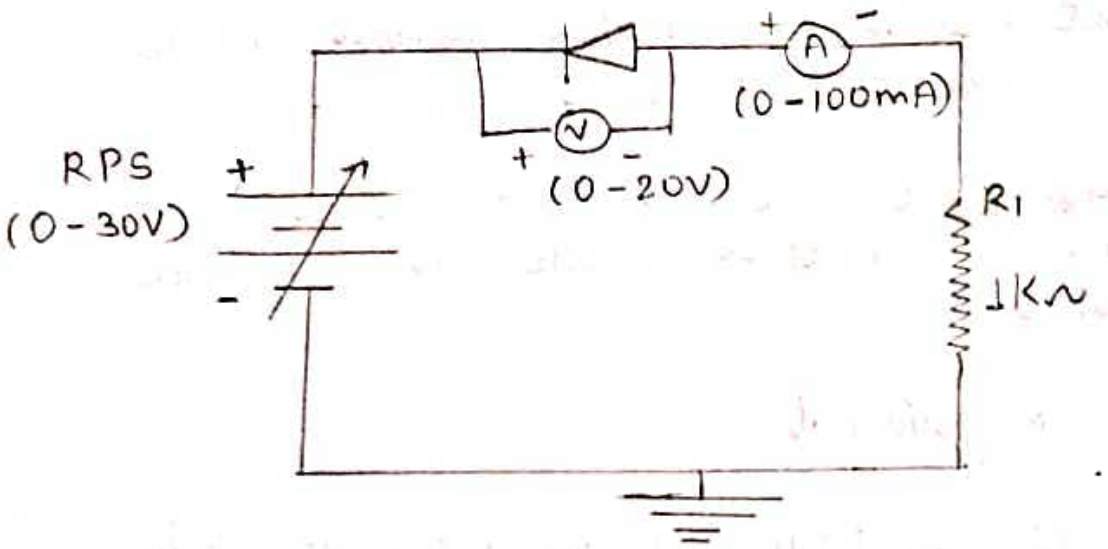
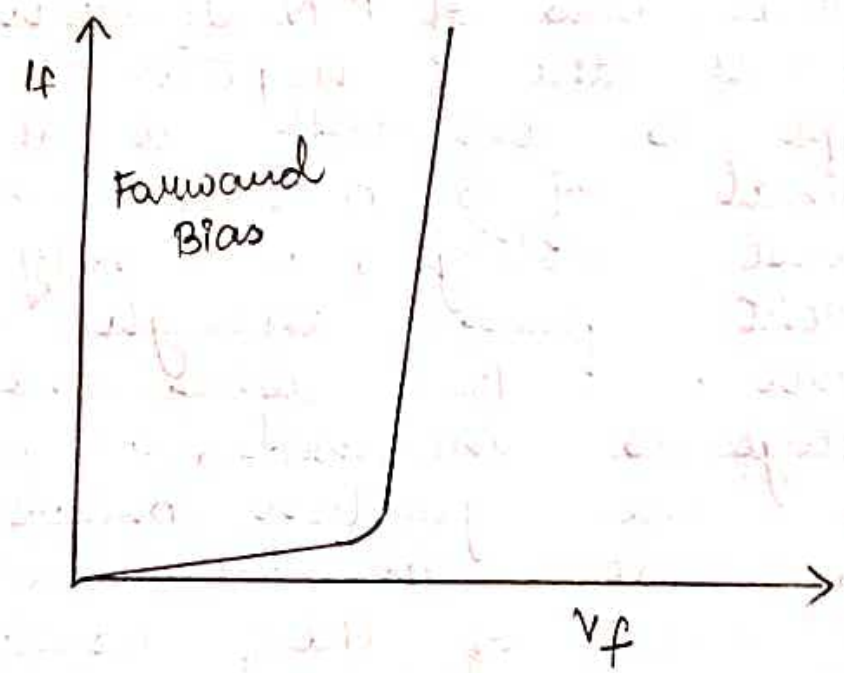
RA2111003010991



PN Junction Forward Bias



Model graph for I-V characteristics

6. Characteristics of PN Junction diode under forward bias.

AIM:- To plot the characteristics curve of PN junction diode in forward bias.

- Apparatus Required:

A diode, DC voltage supplier, Bread board, 100 Ω resistor, two multi-meters for measuring current and voltage and connecting wires.

- Procedure:

For the forward bias of a P-N junction, P-type is connected to the positive terminal while the N-type is connected to the negative terminal of a battery. The potential at P-N junction can be varied with the help of potential divider. At some forward (0.3V for Ge and 0.1V for Si) the potential barrier is altogether eliminated and

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current starts flowing. This voltage is known as threshold voltage (V_{th}) or cut in voltage or knee voltage. It is practically same as barrier voltage V_B. For $V < V_{th}$, the current is negligible. As the forward applied voltage increases beyond threshold voltage, the forward current rises exponentially.

- **Result**

The forward bias I-V characteristic of PN junction diode is studied and curve is drawn.

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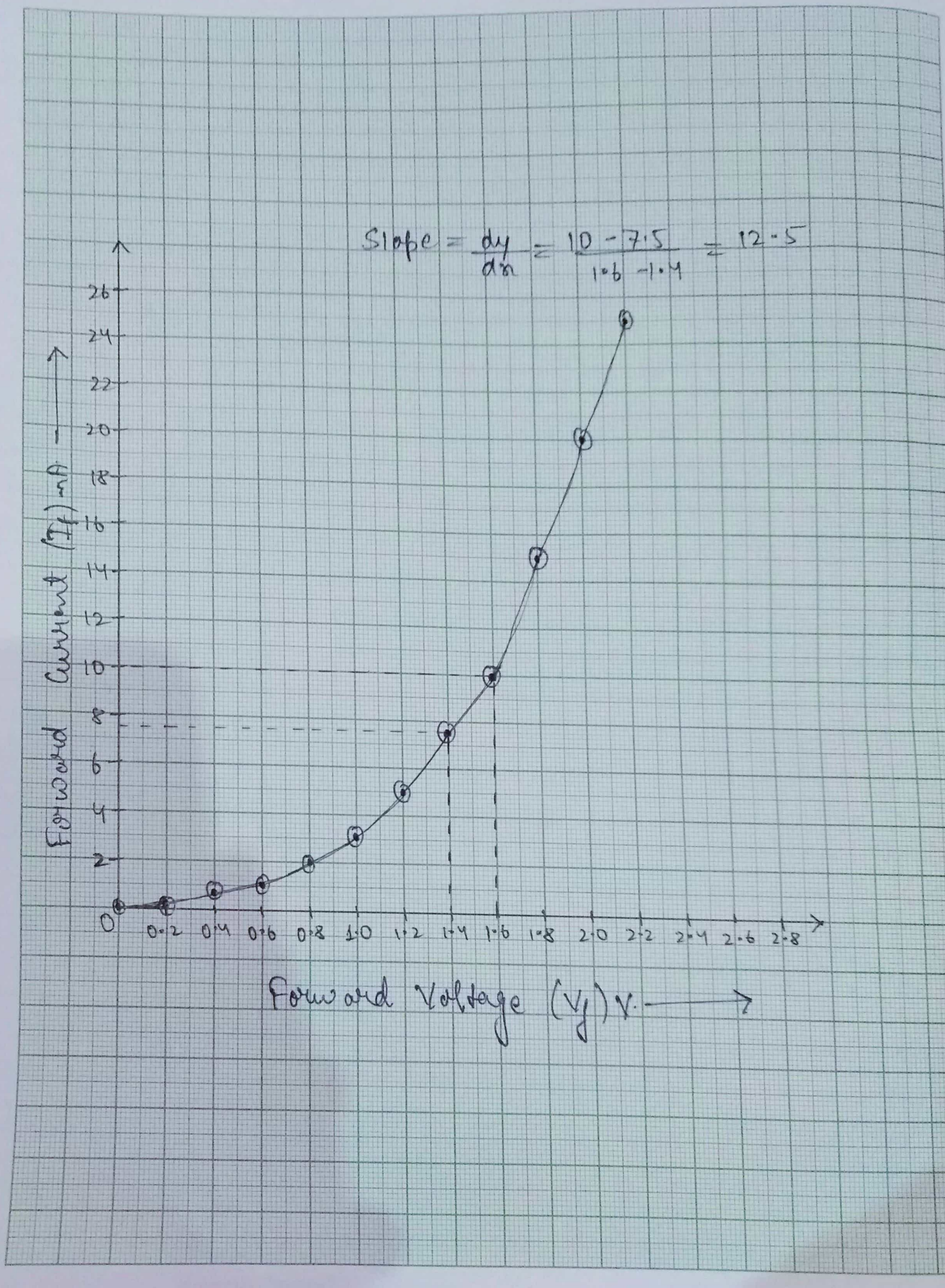
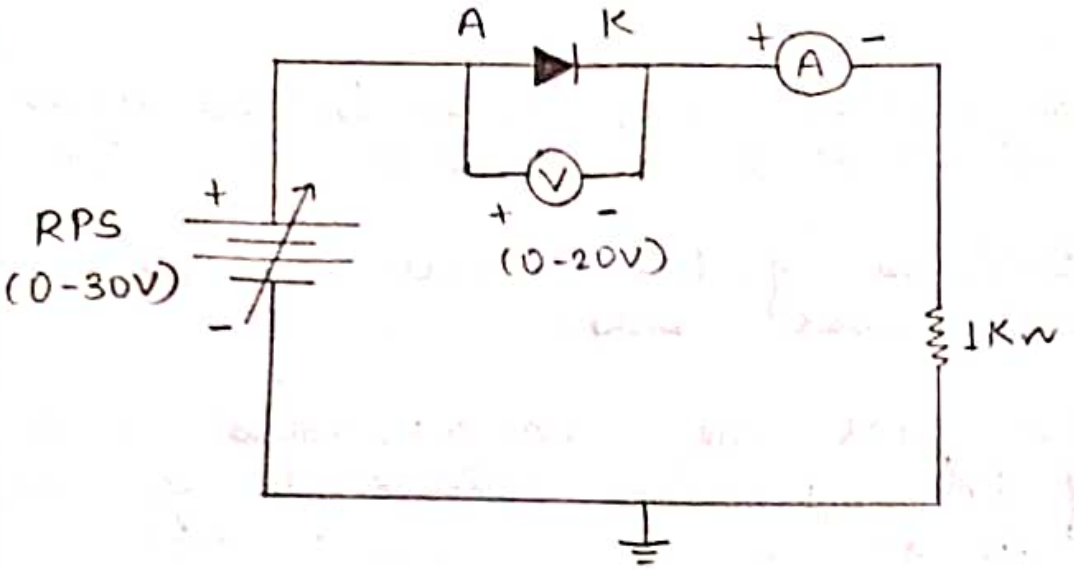
Table

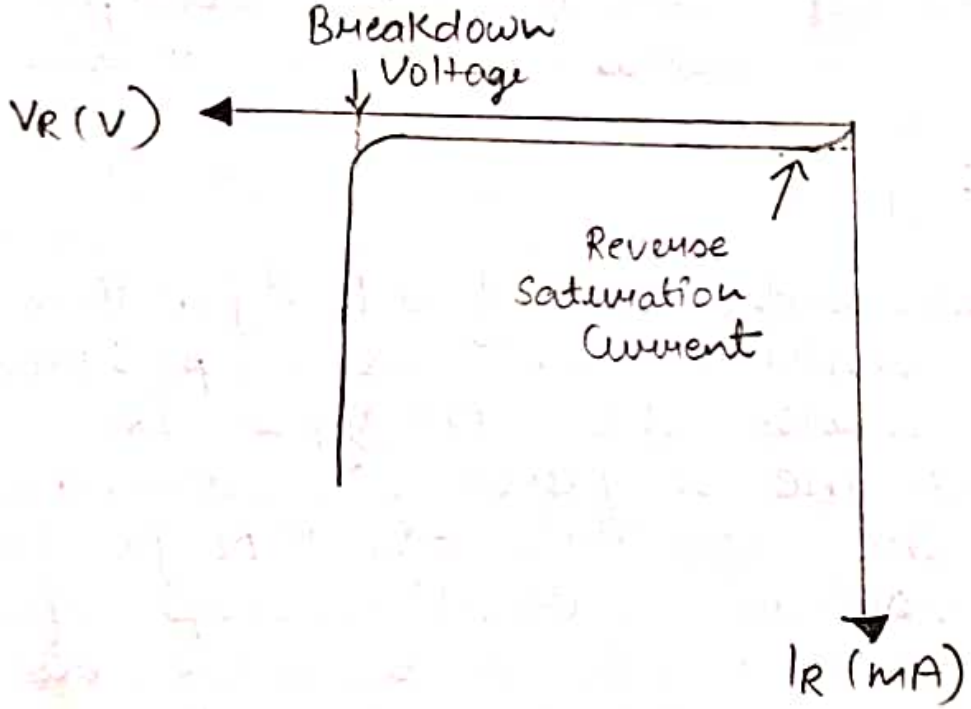
Characteristics of PN Junction diode under forward bias.

S.No.	Forward Voltage V_F	Forward current I_F
1	0	0
2	0.2	0
3	0.4	0.5
4	0.6	1
5	0.8	2
6	1.0	3
7	1.2	5
8	1.4	7.5
9	1.6	10
10	1.8	15
11	2.0	20
12	2.2	25


Slope = dy/dx = 10 - 7.5 / 1.6 - 1.4 = 12.5
Forward Current (If) mA
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8
Forward Voltage (Vf) V.



PN Junction Reverse Bias



Model graph for I-V characteristics

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6.b. Characteristic of PN junction diode under reverse bias -

AIM: To plot the characteristic curve of PN junction diode in reverse bias.

- Apparatus

A diode, DC voltage supplier, Bread Board, 100 Ω resistor, 2 multimeter for measuring current and voltage and connecting wires.

- Procedure

For the reverse bias of p-n junction, P-type is connected to the negative terminal while N-type is connected to the positive terminal of a battery. Under normal reverse voltage, a very little reverse current flows through a P-N junction. But when the reverse voltage is increased, a point is reached when the junction break down with sudden rise in reverse current. The critical value of the voltage is known as break down (VBR). The break down voltage is defined as the reverse voltage at which P-N junction breakdown with sudden rise in reverse current.

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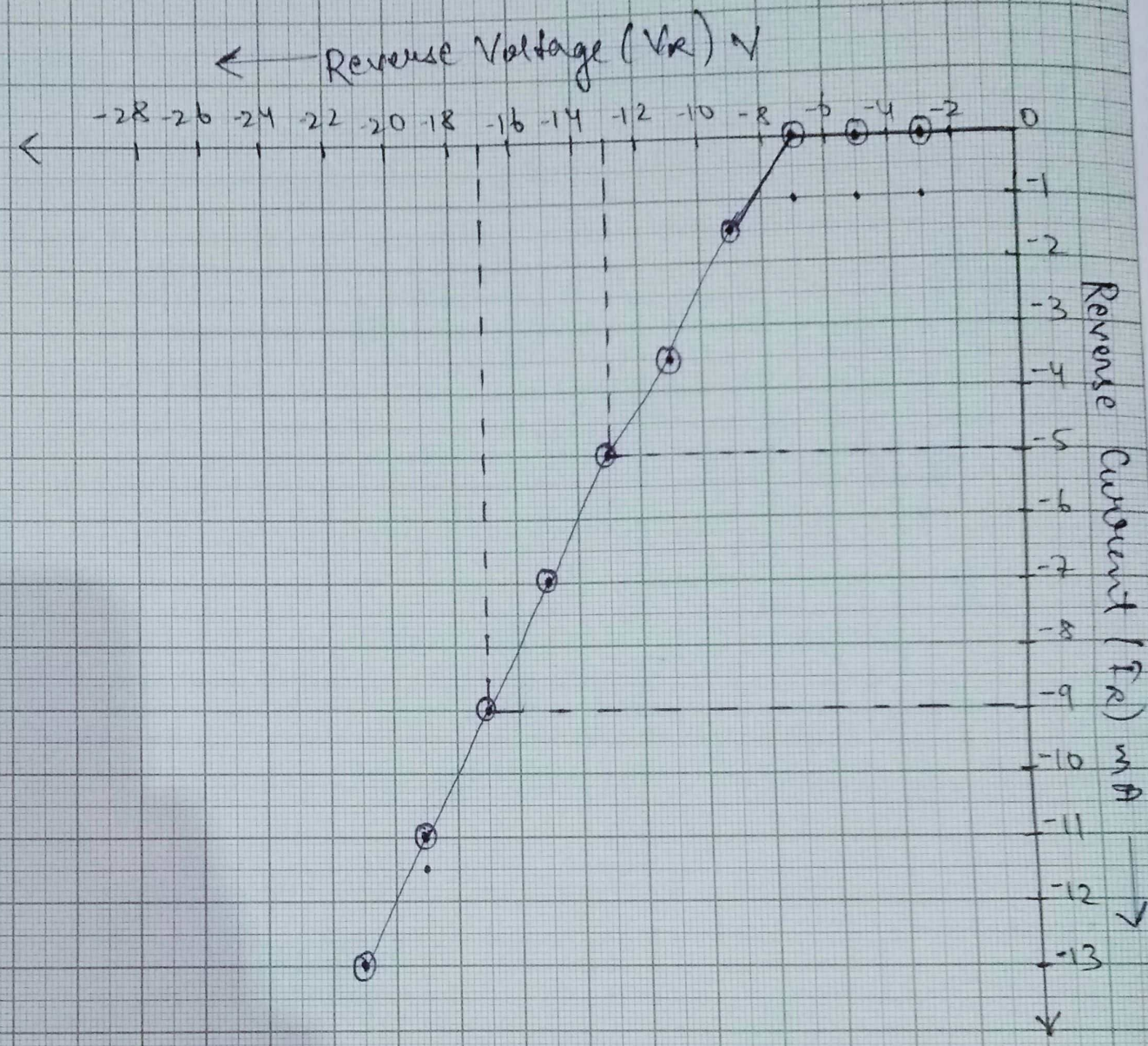
Table

Characteristics of PN junction diode under reverse bias

S.No.	Reverse Voltage V_R	Reverse Current I_R
1	0	0
2	3	0
3	5	0
4	7	0
5	9	1.5
6	11	3.5
7	13	5
8	15	7
9	17	9
10	19	11
11	21	13



$$\text{Slope} = \frac{dy}{dx} = \frac{-9-(-5)}{-17-(-13)} = \frac{-4}{-4} = 1$$

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- Result

The reverse bias I-V characteristic of P N junction diode is studied and curve is drawn.