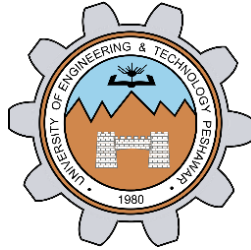


## **LAB 02: DIODE CHARACTERISTIC**



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“On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work.”

Submitted to:

**Engr. Usman Malik**

Month Day, Year (15 March, 2024)

**Department of Computer Systems Engineering**

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## OBJECTIVES:

To study the characteristics of silicon and germanium diodes.

## Equipment:

1. DC power supply
2. Function Generator
3. Digital Multimeter (DMM)

## Components:

1. **Diodes:** Silicon (D1N4002), Germanium (D1N4148)
2. **Resistors:**  $1k\Omega$ ,  $1M\Omega$

## Theory:

### Diode:

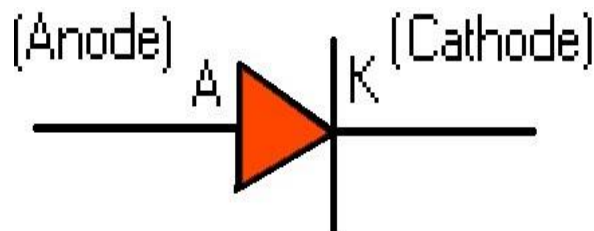
A diode is a two-terminal electronic component that conducts current primarily in one direction; it has low resistance in one direction, and high resistance in the other.

## CHARACTERISTICS: OF DIODE:

Three important characteristics of a diode are:

1. First, the forward voltage drops. Under a forward bias condition, this should be about 0.7 volts.
2. Then there is the reverse voltage drop. In the reverse, when we reverse bias the diode the depletion layer widens and usually, the applied voltages are felt across the diode.
3. Then there is the reverse breakdown voltage. Reverse voltage drop that will reverse current flow and, in most cases, destroy the diode.

## Diode symbol:



*Figure 1: Diode symbol*

## Function generator:

A function generator is an electronic test instrument used to generate a variety of electrical waveforms over a wide range of frequencies. It typically offers precise control over parameters such as frequency, amplitude, waveform shape, and modulation.



Figure 2: Function Generator

## Power supply:

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result power supplies are sometimes referred to as electric power converters.



Figure 3: Power supply

## Digital Multimeter:

A digital Multimeter (DMM) is a test tool used to measure two or more electrical values principally voltage (volts), current (amps) and resistance (ohms). It is a standard diagnostic tool for technicians in electrical/electronic industries.



Figure 4: Multimeter

## Procedur:

### Forward bias diode characteristic:

1. Construct the circuit given below:

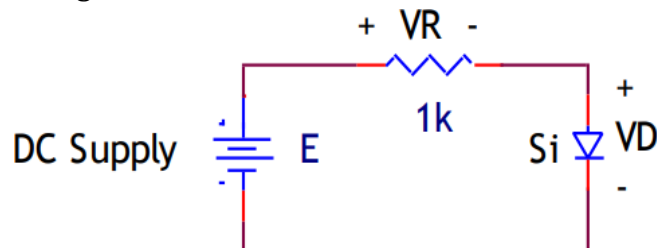


Figure 5: Forward biased circuit

2. Increase the supply voltage until  $V_D$  reads 0.1 V. Then measure current  $I_D$  and record the results in Table.

- Repeat step 2 for the remaining settings of  $V_D$  shown in the Table 3.1. Plot on a graph paper  $I_D$  versus  $V_D$  for the silicon. Complete the curves by extending the lower region of each curve to the intersection of the axis at  $I_D = 0$  mA and  $V_D = 0$  V.

### Experiment:

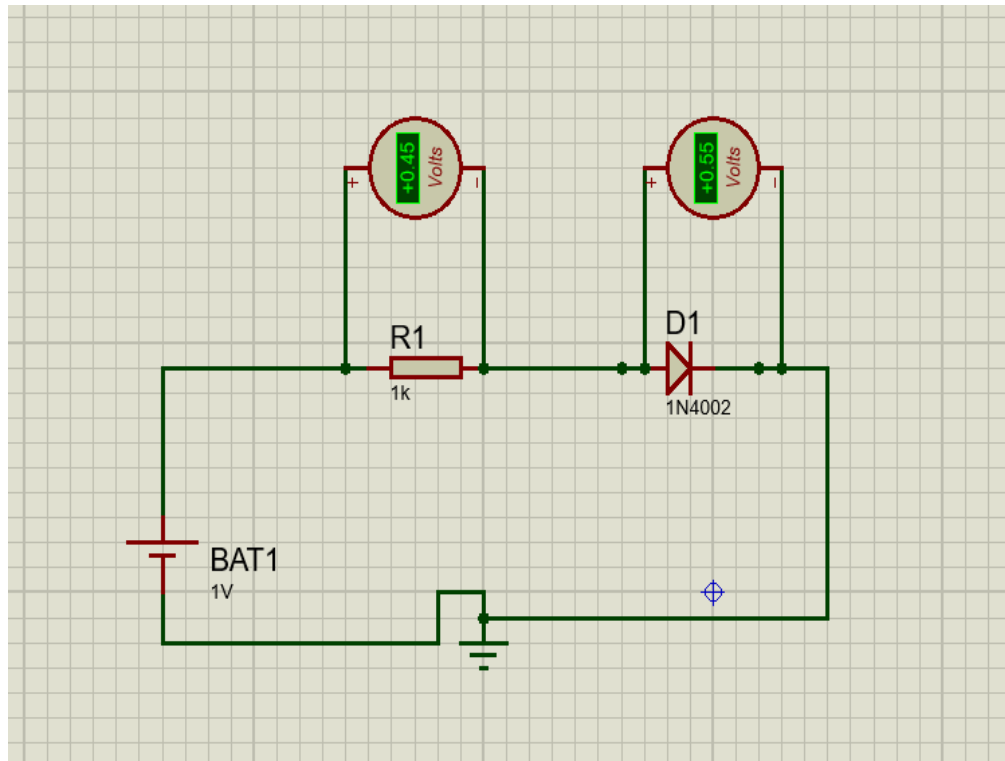


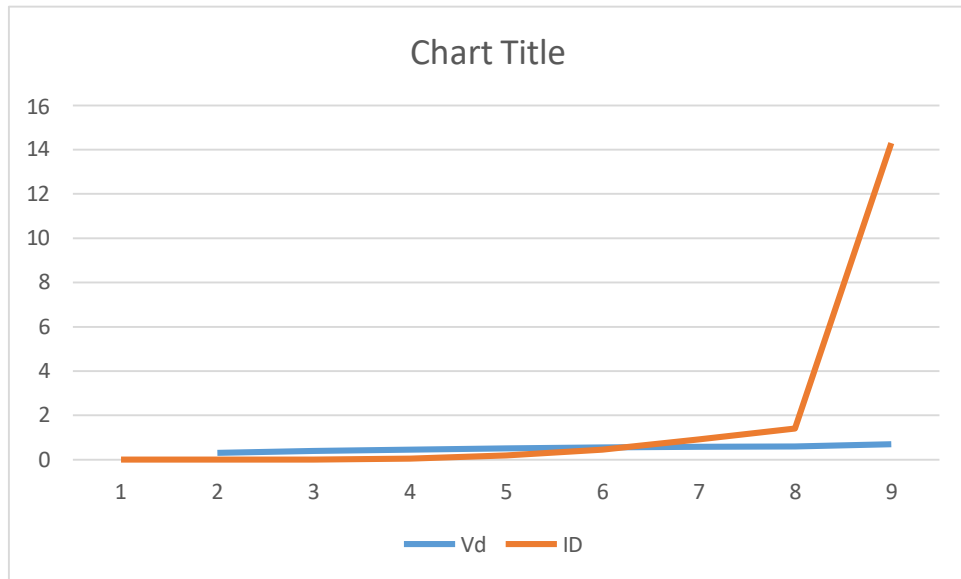
Figure 6: Forward biased circuit on proteus

### Observations:

**R=1K**

| V     | 0.1 | 0.3 | 0.4    | 0.5    | 0.7    | 1      | 1.5    | 2     | 15     |
|-------|-----|-----|--------|--------|--------|--------|--------|-------|--------|
| $V_D$ | 0.1 | 0.3 | 0.39   | 0.45   | 0.51   | 0.55   | 0.58   | 0.6   | 0.7    |
| $V_R$ | 0   | 0   | 0.01   | 0.05   | 0.19   | 0.45   | 0.92   | 1.4   | 14.3   |
| $I_D$ | 0   | 0   | 0.01mA | 0.05mA | 0.19mA | 0.45mA | 0.92mA | 1.4mA | 14.3mA |

## GRAPH:



## Reversed bias diode characteristic:

1. Construct the circuit of Figure given below with E is set at 20V. Record the measured value of the resistor.

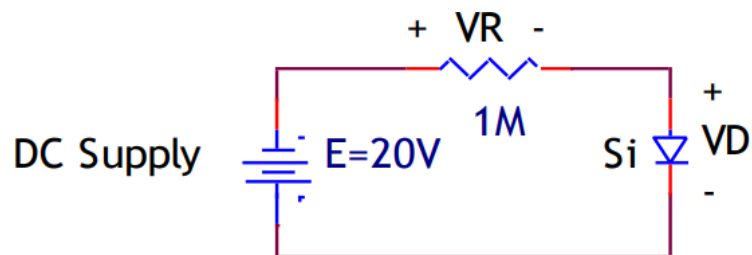


Figure 7: Reverse Biased Circuit

2. Measure the voltage VD. Measure the reverse saturation current, Is

## Experiment:

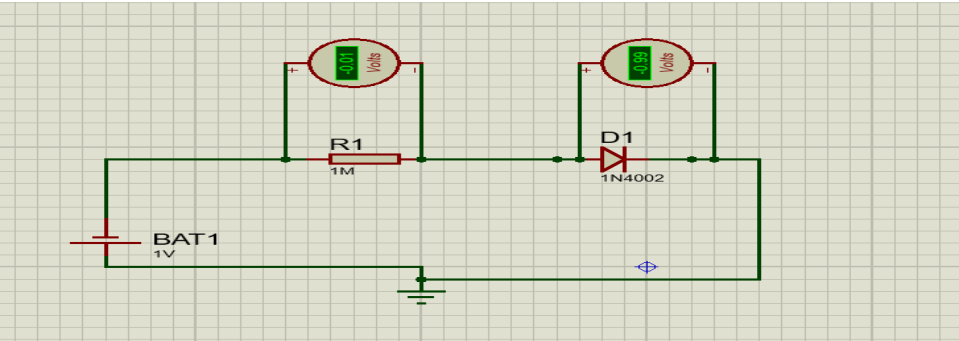


Figure 8: Reversed biased circuit on proteus

**Observation**  
:

**R= 1M**

|                |                    |                      |                    |                    |
|----------------|--------------------|----------------------|--------------------|--------------------|
| V              | -10                | -15                  | -20                | -30                |
| V <sub>D</sub> | -9.99              | -14.9                | -19.8              | -29.7              |
| V <sub>R</sub> | -0.1               | -0.15                | -0.2               | -0.30              |
| I <sub>D</sub> | 1X10 <sup>-7</sup> | 1.5X10 <sup>-7</sup> | 2X10 <sup>-7</sup> | 3X10 <sup>-7</sup> |

**GRAPH:**

