



# Experiment No.1

## Semiconductor Diode Characteristics

### **Objectives:**

To study the characteristics of the forward and reverse biased junction diodes.

### **Apparatus:**

1. DC power supply.
2. AVO meters.
3. Breadboard, Diode and  $1K\Omega$  Resistor.

### **Theory:**

The diode is a device formed from a junction of n-type and p-type semiconductor material. The lead connected to the p-type material is called the anode and the lead connected to the n-type material is the cathode. In general, the cathode of a diode is marked by a solid line on the diode. The primary function of the diode is rectification. When it is forward biased (the higher potential is connected to the anode lead), it will pass current. When it is reversed biased (the higher potential is connected to the cathode lead), current flow is blocked. A current flow in the forward direction is very large compared with that in the reverse direction and such a device is very useful as a rectifier. The diode is in the forward direction when an external battery is connected with positive terminal to the (p) region and negative terminal to the region (n). The reverse current through the diode varies greatly with temperature and with the semiconductor material used.



### **Procedure:**

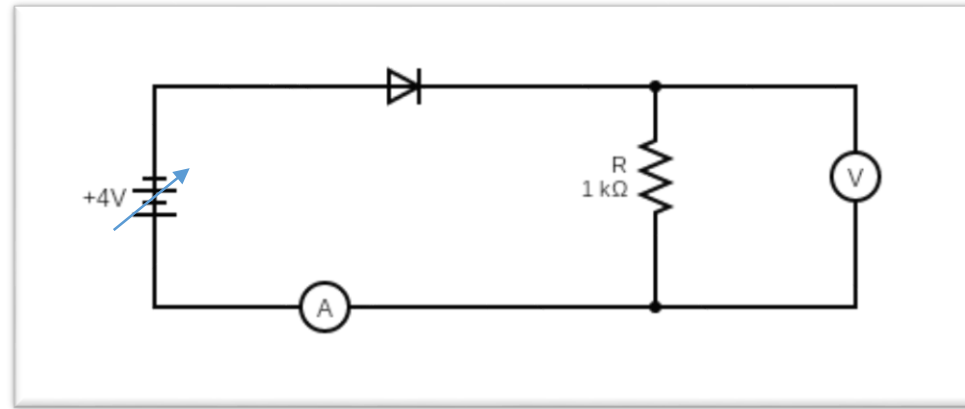
1. Connect the circuit as shown in Figure (1) using silicon diode.
2. Increase the variable DC voltage from zero in steps of (0.1 volts) up to (1 volts), then in step of (0.5 volt) up to (4 volt), and record the voltage across the ( $1K\Omega$ ) resistance ( $V_r$ ).
3. Tabulate your results in a table as shown in table (1).
4. Connect the circuit shown in Figure (2) using Si diode.
5. Increase the variable DC voltage from zero in steps of (0.2 volts) up to (1 volt), then in steps of (1 volt) up to (4 volts) and for each step record the current flowing in the circuit.
6. Tabulate your result in a table as shown in table (2).

### **Note:**

**For the reverse c/cs of (Si) diode the reverse current is very small compare with the current of (Ge) diode, so it assumed to be zero.**

### **Discussion:**

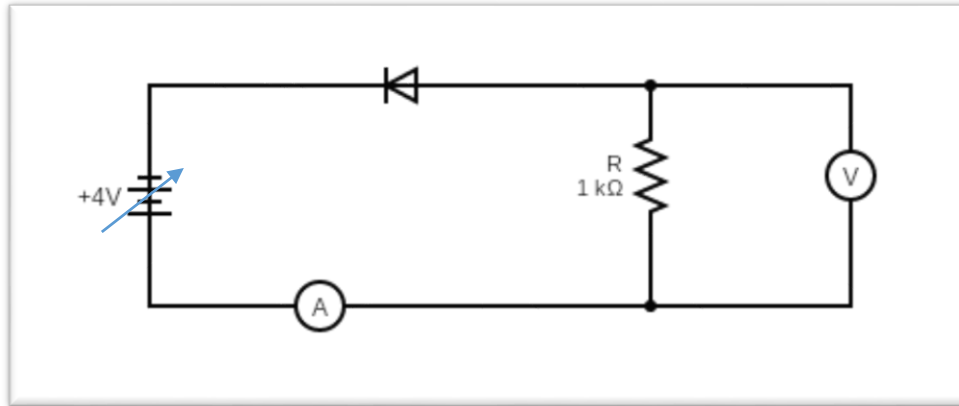
1. Compare between the Si & Ge diode? which is has the better forward characteristic?
2. What is the barrier field and how is it produce?
3. Comment on the results of the experiment.



**Fig.1 Forward circuit**

**Table (1)**

Vin	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	2	3	4
Idc													
Vr													



**Fig.2 Reverse Circuit**

**Table (2)**

<b>V<sub>in</sub></b>	<b>0.5</b>	<b>1</b>	<b>1.5</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>I<sub>dc</sub></b>						
<b>V<sub>r</sub></b>						