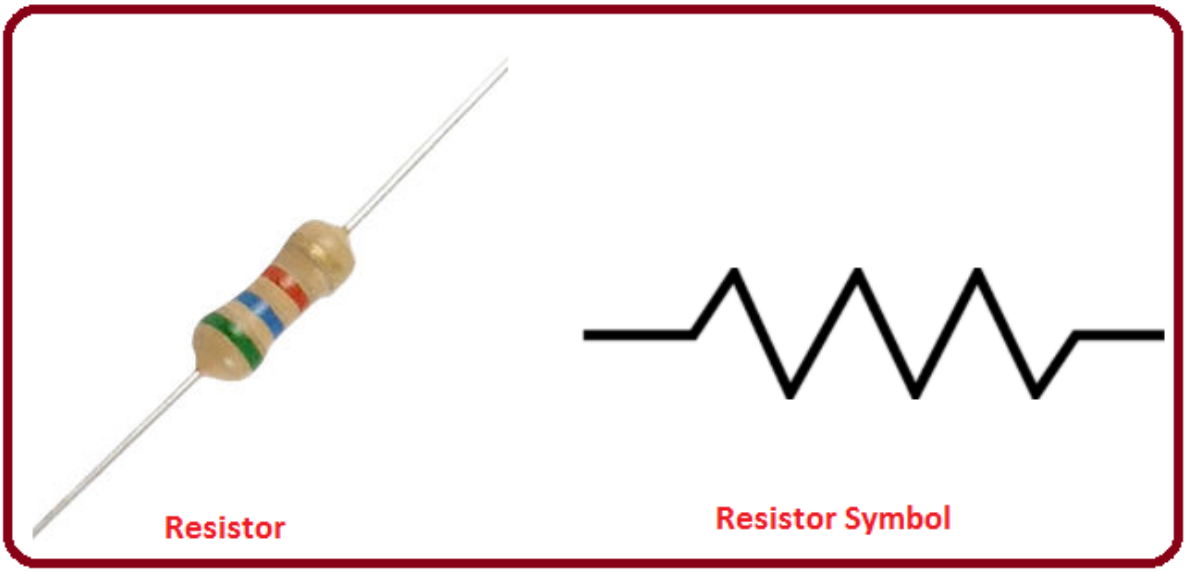
EXPERIMENT -1

AIM- Identification and testing of active and passive elements.

RESISTOR



This is a device whose impedance is simply its resistance to electrical flow. Resistance is the property which describes how easy it is to cause electrons to move in a material when electrical energy is applied. Resistance is measured in units called ohms with symbol "Ω".

1Ω = 1V/A

In some materials, such as most metals it is relatively easy to cause electrons to move. These materials have low resistance and are commonly called conductors.

Many resistors are physically small so writing the value on the package becomes impractical. A standard package marking for resistors includes a set of colored bands on the package.

Color	Digit	Multiplier
Black	0	10^0
Brown	1	10^1
Red	2	10^2
Orange	3	10^3
Yellow	4	10^4
Green	5	10^5
Blue	6	10^6
Violet	7	10^7
Grey	8	10^8
White	9	10^9

Color	Tolerance
Gold	± 5%
Silver	± 10%
No band	± 20%

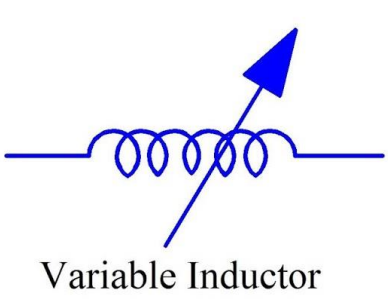
CAPACITOR

Capacitors are electric components that store, filter and regulate electrical energy and current flow and are one of the essential passive components used for storing electrical charges, conducting alternating current (AC) and blocking or separating different voltages levels of direct current.

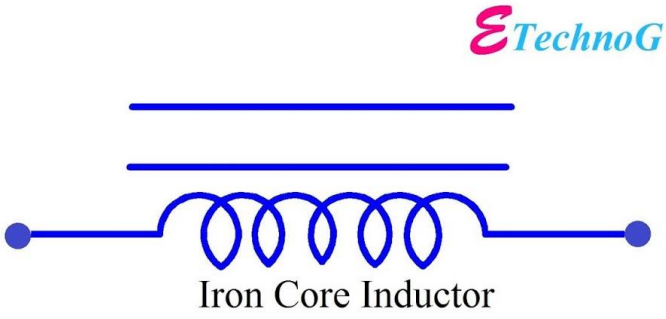
The unit of capacitance is the farad. For 1 farad of capacitance, 1 coulomb of charge is stored on the plates when 1 volt is applied.

1 farad = 1coulomb/1volt

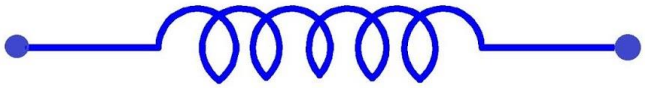
INDUCTORS



Variable Inductor



Iron Core Inductor



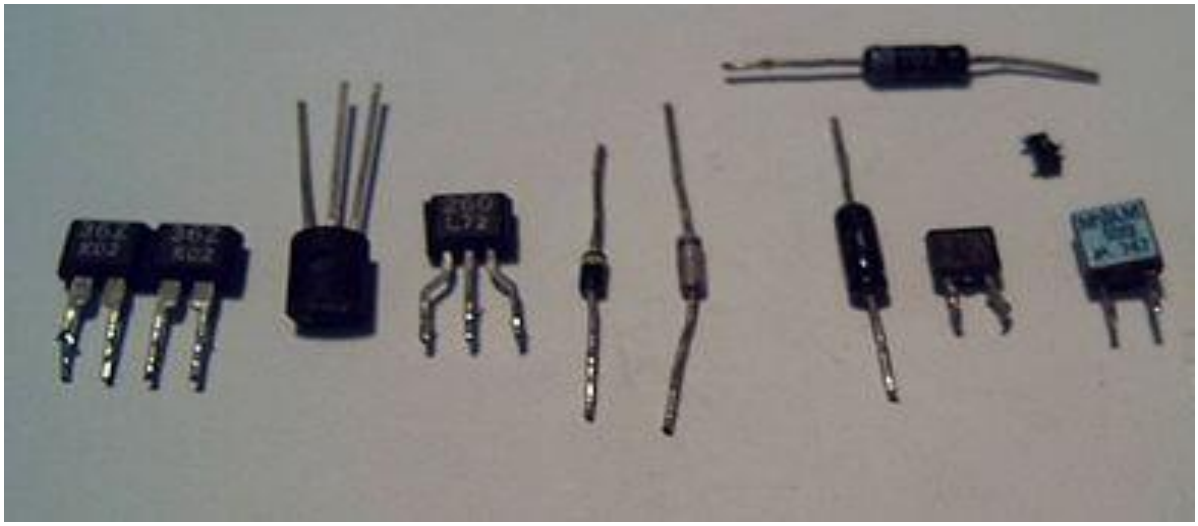
Inductor

Inductors are closely related to capacitors, the rate of current change in an inductor depends on the voltage applied across it, whereas the rate of voltage change in a capacitor depends on the current through it.

$$V=L\ di/dt$$

Where L is called the inductance and is measured in henry and “di/dt” is the change in current over a small period of time.

DIODES



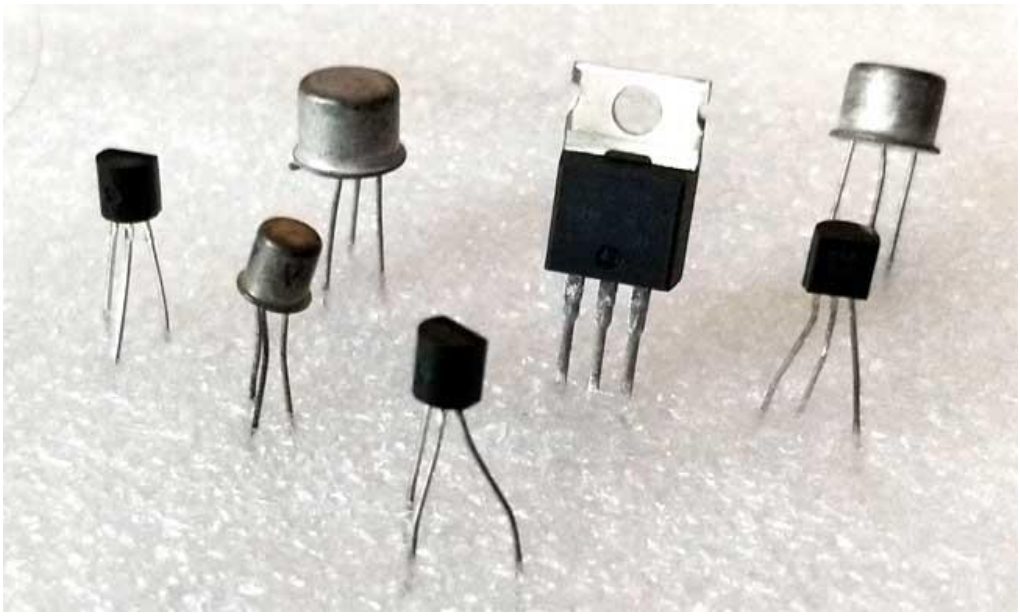
A diode is a dipositive made of a semiconductor material, which has two terminals or electrodes that act like an on-off switch. When the diode is “on”, it acts as a short circuit and passes all current. When it is “off”, it behaves like an open circuit and passes no current. The two terminals are different and are marked as plus and mins. If the polarity of he applied voltage matches that of the diode, then the diode turns “on”.

When the applied voltage polarity is opposite, it twins “off”.

Diode is connected in two ways—

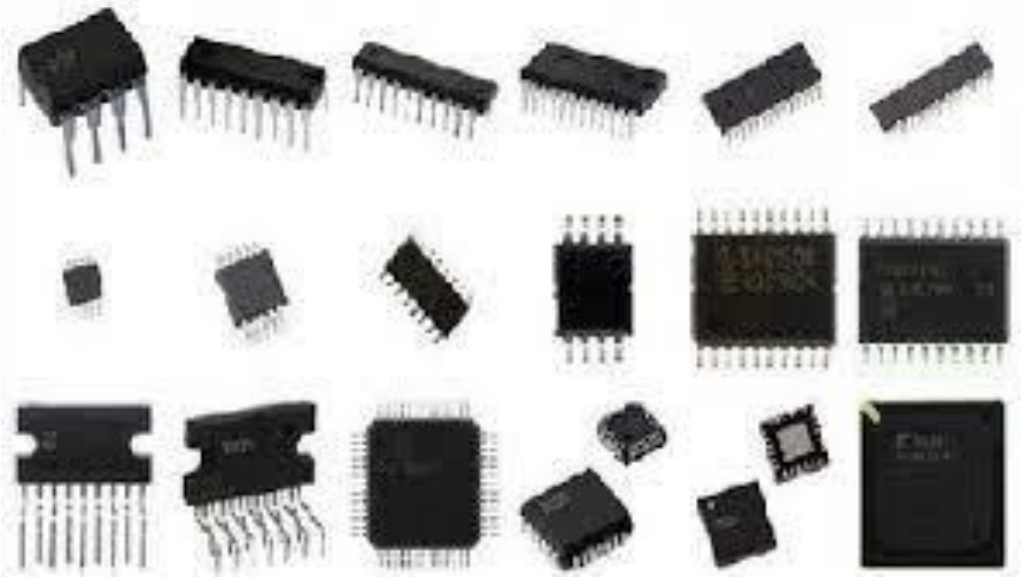
1. Forward Bias
2. Reverse Bias

TRANSISTORS



The transistor is a semiconductor device that can function as a signal amplifier or as a solid state switch. A typical switching circuit using a PNP transistor is shown at the left. In a transistor a very small current input signal flowing emitter-to-base able to control a much longer current which flows from the system power supply through the transistor emitter-to-collector, through the load and back to the power supply.

INTEGRATED CIRCUITS



The concept of IC was first introduced in the year 1958. The invention of integrated circuits which just revolutionized the use of computers. Due to its small dimension , low cost , and very high relatability even the common man is familiar with its applications like smartphones and laptops. The IC’ s also found its way in military applications due to its high relatability and compact size.

Advantage-:

1.Miniature in size

2.Due to small size, the weight of the IC also reduces.

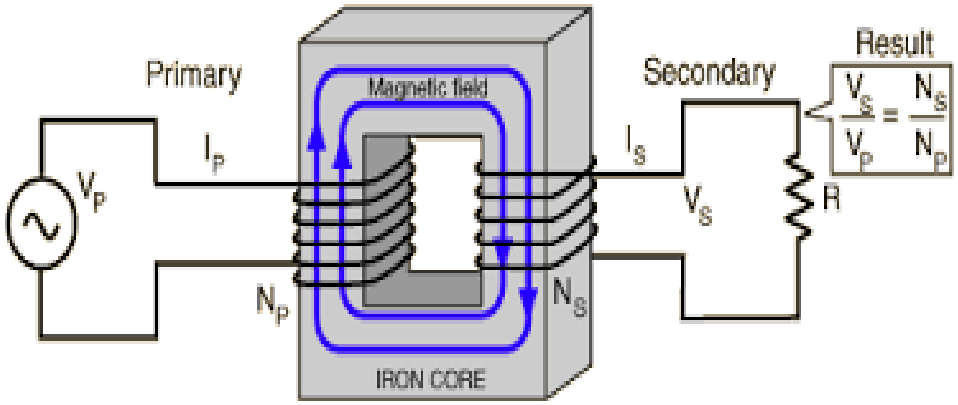
3. The small size cause less power consumption and less power loss.

4.Increased operating speed.

Disadvantage-:

1. The power rating for most of the integrated circuits does not exceed more than 10 watts.
2. High grade PNP assembly is not possible.

TRANSFORMERS



A **transformer** is a passive component that transfers electrical energy from one electrical circuit to another circuit, or multiple circuits. A varying current in any one coil of the transformer produces a varying magnetic flux in the transformer's core, which induces a varying electromotive force across any other coils wound around the same core. Electrical energy can be transferred between separate coils without a metallic (conductive) connection between the two circuits. Faraday's law of induction, discovered in 1831, describes the induced voltage effect in any coil due to a changing magnetic flux encircled by the coil. Transformers are most commonly used for increasing low AC voltages at high current (a step-up transformer) or decreasing high AC voltages at low current (a step-down transformer) in electric power applications, and for coupling the stages of signal-processing circuits. Transformers can also be used for isolation, where the voltage in equals the voltage out, with separate coils not electrically bonded to one another.

MULTIMETERS

A digital multimeter (DMM) is a test tool used to measure two or more electrical values-principally voltage, current and resistance. It is a standard diagnostic tool for technicians in he electrical/electronic industries. Digital multimeters long ago replaced-based analog meters due to their ability to measure with greater accuracy, reliability and increased impedance. Fluke introduced its first digital multimeter in 1977. Digital multimeters combine the testing capabilities of single task meters-the voltmeter (for measuring volts), ammeter and ohmmeter. Often they include a number of additional specialized features or advanced options.