{ V}$

From the graph , $V_D = 0.7\text{ V}$

Again,

For the circuit,

$V_{dc} = V_R + V_D$

$\therefore V_{dc} = IR + V_D$

Now, $V_D = 0\,V$ and $V_{dc} = 15\,V$

$\therefore I = 15\,mA$

From the graph,

the intersection point of the load line and the curve is (0.57, 2.4)

So, the Q point is (0.57, 2.4)

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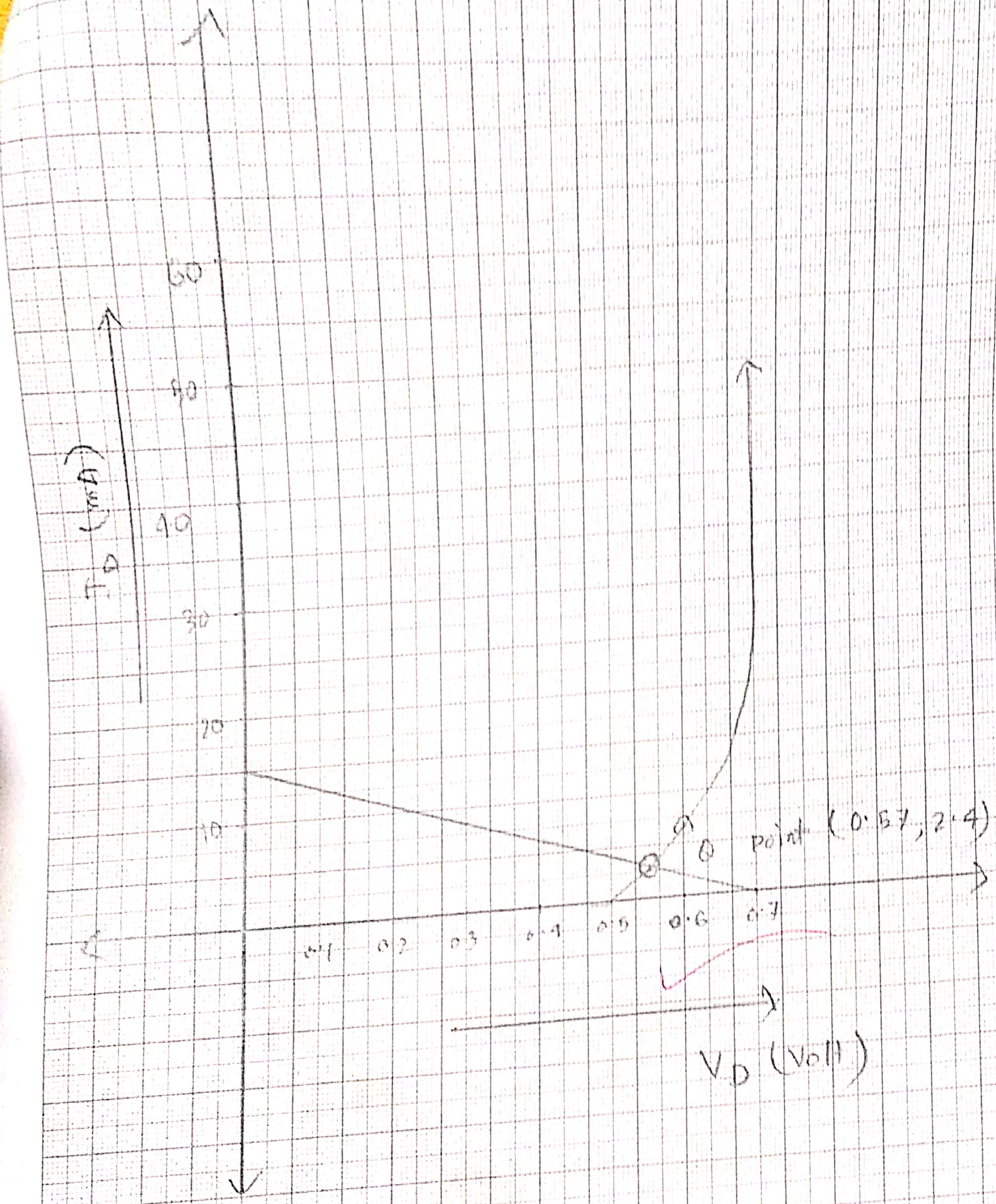
To determine Q point



20 cm x 25 cm

MICRO

We can see a loop.

4/ Explain the result obtained in step- 4.

Answer :

At step-4, the basic difference we can see from step-3 is a loop.

During this step we apply high frequency input voltage. Because of that high frequency the electrons can not be stopped immediately after the operation turns off. That is why, the current starts to flow in the opposite direction. This is known as reverse recovery time. That is why, we can see a loop.

5/ What is the zener voltage of the diode in Fig. 3 ?

Ans.

The voltage that is sufficient for the reverse breakdown condition, is known as Zener Voltage. It allows the diode to conduct in the reverse direction. From the graph and data table, we can see that the current is negligible during 0.5 volt to 5.1 volt. But when the voltage is 5.15 a huge ammount of current starts to flow. So we can say that after 5.1 volt, the reverse breakdown condition occurs. So, the zener voltage of the diode in Fig-3 is 5.1 Volt.

6/ What is the dynamic resistance of the zener diode at zener voltage?

Answer:

The resistance which is offered by the p-n junction diode when AC voltage is applied is known as dynamic resistance.

The dynamic resistance can be measured by $\frac{dV}{dI}$. At zener voltage which is near to zero because the current flow is very high at that time. The voltage becomes very small comparing to the current. So $\frac{dV}{dI} \simeq 0$.
So, dynamic resistance is zero.