

Ex. No.	<b>CHARACTERISTICS OF PN JUNCTION DIODE AND ZENER DIODE</b>
Date:	

**AIM:**

- (a) To plot the forward characteristics of the PN junction diode
- (b) To plot the reverse characteristics of the Zener diode.

**APPARATUS REQUIRED:**

S.NO.	NAME OF THE EQUIPMENT	TYPE	RANGE	QUANTITY (NO.S)
1	PN junction Diode	IN 4001		1
2	Zener Diode			
3	Resistor		470 $\Omega$ , 1k $\Omega$	One from each
4	Voltmeter	MC	(0 – 2V) (0 – 30V)	
5	Ammeter	MC	(0 – 25mA) (0 – 50mA)	One from each
6	Regulated Power Supply		(0 – 30V)	1
7	Bread Board			1
8	Connecting wires			Required

**(a) Forward Characteristics of PN junction Diode**

**THEORY:**

An ideal PN junction Diode is a two terminal, two layer, polarity sensitive device, that conducts only in one direction. It offers zero resistance (i.e. diode conducts) when it is forward biased and infinite resistance (i.e. diode doesn't conduct) when it is reverse biased. Due to this characteristic, the diode finds number of applications as 1. Rectifiers in DC power supply, 2. Switch in digital circuits, 3. Clamping, Clipping circuits network used in TV Receiver, 4. Demodulation (detector) circuits.

The V-I characteristics of the diode are curve between voltage across the diode and current through the diode.

### Symbol of a PN junction Diode



### Terminal Identification



### CIRCUIT DIAGRAM:

#### Forward Bias Condition

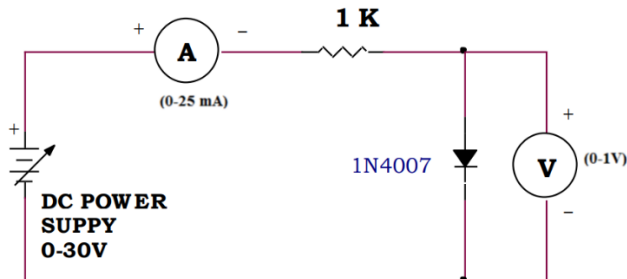


Figure 1

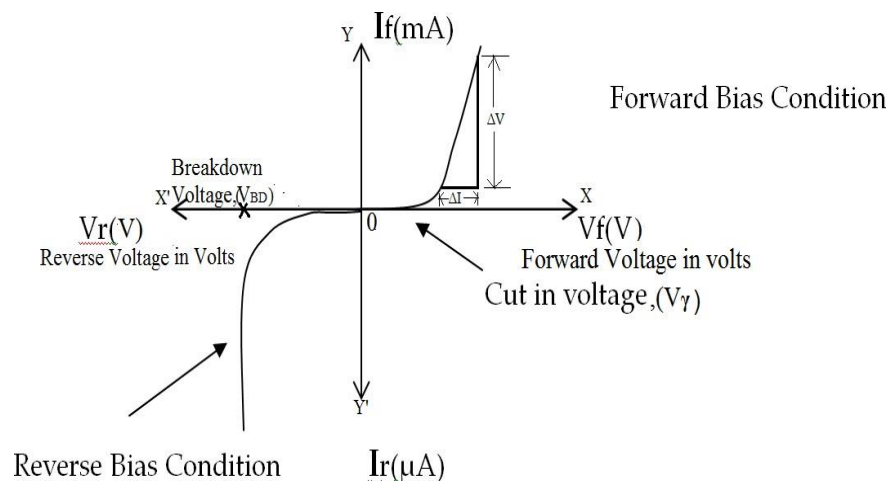
### TABULATION:

#### Forward Bias diode

Sl. No.	V <sub>f</sub> in volts	I <sub>f</sub> in mA
1	0	0
2	0.2	
3	0.4	
4	0.6	
5	0.8	
6	1	
7	2	
8	4	
9	6	
10	8	
11	10	
12	12	

### MODEL GRAPH

#### V-I characteristics of PN junction



### PROCEDURE:

1. Identify the anode and cathode terminals of an IN4001 diode (or equivalent silicon diode such as BY126) and test it using a multimeter.
2. Wire the circuit as shown in figure 1.
3. By varying the input voltage (as shown in table) in steps and note down the corresponding ammeter readings.
4. Plot the graph by taking the forward voltage (V<sub>f</sub>) on the x axis and the forward current (I<sub>f</sub>) on the y axis.

### (b) Reverse Characteristics of Zener Diode

#### Theory

The Zener diodes are heavily doped PN junction diodes. It is designed for some specific

reverse breakdown voltage. Also called Zener breakdown voltage ( $V_Z$ ). While operated in reverse breakdown region Zener diode is used for voltage regulation purpose. The value of  $V_Z$  depends on amount of doping. Breakdown current is limited by power dissipation capacity of the Zener diode. Forward characteristics of the Zener diode is similar to normal PN junction diode.

#### CIRCUIT DIAGRAM:

##### Reverse Bias Condition

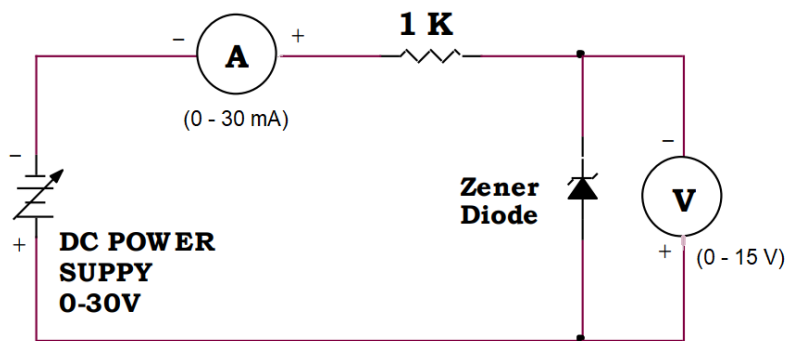


Figure 2

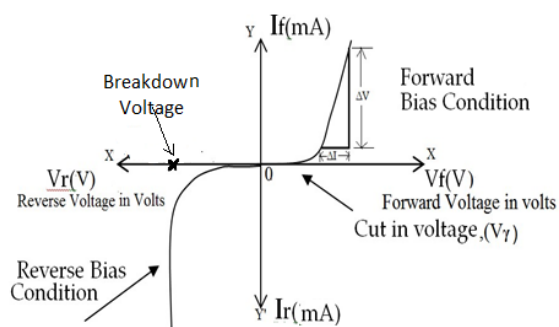
#### TABULATION:

##### Forward Bias diode

Sl. No.	$V_r$ in volts	$I_r$ in mA
1	0	0
2	2	
3	4	
4	6	
5	7	
6	8	
7	10	
8	12	
9	14	
10	16	
11	18	
12	20	

#### V-I characteristics of Zener Diode

##### Model Graph



**PROCEDURE:**

5. Identify the anode and cathode terminals of a Zener diode and test it using a multimeter.
6. Wire the circuit as shown in figure 2.
7. By varying the input voltage (as shown in table) in steps and note down the corresponding ammeter readings.
8. Plot the graph by taking reverse voltage ( $V_r$ ) on the x axis and reverse current ( $I_r$ ) on the y axis.

**RESULT:** Thus the forward characteristics of PN junction diode and reverse characteristics of Zener diode were obtained and the characteristics curves were plotted.