



USER'S MANUAL/TEST RESULTS

**TO STUDY THE CHARACTERISTICS OF ZENER DIODES
S. No. 22653**

A Product of:

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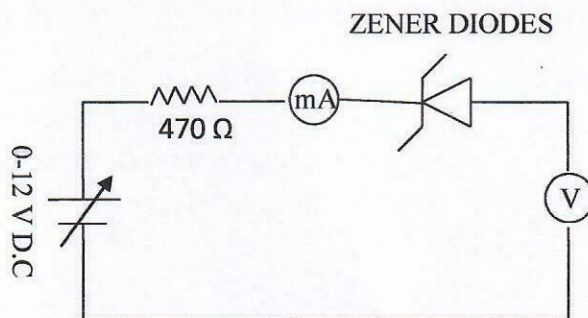
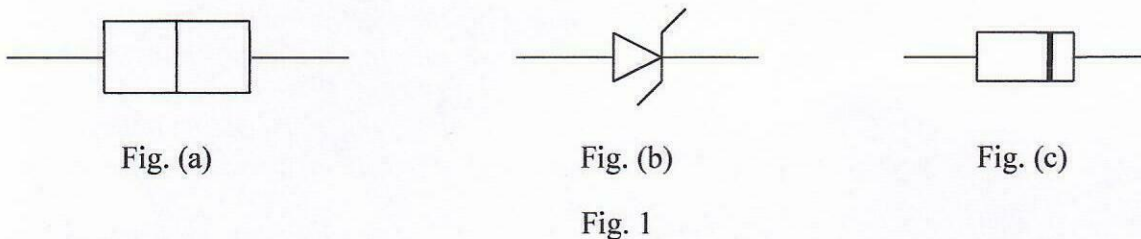
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ZENER DIODE:

This is a other class of diode whose unique reverse bias current and voltage characteristics provide completely different application from those of junction rectifying diode. It is also reverse bias and operate in breakdown region . It is sometimes called the breakdown diode. It is the back bone of voltage regulators circuits that hold the load voltage almost constant despite large change in line and load resistances.

Fig 1 shows the schematics symbol of Zener diode. Fig 1 (a) and 1(b) is an alternative symbol. In Fig 1 (b) lines resembles a "Z" which stand for Zener. These diodes available from 2 to 200V ranges.

Fig (2) shows the principal circuit diagram to draw the reverse bias characteristics of Zener diode and Fig. 3 shows the typical current voltage current voltage characteristics of a zener diode. When a diode is forward biased, it acts like a closed switch and forward current increases with an increase in applied voltage. Forward current is then limited by the parameters of the circuit. When the diode is reversed-biased a small reverse current called SATURATION CURRENT (I_s) flows. This current remains relatively constant despite an increase in reverse bias.



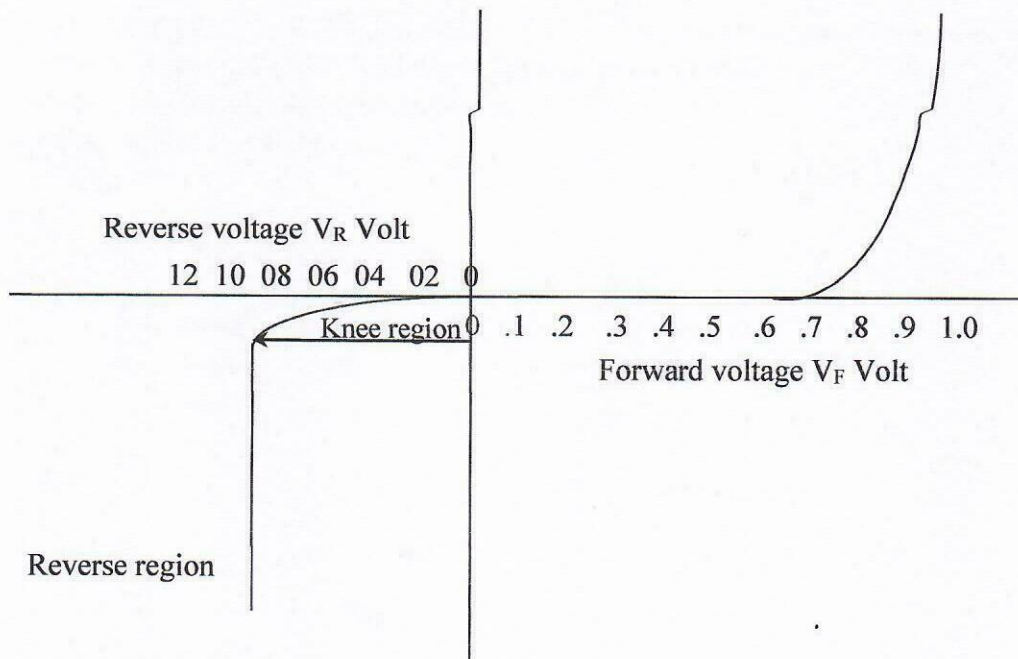


Fig. (3)

EXPERIMENT-I

OBJECT:

To draw the volt-ampere characteristics of Zener diode and measure its Zener voltage (Break-down voltage).

APPARATUS USED:

Set-up 'Make Raman' (To Study The Characteristics of Zener diodes) Fig 4.

DESCRIPTION OF THE SET-UP:

The experimental set-up has been laid down on a decorated bakelite board with an aim of providing an easy understanding to the students. The set-up consists of the following:

- | | | | |
|-----|----------------------------|---|------------------------------------|
| (a) | Variable D.C. Power Supply | : | 0 – 12 volt continuously variable. |
| (b) | Digital Voltmeter | : | 0 – 20 volt |
| (c) | Ammeter (Double range) | : | 0 – 20 mA |
| (d) | Zener diode | : | 6.8 Volt and 9.1 Volt |
| (e) | Patch chords | : | |

METHODS:

(a) For Reverse Bias (Put the switch in Reverse bias mode)

1. Make the connection as shown in Fig. 3. For actual connections refer layout diagram using 6.8 Volt Zener.
2. Adjust the power supply knob at extreme left so that the output is zero.

3. Apply voltage say 2, 4, 6, 6.4, 6.8, 6.82, 6.84and measure the corresponding current in the ammeter. Record these readings in table as shown below.
4. Draw a graph between voltage and current.
5. Calculate the Zener voltage V_Z .

TABLE: 1

Observations and Tabulations

S.No.	Forward Bias		Reverse Bias	
	Voltage V_F Volt	Current I_F mA.	Voltage V_R Volt	Current I_R mA.
1.	Not done	.....	.....	.....
2.	..	.....	.....	.....
3.	...	.....	.....	.....
4.	..	.....	.....	.....
		

(b) For Forward Bias : Zener diode with not work in Forward Bias conditions

RESULTS:

1. Graph shows the V-I characteristics of a Zener diode.
2. The Zener voltage as observed experimentally is volt
3. The Zener voltage as per data sheets are 6.8 V and 9.1 volt

NOTE: As the Zener Diode is optimized for operation in reverse break-down region set during manufacturing process and there is no any practical use of forward characteristics due to low Zener Current (I_Z), therefore it is not advisable to draw the forward characteristics.

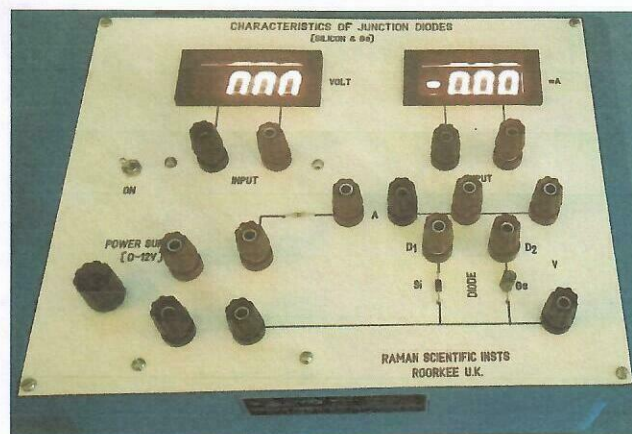


Fig. 4 Complete Layout

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TEST RESULTS:

Observations and Tabulations:

S. No.	Reverse Bias Zener Type 6.8 Volt		Reverse Bias Zener Type 9.1 Volt	
	Voltage Volt	V_R Current I_R mA.	Voltage Volt	V_R Current I_R uA.
1.	0.0	0.0	0.0	0.0
2.	2.0	0.01	2.0	0.01
3.	4.0	0.04	4.0	0.03
4.	6.0	0.06	6.0	0.05
5.	6.2	0.06	8.0	0.07
6.	6.4	0.06	9.0	0.08
7.	6.6	0.06	9.04	0.13
8.	6.8	1.13	9.06	1.51
9.	6.82	3.70	9.08	2.62
10.	6.84	6.21	9.10	4.20
11.	6.86	9.17	9.12	5.75
12.	6.87	10.46		

RESULTS:

1. Graph shows the V-I characteristics of a Zener diodes.
2. The Zener voltage as observed experimentally is 6.75 volt
3. The Zener voltage as per data sheet 6.8 volt
4. The Zener voltage as observed experimentally is 9.05 volt
5. The Zener voltage as per data sheet 9.1 volt

Tested by: Neha (Engineer - QC)

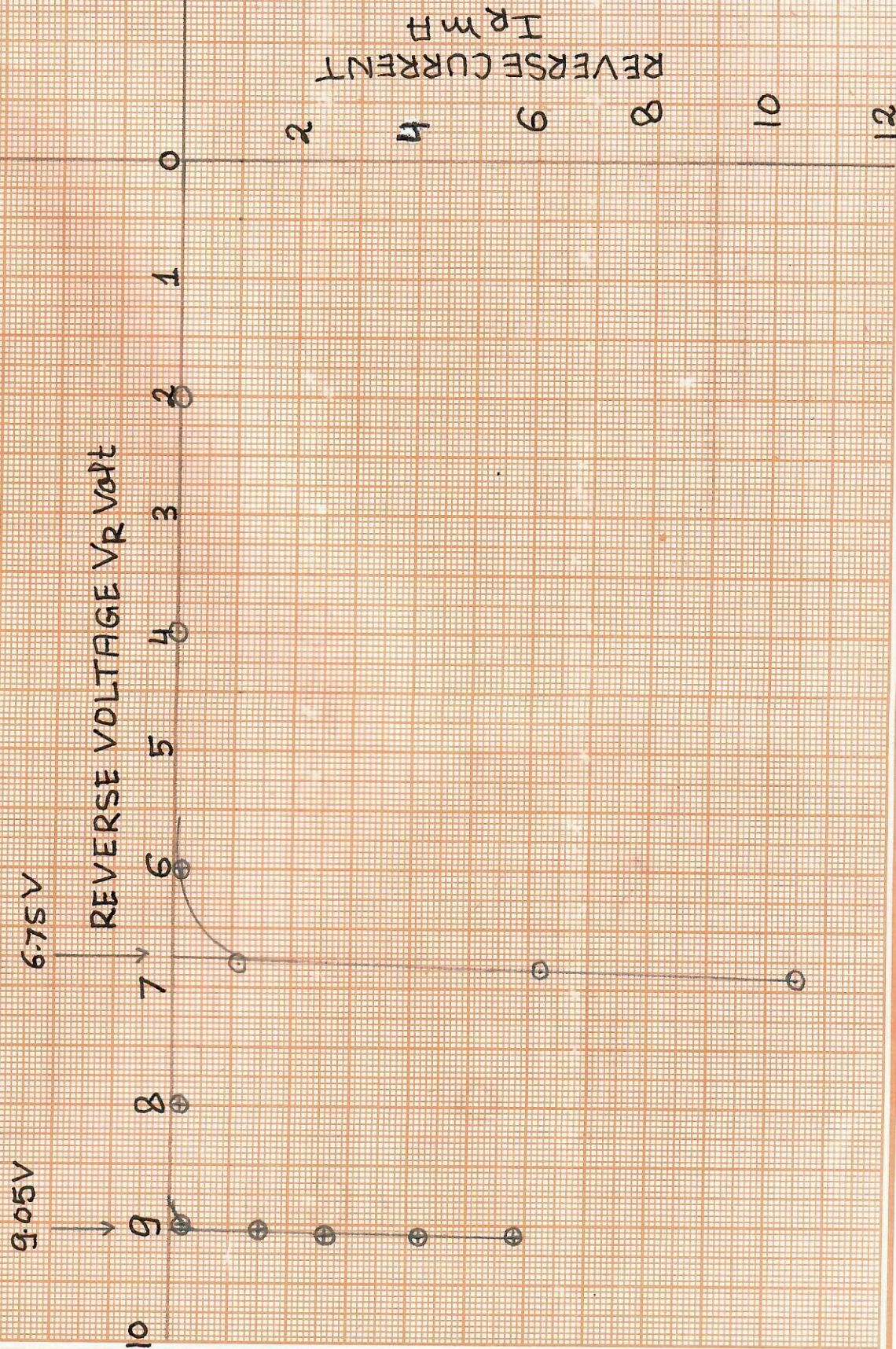
Dated 01-05-2022

**Dispatched To: Head, Department of Physics,
P.P.N. Degree College Kanpur-U.P.**

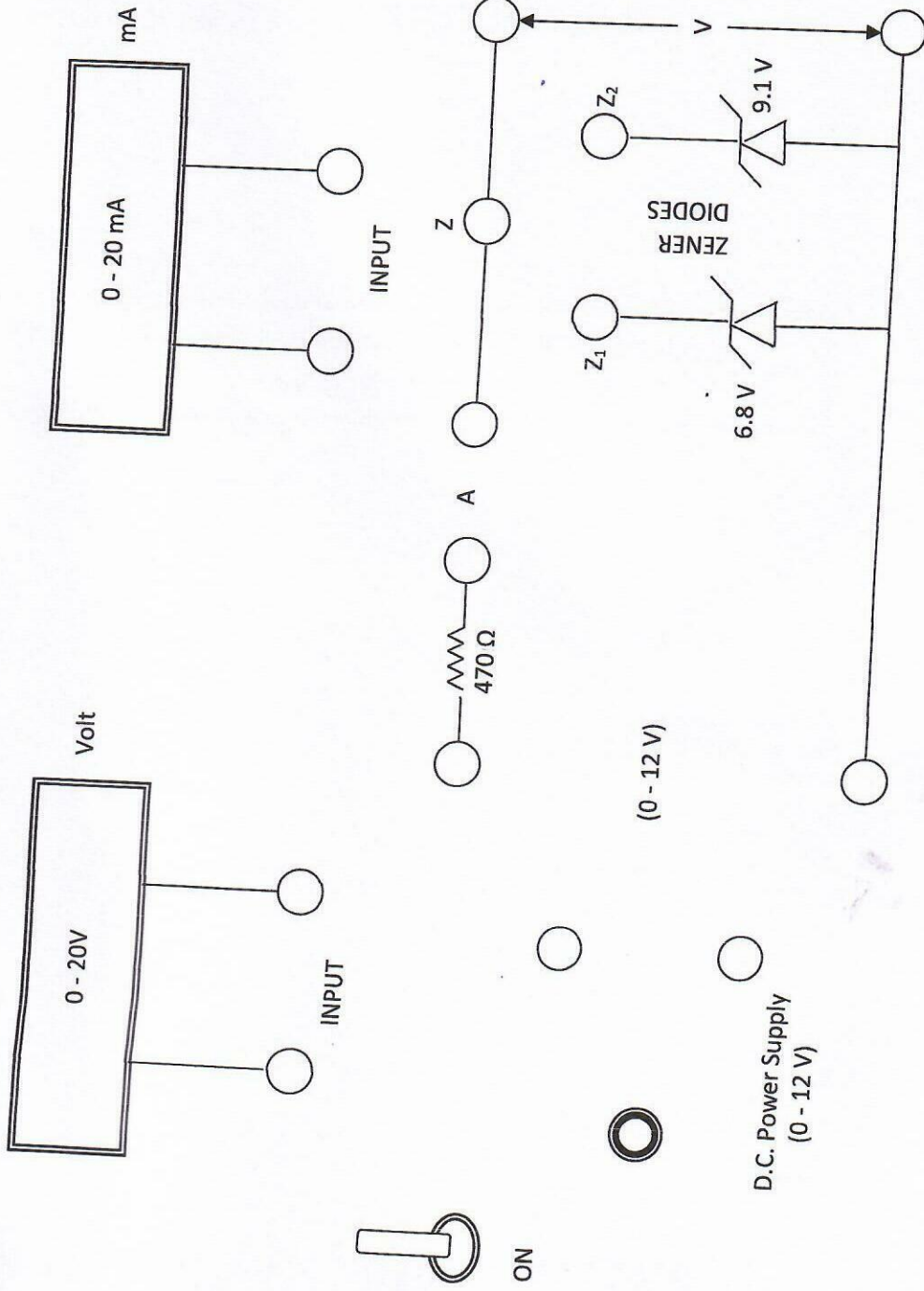
TEST RESULTS.

CHARACTERISTICS OF ZENER DIODES S.NO. 22653

TYPE - 6.8V & 9.1V



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