Virtual Lab

Characteristics of Zener Diode (Expt. 04)

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Aim:

To draw the static current-voltage (I-V) characteristics of a junction diode.

Apparatus:

Zener Diode, resistor, variable DC power supply, milliammeter, voltmeter, Rheostat and wire.

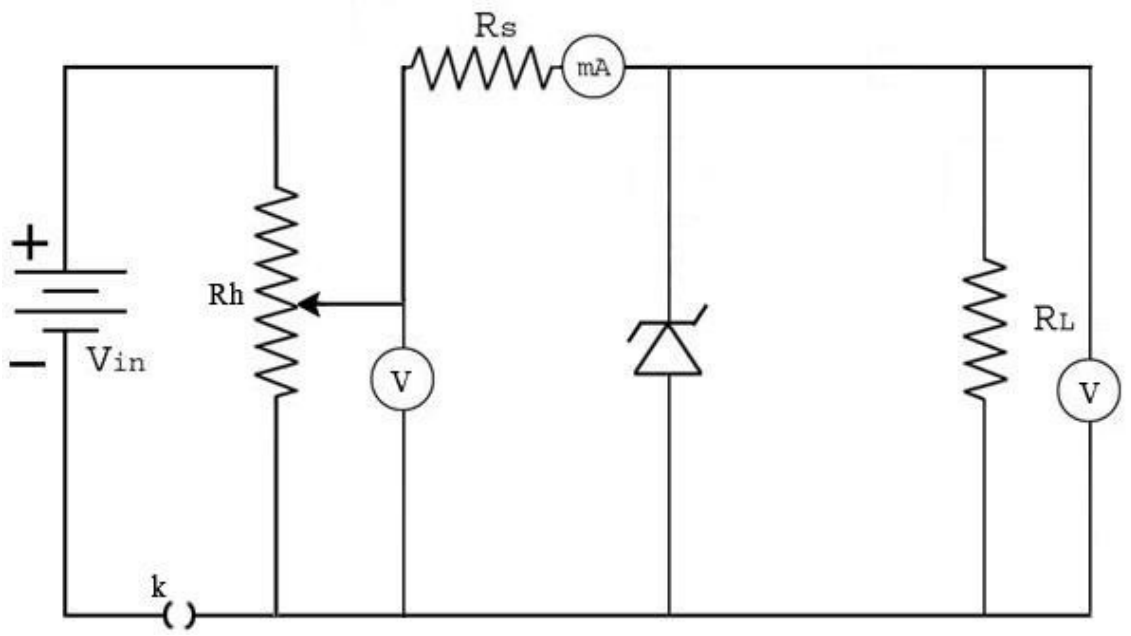
Theory:

A diode, in electronics, is a two terminal electronic component with an asymmetric transfer characteristics, with low resistance to current flow in one direction and high resistance to current flow in the other direction. A semi-conductor diode is the most common type diode, which is a piece of semi-conductor material with a p-n junction connected to two terminals.

A diode allow electric current to pass in forward direction and block current in reverse direction. The behaviour of a diode in a circuit is given by its I-V characteristics. The shape of the curve is determined by the transport of charge carriers through the depletion layer that exist at the p-n junction. When a p-n junction is first cretaed, diffusion of holes and electrons take place through the junction. As recombination proceeds, more ions are created at the junction and a built-in potential is developed at the depletion zone.

If a voltage of same polarity as that of built-in potential is applied across the junction, depletion zone acts as an insulator, preventing significant current flow through the junction. This is the reverse bias phenomenon.

Diagram:



Working Process:

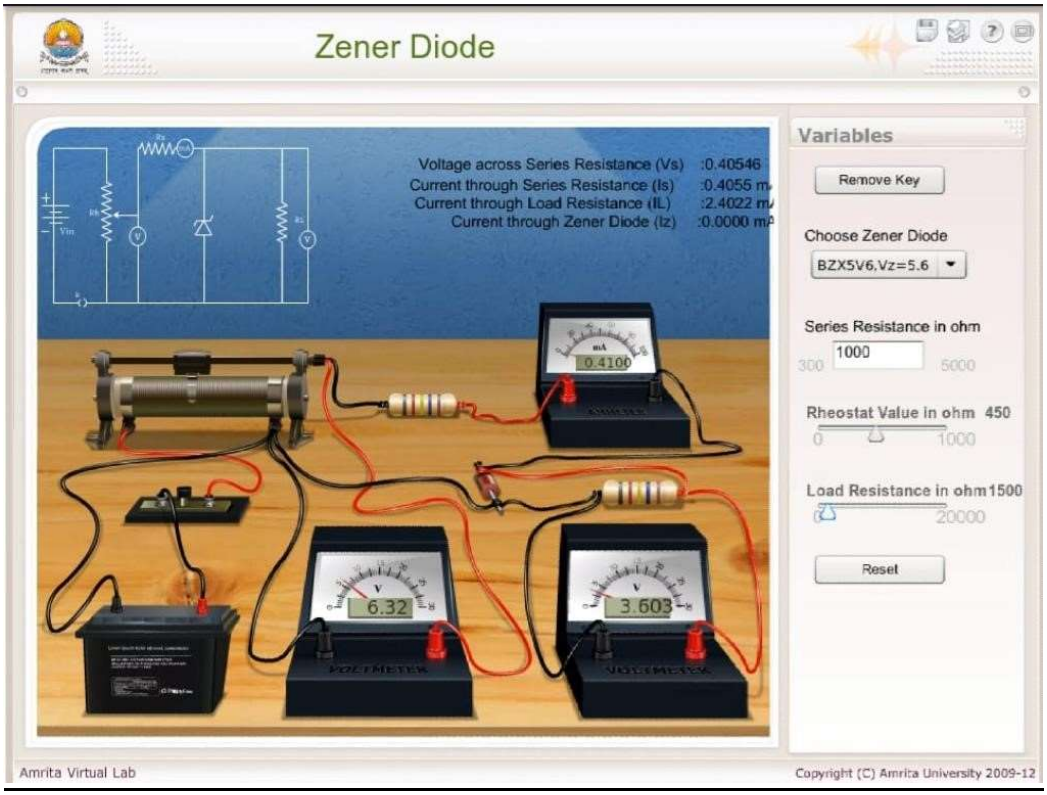
- **Insert Key Button:**This is used to insert key on the switch connected with battery. This key is only activated when the connection is perfect.
  Choose Zener Diode: This combo box is used to select different zener diodes having different zener voltage
  Series Resistance: Value of the Series Resistance can be directly input here.

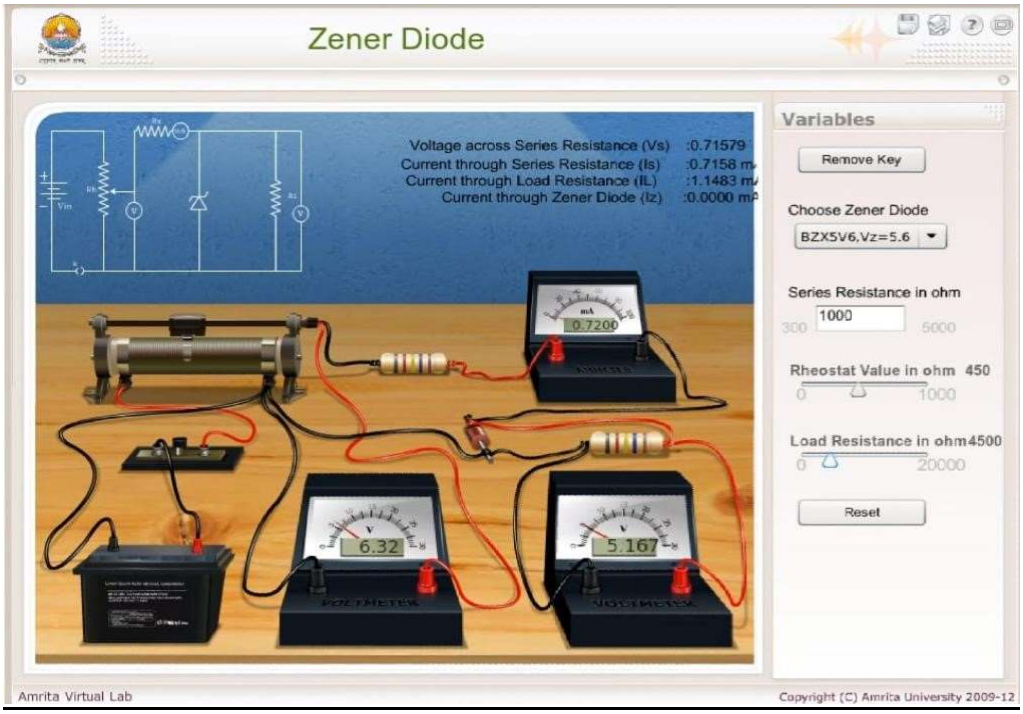
  Slider
  Rheostat value: Rheostat can be controlled by using this slider
  Load Resistance: Value of load resistance can be set or change by using this slider

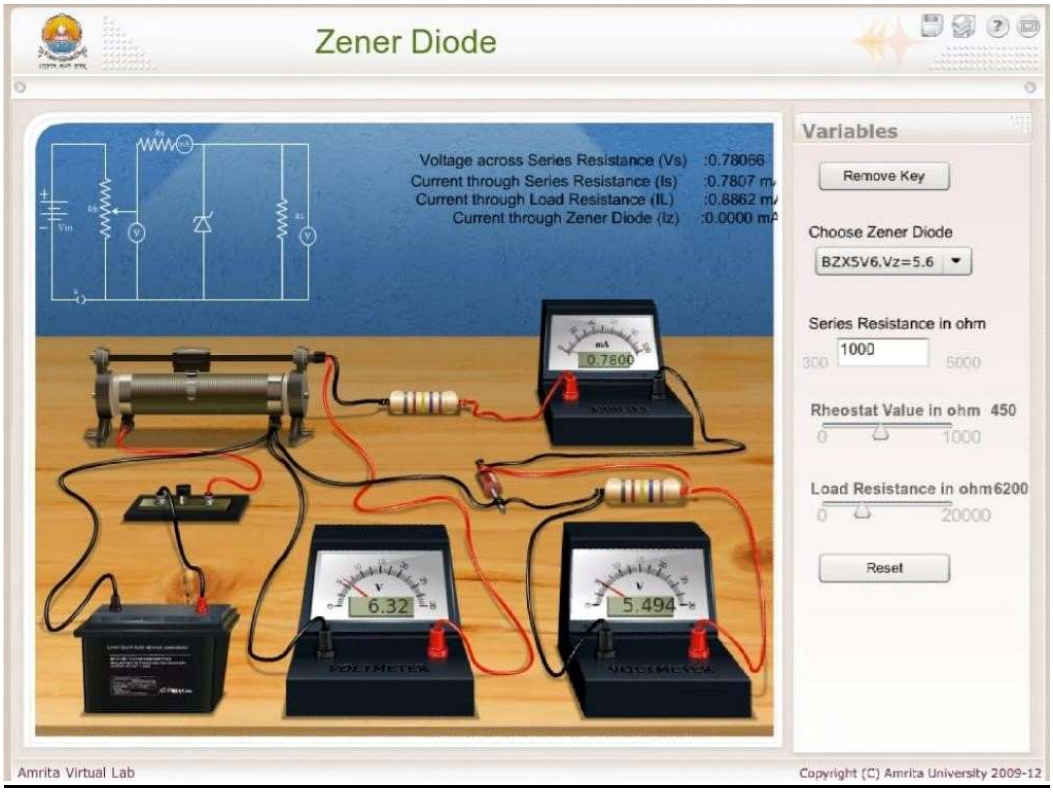
  Button
  Reset Button: To reset all the connections

- Using the circuit diagram, identify the connections in the given platform.
- Click one end node of the battery and drag to the next position, where we want to connect the wire.

Observations:






Zener Diode
Voltage across Series Resistance (Vs) :0.78066
Current through Series Resistance (Is) :0.7807 m
Current through Load Resistance (IL) :0.8862 m
Current through Zener Diode (Iz) :0.0000 mA
0.7800
6.32
5.494
VOLTMETER
Variables
Remove Key
Choose Zener Diode
BZX5V6,Vz=5.6
Series Resistance in ohm
1000
300
5000
Rheostat Value in ohm 450
0
1000
Load Resistance in ohm6200
0
20000
Reset
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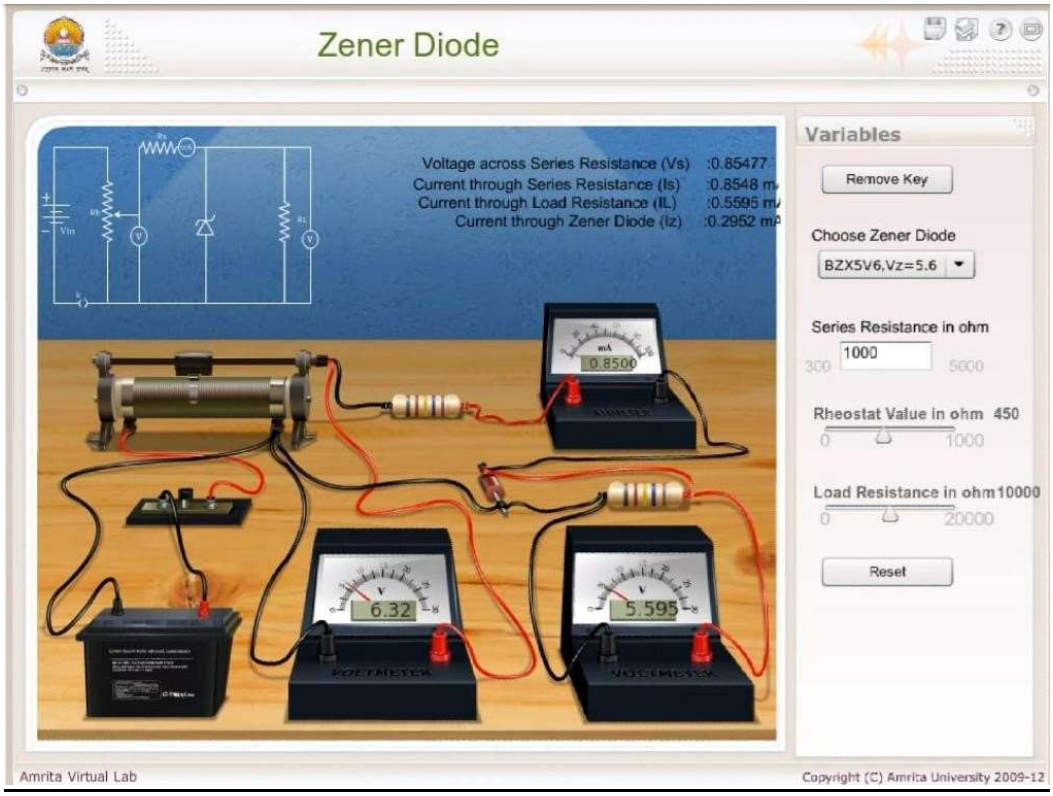
Zener Diode
Voltage across Series Resistance (Vs) :0.85477
Current through Series Resistance (Is) :0.8548 m
Current through Load Resistance (IL) :0.5595 m
Current through Zener Diode (Iz) :0.2952 mA
0.8500
6.32
5.595
VOLTMETER
Variables
Remove Key
Choose Zener Diode
BZX5V6,Vz=5.6
Series Resistance in ohm
1000
300
5000
Rheostat Value in ohm 450
0
1000
Load Resistance in ohm10000
0
20000
Reset
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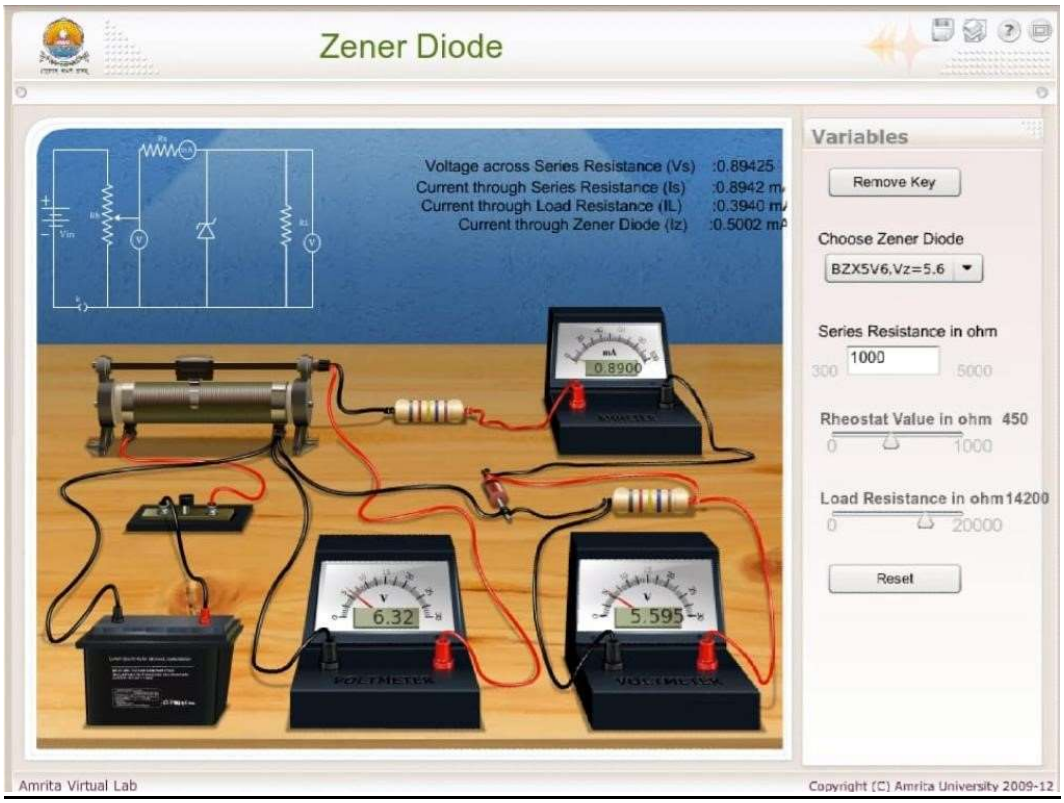

Result: Hence the properties and characteristics of a Zener diode are successfully studied.