Ex.No.2

Date:

CHARACTERISTICS OF ZENER DIODE

AIM:

To study the characteristics and to determine the breakdown voltage of a zener diode.

APPARATUS REQUIRED

S.No.	Name	Range	Qty
1	R.P.S	(0-30)V	1
2	Ammeter	(0–100)μA	1
3	Voltmeter	(0–30)V	1
		(0–1V	1

COMPONENTS REQUIRED

S.No	Name	Range	Qty
1	zener diode	$I_2$7.5 V	1
2	Resistor	1KΩ	1
3	Breadboard		1
4	Wires		

THEORY:

A properly doped crystal diode, which has a sharp breakdown voltage, is known as zener diode.

FORWARD BIAS:

On forward biasing, initially no current flows due to barrier potential. As the applied potential increases, it exceeds the barrier potential at one value and the charge carriers gain sufficient energy to cross the potential barrier and enter the other region. the holes ,which are majority carriers in p-region, become minority carriers on entering the N-regions and electrons, which are the majority carriers in the N-regions become minority carriers on entering the P-region. This injection of minority carriers results current, opposite to the direction of electron movement.

REVERSE BIAS:

When the reverse bias is applied due to majority carriers small amount of current (ie) reverse saturation current flows across the junction. As the reverse bias is increased to breakdown voltage, sudden rise in current takes place due to zener effect.

ZENER EFFECT:

Normally, PN junction of Zener Diode is heavily doped. Due to heavy doping the depletion layer will be narrow. When the reverse bias is increased the potential across the depletion layer is more. This exerts a force on the electrons in the outermost shell. Because of this force the electrons are pulled away from the parent nuclei and become free electrons. This ionization, which occurs due to electrostatic force of attraction, is known as Zener effect. It results in large number of free carriers, which in turn increases the reverse saturation current

PROCEDURE:

FORWARD BIAS:

1. Connect the circuit as per the circuit diagram.
2. Vary the power supply in such a way that the readings are taken in steps of 0.1V.
3. Note down the corresponding ammeter readings.
4. Plot the graph : V_f (vs) I_f.
5. Find the dynamic resistance **r = δV / δI.**

REVERSE BIAS:

1. Connect the circuit as per the diagram.
2. Vary the power supply in such a way that the readings are taken in steps of 0.5V.
3. Note down the corresponding Ammeter readings I_r.
4. Plot a graph between V_r & I_r
5. Find the dynamic resistance **r = δV / δI.**

RESULT:

Forward and Reverse bias characteristics of the zener diode was studied and the values of the various parameters were found to be:

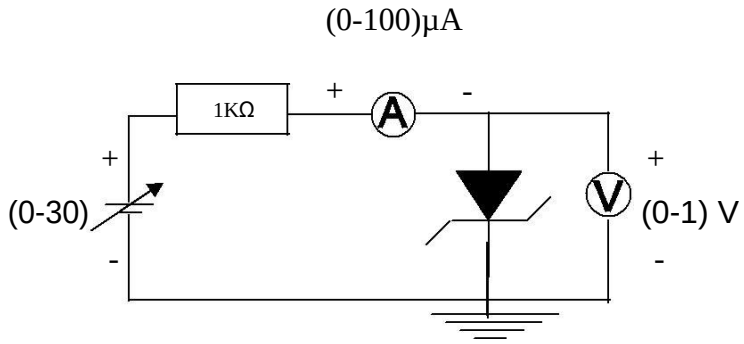
Forward bias dynamic resistance = ----------

Reverse bias dynamic resistance = ----------

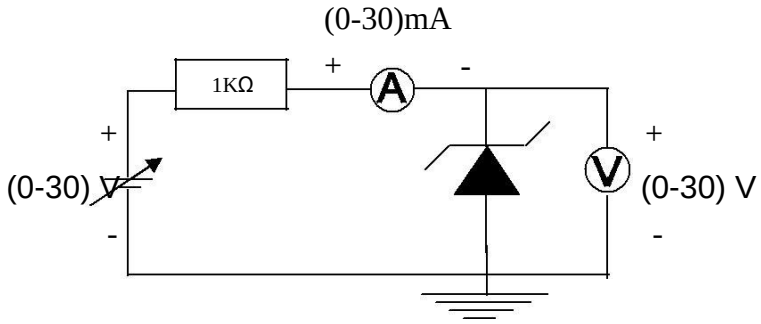
The reverse Breakdown voltage = ----------

CIRCUIT DIAGRAM:

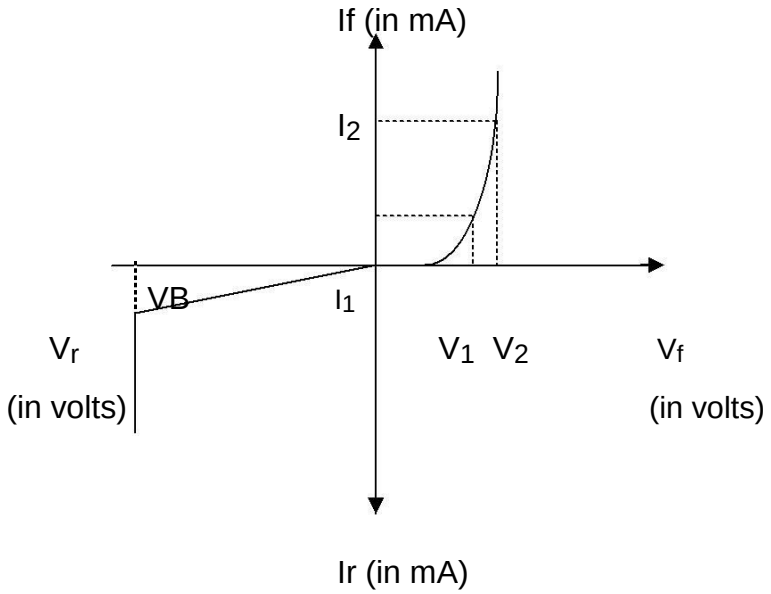
FORWARD BIAS:



REVERSE BIAS:



ZENER DIODE:



TABULAR COLUMN:

FORWARD BIAS:

S.No	VOLTAGE(V_f) (V)	CURRENT (If) (mA)

REVERSE BIAS:

S.No.	VOLTAGE (V_r) (V)	CURRENT(I_r) (mA)