CHARACTERISTICS OF LED-V-I CHARACTERISTIC FOR DIFFERENT COLOURS

LED, which stands for Light Emitting Diode, is a semiconductor device that emits light when an electric current passes through it.

Aim

To plot the V-I characteristics of an LED.

Apparatus

LEDs, resistors, rheostat, voltmeter (0-5V), ammeter (0-100mA) bread board and a dc power supply (0-10V).

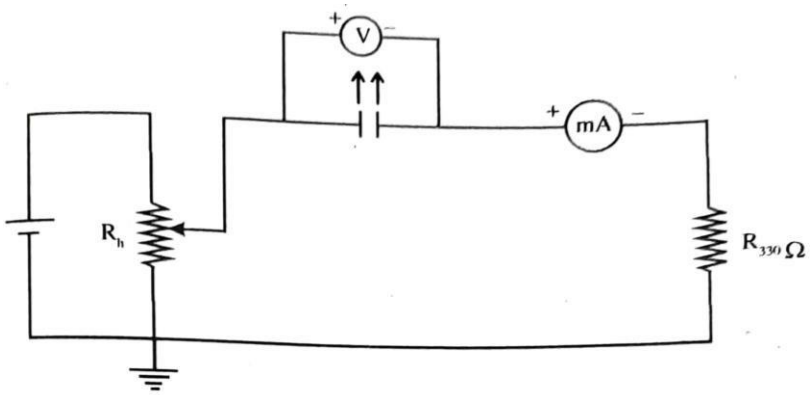
Theory

Light emitting diode (LED) is a semiconductor which emits light when it is forward biased. The colour of emitted light depends upon the composition of the semiconductor material used for its construction. The V-I characteristics of LER is similar to that of a PN junction diode. Most LEDs have low reverse break down voltage ratings, hence they may be damaged when reverse volt age of more than a few volts is applied. Most of the LEDs have a forward voltage of 1.6V to 3.5V and a current of 20mA to 35mA.

Static and dynamic resistances of LED

When the diode is forward biased, it offers a finite resistance in the circuit. The static resistance or de resistance is the ratio of de voltage across the LED to the de current flowing through it. The dynamic resistance or ac resistance of the diode at any point is the reciprocal of the slope of the characteristic curve at that point.

$$\text{Dynamis resistance} = \frac{\text{Change in voltage}}{\text{Resulting change in current}}$$

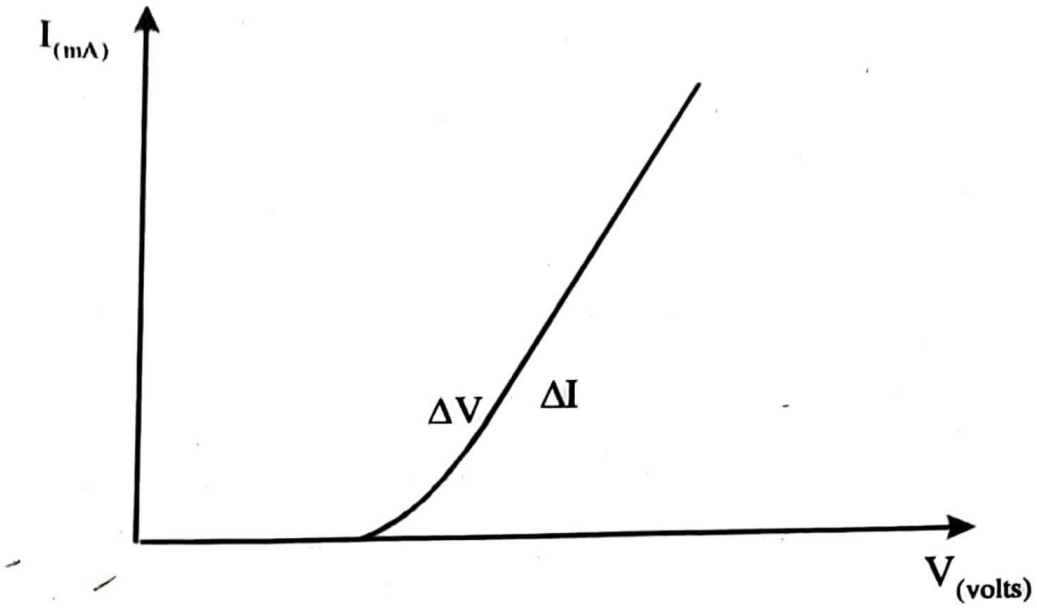


$$= \frac{\Delta V}{\Delta I}$$

Observations and tabulations

Trial No.	LED colour	Voltmeter reading (Volts)	Ammeter reading (mA)
1 2 3 4 5	Red		
1 2 3 4 5	Green		
1 2 3 4 5	Yellow		

V-I Characteristics



Procedure

First of all identify the anode and cathode terminals of the LED. Make the connections on the bread board as shown in figure below. Vary the rheostat and take the readings of the voltmeter and ammeter. Take at least five sets of readings. Repeat the above steps for different colour LEDs.

Draw a graph between voltage along the horizontal axis and current along the vertical axis we get a graph as shown in figure. To measure the forward static resistance consider a point on the characteristic curve and note the corresponding voltage and current. The ratio of the voltage to the current gives the static resistance. To measure the dynamic forward resistance for a particular de current, find out the reciprocal of the slope (tan θ) of the forward characteristic curve at the point corresponding to that current.

Result

(i) The variation of current with voltage has been studied.
(ii) Static forward resistance at 20mA = ... Ω

(iii) Dynamic forward resistance at 20mA =.....Ω

References

- Experimental Physics – II, For Fifth & Sixth Semester, BSc Degree Programme, Dr.P. Sethumadhavan, Prof. K.C. Abraham, Prof. Meppayil Narayanan, Prof. Philipson C Philip, **Manjusha Publications**
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