



Higher Technology Institute
10th Of Ramadan City
Biomedical Engineering Department

ELECTRONICS (1)

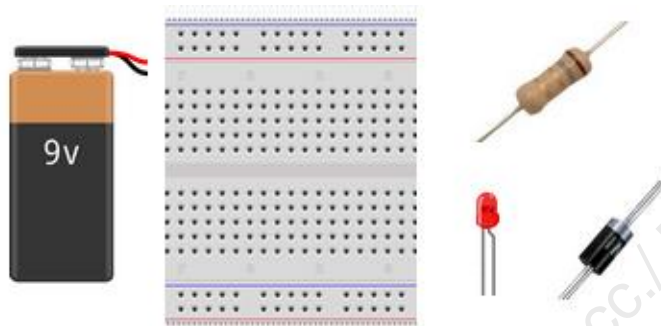
Table of contents:

First Lab: introduction on electric circuit compounds and connection	2
Second Lab: Types and Using Multimeter (Avo).....	4
Third Lab: Using Some Laboratory Devices	7
Fourth Lab: Diode Characteristics	10
Fourth Lab: Zener Characteristics	12

First Lab: introduction on electric circuit compounds and connection

❖ Material required

- 1) breadboard, resistance, battery



- 2) capacitor, led, regulator and diode.

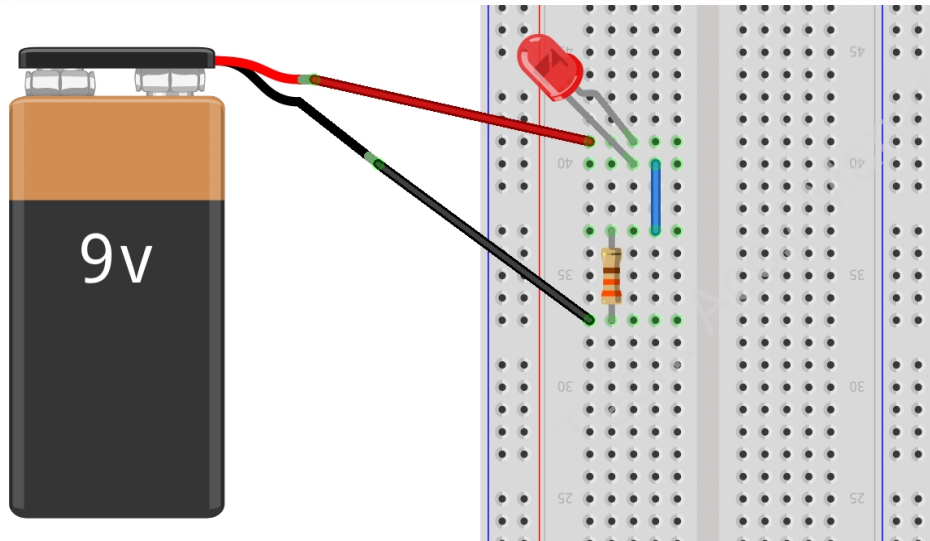
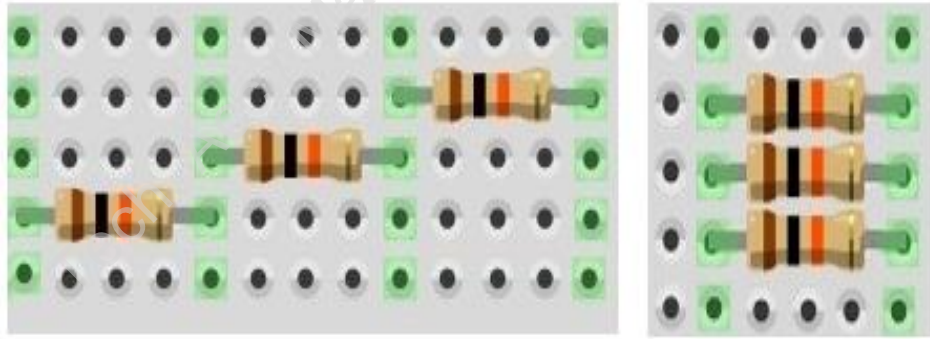


❖ Objectives:

- 1) Identify breadboard, resistance, battery, capacitor, led, regulator and diode.
- 2) Serial and parallel connection.

❖ Procedure:

Explore electric circuit compounds, connection, and application



❖ **Results:**

The student can identify electric circuit compounds and connect circuit.

Second Lab: Types and Using Multimeter (Avo).

❖ Material required

- 1) AVO



❖ Objectives:

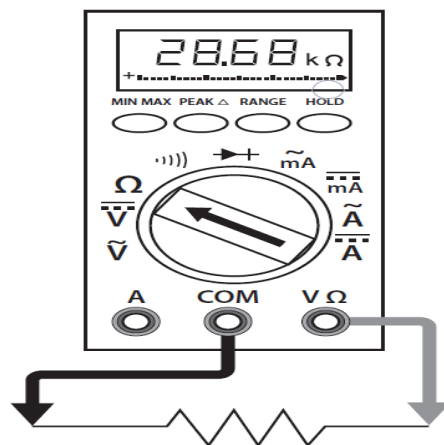
- 1) Learn types of AVO.
- 2) Learn how to use AVO.

❖ Procedure:

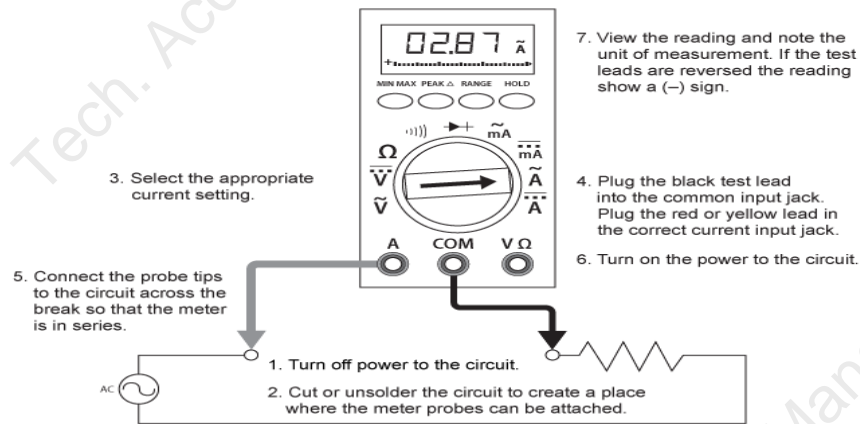


Switch Position Or Symbols	Measurement Functions
\tilde{V}	AC Voltage
\overline{V}	DC Voltage
A	DC Current
Ω	Resistance (Ohms)
 	Continuity Beeper
$\rightarrow +$	Diode Test
OFF	ON/OFF Switch

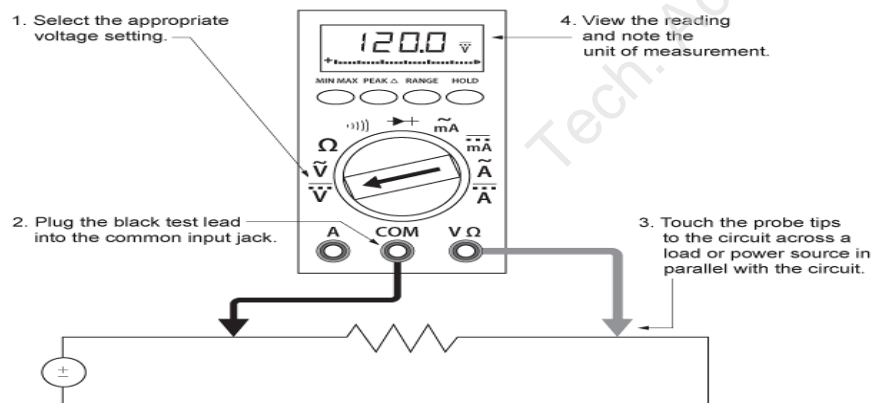
Using AVO as ohmmeter



Using AVO as ammeter



Using AVO as voltmeter



❖ Results:

The student knows Types and Using Multimeter (Avo).

Third Lab: Using Some Laboratory Devices

❖ Material required

1) power supply



2) function generator



3) oscilloscope



❖ **Objectives:**

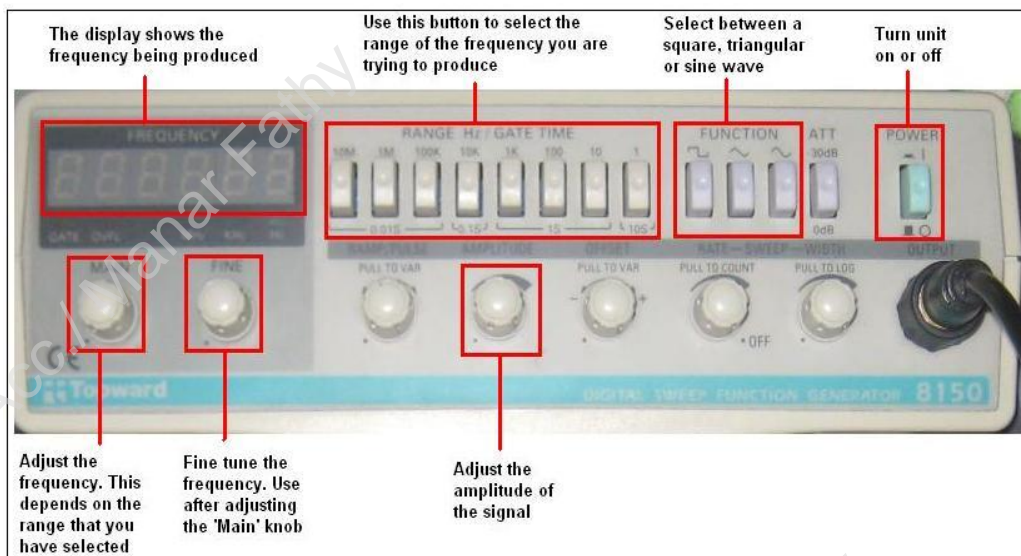
1) Learn how to use Laboratory Devices.

❖ **Procedure:**

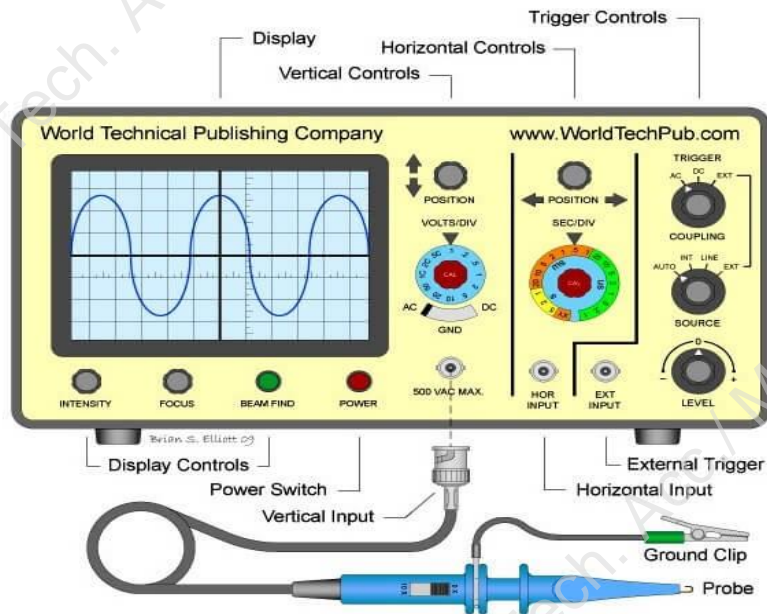
power supply parts and how to use them



function generator parts and how to use them



function oscilloscope parts and how to use them



❖ Results:

The student can will know Laboratory Devices parts and how to use them

Fourth Lab: Diode Characteristics

❖ Material required

1) Diode



2) Resistances 220Ω



3) power supply



4) AVO



❖ Objectives:

1) Draw Diode Characteristics in forward and reverse bias.

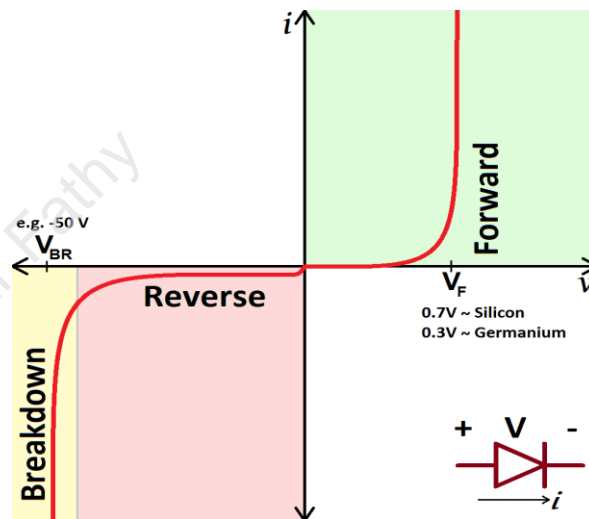
❖ Procedure:

Real Diode Characteristics

Ideally, diodes will block all current flowing the reverse direction, or just act like a short-circuit if current flow is forward. Unfortunately, actual diode behavior isn't quite ideal. Diodes do consume some amount of power when conducting forward current, and they won't block out all reverse current. Real-world diodes are a bit more complicated, and they all have unique characteristics which define how they operate.

Current-Voltage Relationship

The most important diode characteristic is its current-voltage (i-v) relationship. This defines what the current running through a component is, given what voltage is measured across it. Resistors, for example, have a simple, linear i-v relationship...Ohm's Law. The i-v curve of a diode, though, is entirely non-linear. It looks something like this:



❖ Results:

The student learns Draw Diode Characteristics in forward and reverse bias.

Fourth Lab: Zener Characteristics

❖ Material required

1) Zener



2) Resistances 220Ω



3) power supply



4) AVO



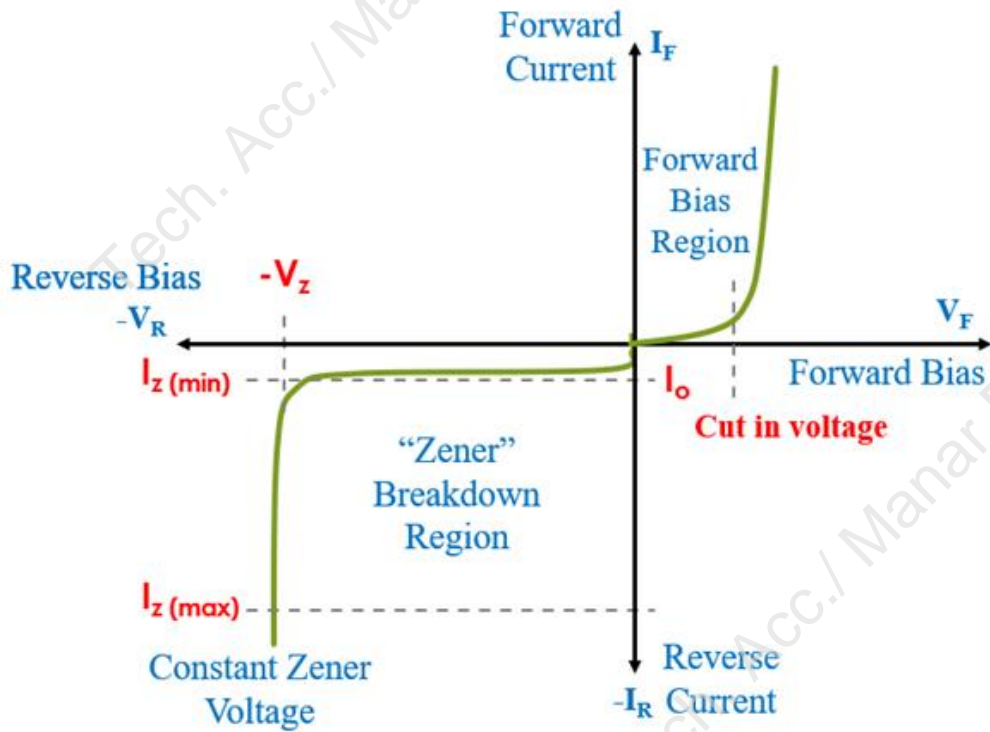
❖ Objectives:

- 2) Draw Zener Characteristics in forward and reverse bias and break down.

❖ Procedure:

A Zener diode is a special purpose p-n junction diode that is designed to operate in the reverse direction. When reverse voltage applied across the Zener diode (anode terminal is negative w.r.t cathode terminal) and the potential reaches the Zener Voltage (knee voltage), the junction breaks down and the current flows in the reverse direction. This effect is known as the Zener Effect. The breakdown voltage of a Zener diode is carefully set by controlling the doping level during manufacture.

The VI characteristic of the Zener diode is shown in the figure below. When the diode is connected in forward bias, this diode work like a normal diode. But when a reverse voltage is applied across the diode. initially a small reverse saturation current I_0 flows across the diode. As the reverse voltage is increased, at a certain value of reverse voltage, the junction will be breakdown and drastically a large reverse current flow through the device. This breakdown is called Zener breakdown. The voltage at which this breakdown occurs is called Zener voltage.



❖ Results:

The student learns Draw Zener Characteristics in forward and reverse bias and break down.