



GANPAT UNIVERSITY



U. V. Patel College of Engineering

To Study about Electronic Components

2CEIT6PE9: Internet of Things

B.Tech Semester: VI

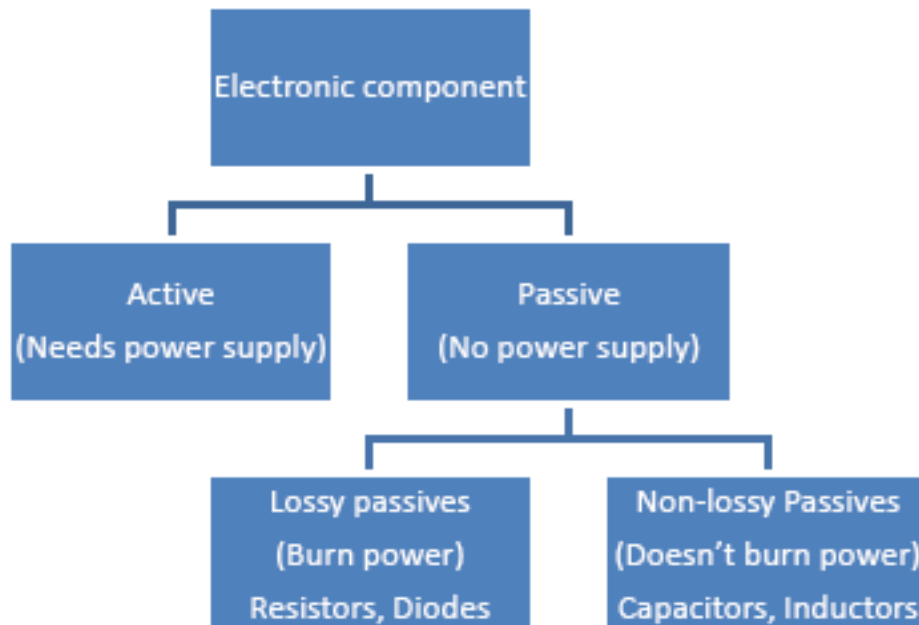
Computer Engineering/ Information Technology

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Aim: To Study about Electronic Components

OBJECTIVES



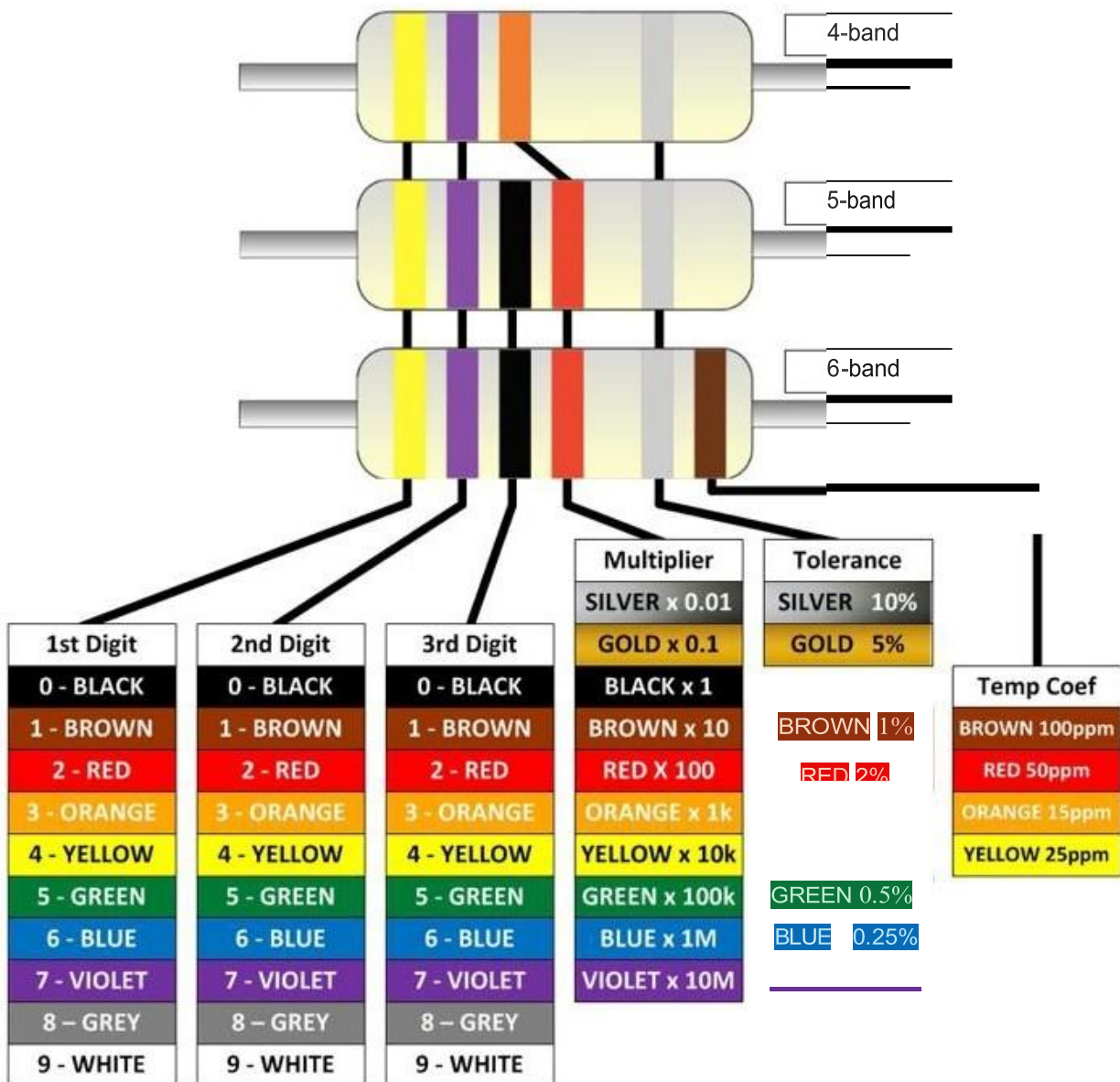
RESISTORS

The resistor is a passive electrical component to create resistance in the flow of electric current. In almost all electrical networks and electronic circuits they can be found. The resistance is measured in ohms. An ohm is the resistance that occurs when a current of one ampere passes through a resistor with a one volt drop across its terminals. The current is proportional to the voltage across the terminal ends. This ratio is represented by Ohm's law:

formula with ohm's law: $R = \frac{V}{I}$

A register is a temporary storage area built into a CPU. Some registers are used internally and cannot be accessed outside the processor, while others are user-accessible. Most modern CPU architectures include both types of registers.

Resistors are used for many purposes. A few examples include delimit electric current, voltage division, heat generation, matching and loading circuits, control gain, and fix time constants. They are commercially available with resistance values over a range of more than nine orders of magnitude. They can be used to as electric brakes to dissipate kinetic energy from trains, or be smaller than a square millimeter for electronics



CAPACITORS

A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric (i.e., insulator). The conductors can be thin films of metal, aluminum foil or disks, etc. The 'nonconducting' dielectric acts to increase the capacitor's charge capacity. A dielectric can be glass, ceramic, plastic film, air, paper, mica, etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, a capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.



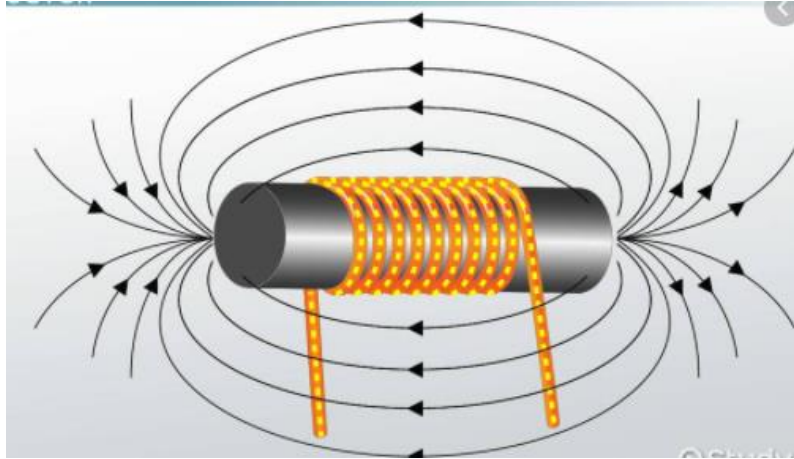
An ideal capacitor is characterized by a single constant value for its capacitance. Capacitance is expressed as the ratio of the electric charge (Q) on each conductor to the potential difference (V) between them. The SI unit of capacitance is the farad (F), which is equal to one coulomb per volt (1 C/V). Typical capacitance values range from about 1 pF (10⁻¹² F) to about 1 mF (10⁻³ F).

The capacitance is greater when there is a narrower separation between conductors and when the conductors have a larger surface area. In practice, the dielectric between the plates passes a small amount of leakage current and also has an electric field strength limit, known as the breakdown voltage. The conductors and leads introduce an undesired inductance and resistance.

INDUCTORS

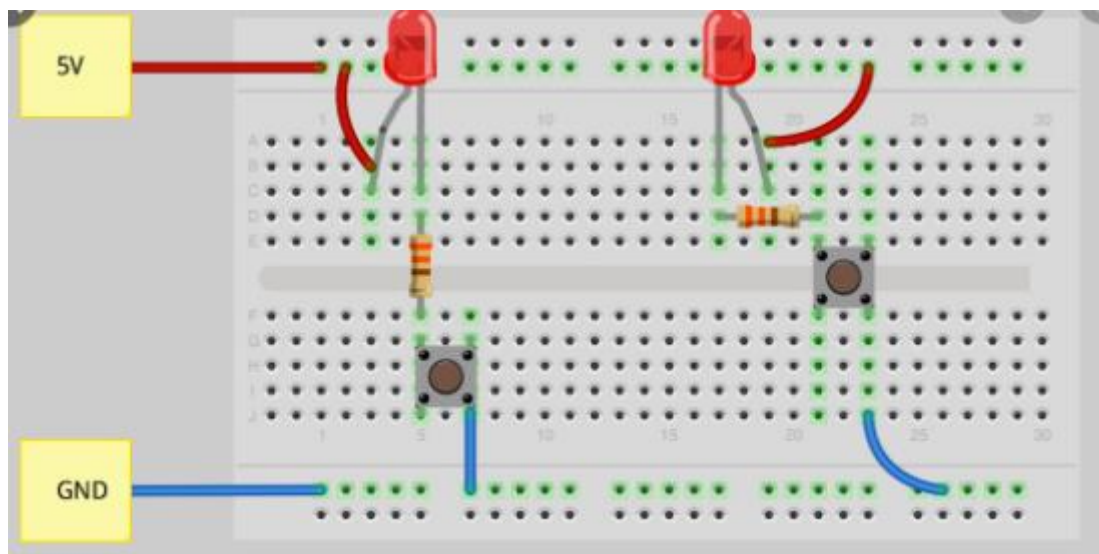


An inductor, also called a coil, choke, or reactor, is a passive two-terminal electrical component that stores energy in a magnetic field when electric current flows through it. An inductor typically consists of an insulated wire wound into a coil around a core.



When the current flowing through an inductor changes, the time-varying magnetic field induces an electromotive force (e.m.f.) (voltage) in the conductor, described by Faraday's law of induction. According to Lenz's law, the induced voltage has a polarity (direction) which opposes the change in current that created it. As a result, inductors oppose any changes in current through them.

BREADBOARD



A thin plastic board used to hold electronic components (transistors, resistors, chips, etc.) that are wired together. Used to develop prototypes of electronic circuits, breadboards can be reused for future jobs. They can be used to create one-of-a-kind systems but rarely become commercial products. See printed circuit board.

The breadboard contains spring clip contacts typically arranged in matrices with certain blocks of clips already wired together. The components and jump wires (assorted wire lengths with pins at both ends) are plugged into the clips to create the circuit patterns. The boards also typically include metal strips along the side that are used for common power rails and signal buses.

FUSES

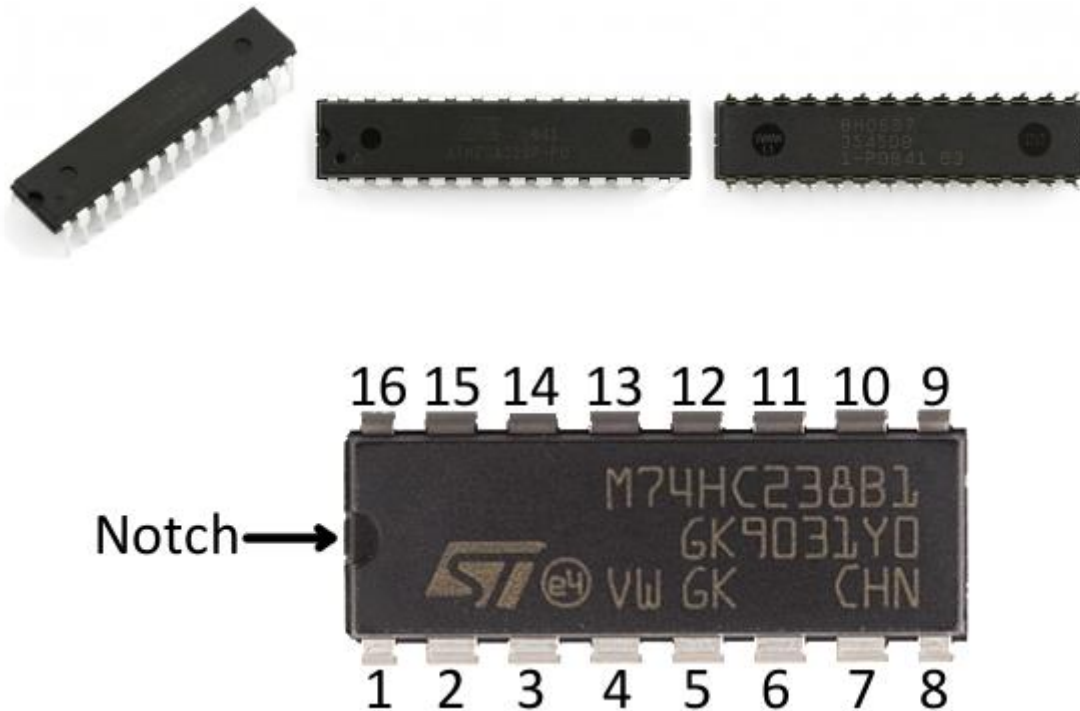


Fuse is an electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby stopping or interrupting the current. It is a sacrificial device; once a fuse has operated it is an open circuit, and must be replaced or rewired, depending on its type.

Fuses have been used as essential safety devices from the early days of electrical engineering. Today there are thousands of different fuse designs which have specific current and voltage ratings, breaking capacity, and response times, depending on the application. The time and current operating characteristics of fuses are chosen to provide adequate protection without needless interruption. Wiring regulations usually define a maximum fuse current rating for particular circuits. Short circuits, overloading, mismatched loads, or device failure are the prime or some of the reasons for fuse operation. When a damaged live wire makes contact with a metal case that is connected to ground, a short circuit will form and the fuse will blow.

INTEGRATED CIRCUITS

Integrated circuit (IC), also called microelectronic circuit, microchip, or chip, an assembly of electronic components, fabricated as a single unit, in which miniaturized active devices (e.g., transistors and diodes) and passive devices (e.g., capacitors and resistors) and their interconnections are built up on a thin substrate of semiconductor material (typically silicon). The resulting circuit is thus a small monolithic “chip,” which may be as small as a few square centimetres or only a few square millimetres. The individual circuit components are generally microscopic in size



RELAYS

Relays are electric switches that use electromagnetism to convert small electrical stimuli into larger currents.

These conversions occur when electrical inputs activate electromagnets to either form or break existing circuits.

By leveraging weak inputs to power stronger currents, relays effectively act as either a switch or an amplifier for the electric circuit, depending on the desired application.

Relays are highly versatile components that are just as effective in complex circuits as in simple ones.

They can be used in the place of other forms of switches, or they can be specifically designed based on factors such as required amperage.

Relays differ in their size, capacity, and corresponding uses. However, although they may differ in these respects, all relays function in essentially the same way: one circuit is used to power another.

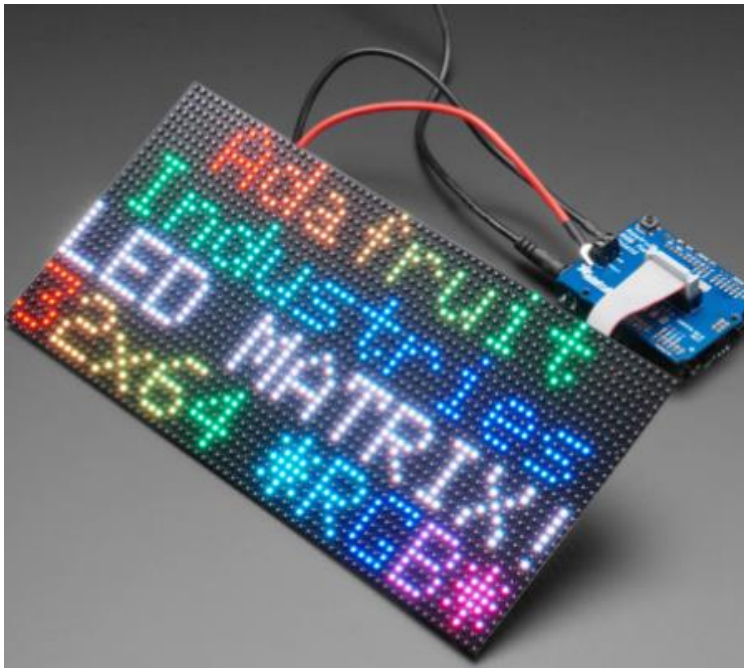


BATTERIES



In electricity, a battery is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy. Batteries are also pretty easy to identify, and are well marked with their specification.

LED DISPLAY



LED Display (light-emitting diode display) is a screen display technology that uses a panel of LEDs as the light source. Currently, a large number of electronic devices, both small and large, use LED display as a screen and as an interaction medium between the user and the system. Modern electronic devices such as mobile phones, TVs, tablets, computer monitors, laptops screens, etc., use a LED display to display their output.

LED Display is one of the main screen displays that are being commercially used. The biggest advantage of the LED display is its efficient and low-energy consumption, which is especially needed for handhelds and chargeable devices such as mobile phones and tablets. An LED display consists of a number of LED panels that, in turn, consist of several LEDs. LEDs have numerous advantages over other light-emitting sources that can be used alternatively. Aside from being power efficient, LEDs produce more brilliance and greater light intensity. LED Display is different from the vacuum fluorescent display used in some consumer electronics such as car stereos, videocassette recorders, etc., and, hence, these two should not be confused with each other.

SWITCHES

A switch is a device which is designed to interrupt the current flow in a circuit, in other words, it can make or break an electrical circuit. Every electrical and electronics application uses at least one switch to perform ON and OFF operation of the device.

So the switches are the part of a control system and without it, control operation cannot be achieved. A switch can perform two functions, namely fully ON (by closing its contacts) or fully OFF (by opening its contacts).

When the contacts of a switch are closed, the switch creates the closed path for current flow and hence load consumes the power from source. When the contacts of a switch are open, no power will be consumed by the load as shown in below figure.

