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Division :- IT 3

Institute :- PIET

Subject :- Physics practical

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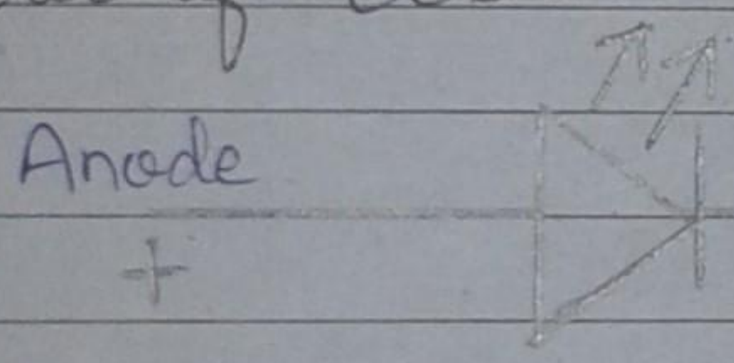
| SR. NO. | Title | Pg. No. From | Pg. No. To | Date of Performance | Date of Assesment | Marks (out of 10) | Sign |
|---|---|---|---|---|---|---|---|
| | To study I-V | | | | | | |
| 1. | characteristic of LED & determine Knee voltage & dynamic Resistance of LED. | 1 | 5 | 24/11/20 | | | |

# Ex.-1:- light Emitting Diode.

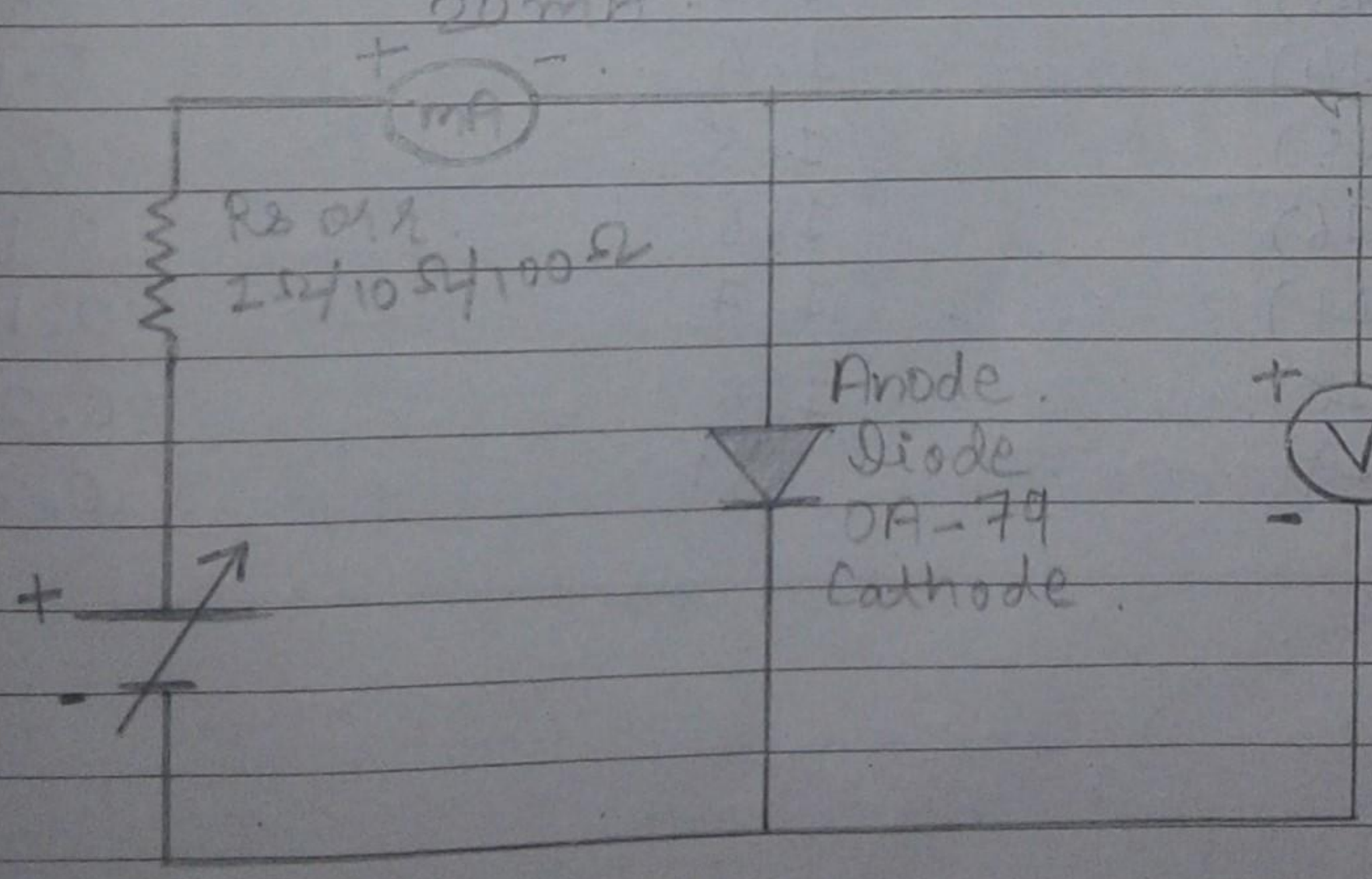
* Aim:- To study the V-I characteristic of LED and determine Knee voltage and dynamic resistance of LED.

* Appartus:- Circuit board. comprises 0-10 V D.C. at 10 mA, continuously variable regulated power supply, integral current limiting resistor Digital voltmeter, digital current meter, LED, Patch chords.

* Symbol of LED:-




* Circuit diagram:-



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* Observation :-

The value of Series Resistance R = 9 K-Ω

* Observation Table :-

1)

| Sr.No. | Applied Voltage V (Volts) | Current I (mA) |
|---|---|---|
| 1) | 0.1. | 0 |
| 2) | 0.2 | 0 |
| 3) | 0.3 | 0 |
| 4) | 0.4 | 0 |
| 5) | 0.5 | 0 |
| 6) | 0.6 | 0 |
| 7) | 0.7 | 0 |
| 8) | 0.8. | 0.02. |
| 9) | 0.9 | 0.08. |
| 10) | 1.0 | 0.1. |
| 11) | 1.1. | 0.13. |
| 12) | 1.2 | 0.14 |
| 13) | 1.3 | 0.15 |
| 14) | 1.4 | 0.16 |
| 15) | 1.5 | 0.17. |
| 16) | 1.6 | 0.18 |
| 17) | 1.7 | 0.19 |
| 18) | 1.8 | 0.20 |
| 19) | 1.9. | 0.21 |

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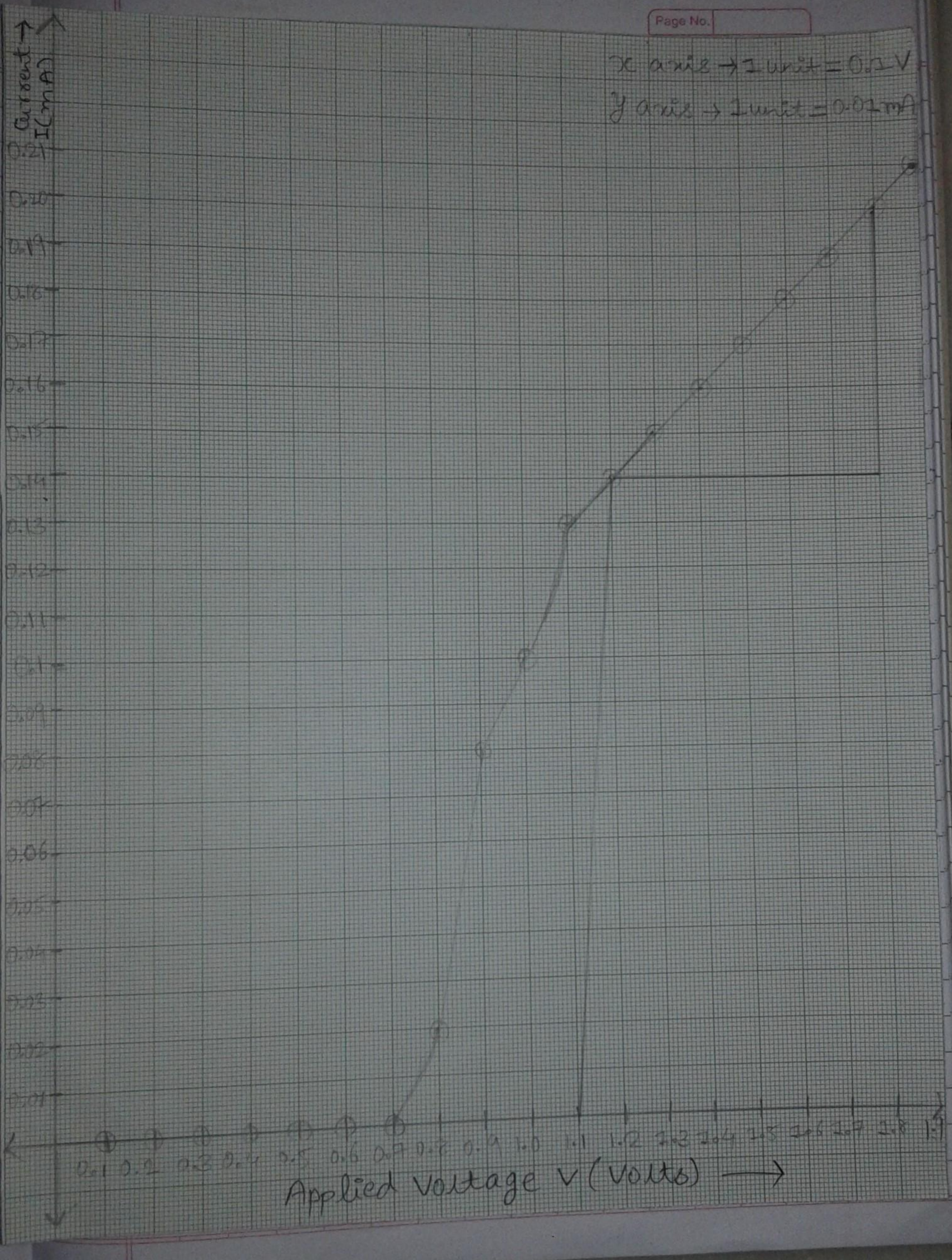
x axis → 1 unit = 0.1 V

y axis → 1 unit = 0.01 mA



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* Calculation :-

$$\text{Slope } (m) = \frac{Y_2 - Y_1}{x_2 - x_1} = \frac{\Delta I}{\Delta V}$$

$$\therefore m = \frac{1}{\Delta R} = \frac{\Delta I}{\Delta V}$$

$$m = \left(\frac{0.20 - 0.14}{1.8 - 1.2}\right) \times 10^{-3}$$

$$m = \frac{0.06}{0.6} \times 10^{-3}$$

$$m = 1 \times 10^{-4}$$

$$10^{-4} = \frac{1}{\Delta R}$$

Dynamic Resistance, $\Delta R = 10^4\ \Omega$

$\therefore \Delta R = 10\ K\Omega$ Approx

OR

$\Delta R = 9\ K\Omega$

* Result :- The forward biased characteristics curve is plotted in the graph.

1) Knee Voltage of LED is found as 1.1 Volt

2) The Dynamic Resistance of LED is found as $9\ K\Omega$ approx.

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* Question and Answer:-

1) What do you mean by knee voltage?

A. The forward voltage at which the flow of current during the PN junction begins. increasing quickly. is known as knee Voltage.

2) What is depletion region in P-N Junction

A. Depelation layer is a region in a P-N Junctio diode where no mobile charge carrier are present It acts like a barrier that opposes the flow of $e^-$ from n-side and holes from p-side.

3) What is barrier potential!

A. It is. region in which particles are decelerat or stopped by a repulsive force.