

SEMI-CONDUCTOR DIODE

Aim: To Draw the I-V characteristic curve of a p-n junction in forward bias and reverse bias.

Apparatus: A p-n junction diode, milli ammeter, microammeter, voltmeter, rheostat and battery.

Principle: when p-side of the semi-conductor diode is connected to the positive terminal of the battery, then p-n junction is said to be forward biased. The junction offers low resistance and initially a negligibly small current flows through circuit till the applied voltage crosses a certain value the diode current increases exponentially.

When p-side of the semi-conductor diode is connected to the negative terminal of the battery, then p-n junction is said to be reverse biased. As the applied voltage is increased in the reverse biased condition, starting from zero, the current increases, but soon become constant. It is called reverse saturation current.

Procedure:

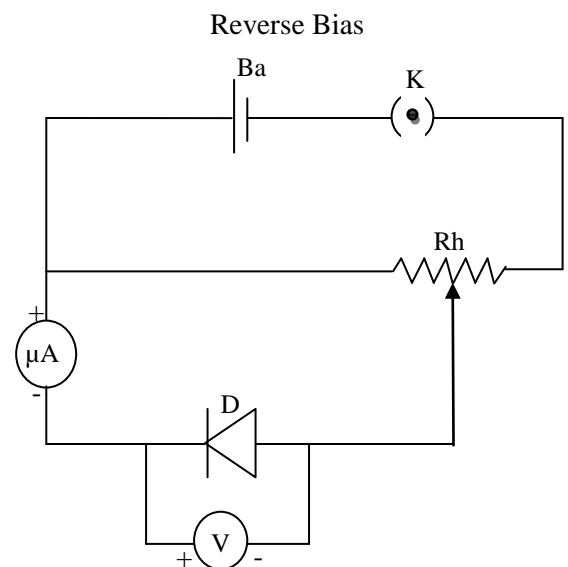
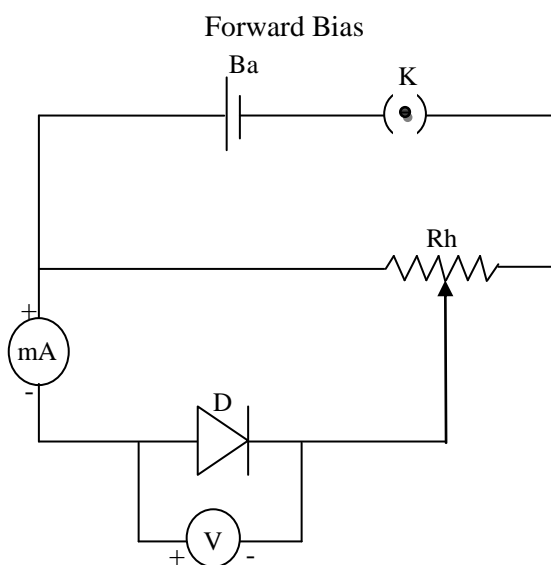
(a) For forward bias:

1. The connections are made as shown in the circuit diagram.
2. Using rheostat, the voltage is adjusted for a value V . the voltage V and corresponding Current I are noted.
3. The voltage is increased in small steps. Value of V and I are noted in each case and readings are tabulated.
4. A graph is plotted for the current I versus voltage V .
5. Cut in voltage is located in the graph.

(b) For reverse bias:

1. The connections are made as shown in the circuit diagram.
2. Using rheostat, the voltage is adjusted for a value V . the voltage V and corresponding Current I are noted.
3. The voltage is increased in small steps. Value of V and I are noted in each case and reading are tabulated.
4. A graph is plotted for the current I versus voltage V .
5. Reverse saturation current is found.

Circuit Diagram:



Where:

Ba – Battery,

V – Voltmeter,

μA – Micro ammeter,

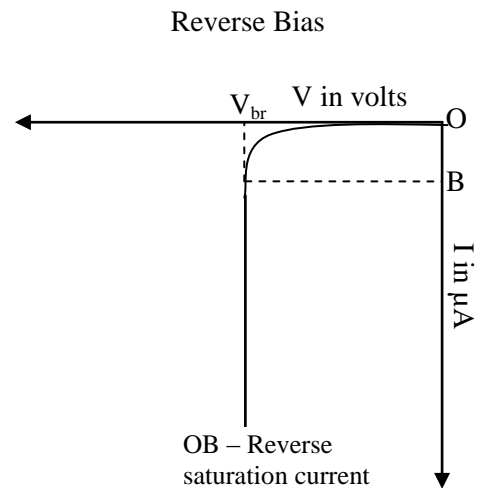
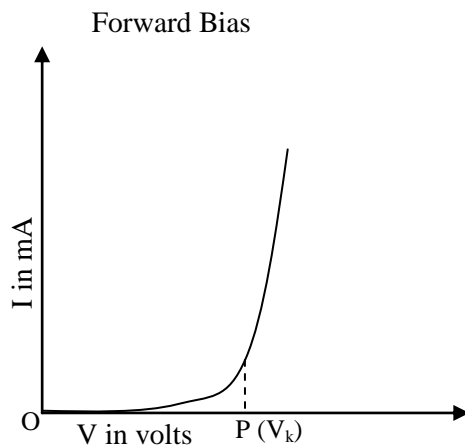
mA – Milli ammeter

Rh – Rheostat,

D – Diode

K – Plug key.

Nature of Graph:



Observations:

Forward Bias Characteristics:

S.No	Voltage(V) in volts	Current I in mA
1		
2		
3		
4		
5		
6		
7		
8		
9		

Reverse Bias Characteristics:

S.No	Voltage(V) in volts	Current I in mA
1		
2		
3		

4		
5		
6		
7		
8		
9		

Result:

I-V characteristics of p-n junction diode are drawn.

From graph: Cut in voltage = $OP = \dots V$

Precautions:

1. The connections should be neat, clean and tight.
2. Forward- bias voltage beyond breakdown should not be applied.
3. Reverse- bias voltage beyond breakdown should not be applied.

Source of error:

The junction diode supplied may not be faulty