

Palakonda,

13/12/2021.

To

The Principal,

Govt. Degree college-Palakonda.


Srikakulam District.


Respected sir,

I K Srinivasarao lecturer in PHYSICS, submits that we would like to conduct a two months duration certificate course on 'Electrical Components' for IInd and IVth semester students.

Hence I humbly request you to accord permission to initiate the certificate course in our Department of Physics

Thanking you sir


Yours Faithfully


PRINCIPAL
GOVT. DEGREE COLLEGE
PALAKONDA
Parvathipuram Manyam Dist.

1. 


Circular



Date: 14/12/21


The Department of physics initiate a certificate course on Electrical Components during Academic year 2021-2022. The course is for about 2-months. Interested Candidates can join this course.

After completion of this course they will given a Certificate of their proficiency in their proficiency in the 'Electrical Components'

Hence interested Candidates are advised to meet K Srinivasa Rao in this regard the Registration fee for each candidate is 50 Rupees.

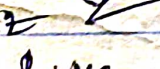

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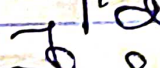
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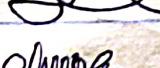
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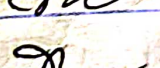
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The first step is to understand the problem.

All are equal and free in the eyes of the law.

The second step is to identify the cause of the problem.

Registrations

Reg. No	Name of the Student	years group	Address of the College.	
CEC 2021001	Abotula Sandhyarani	III mpc	GDC palakonda	P
CEC 2021002	Allu Rajeev	II mpc	GDC palakonda	P
CEC 2021003	Allubona Ramya	III mpc	GDC palakonda	P
CEC 2021004	Botta Rajkumar	III mpc	GDC palakonda	P
CEC 2021005	Chintada Hemalata	III mpc	GDC palakonda	P
CEC 2021006	Chokkara Damayanthi	II mpc	GDC palakonda	P
CEC 2021007	Gondela Sandhyarani	III mpc	GDC palakonda	P
CEC 2021008	Jampa Rajasetha	III mpc	GDC palakonda	P
CEC 2021009	Majji Syamala	III mpc	GDC palakonda	P
CEC 2021010	Majji Himaja	III mpc	GDC palakonda	P
CEC 2021011	Mamidi Dilip	III mpc	GDC palakonda	P
CEC 2021012	Mantina Parvathi	III mpc	GDC palakonda	P
CEC 2021013	Nagalla Simha Chalan	III mpc	GDC palakonda	P
CEC 2021014	Nai gopala Sandhyarani	III mpc	GDC palakonda	P
CEC 2021015	Dappala Lavanya	II mpc	GDC palakonda	P
CEC 2021016	Utlapu Rajeswari	III mpc	GDC palakonda	P
CEC 2021017	Vavika Palli Triveni	IV mpc	GDC palakonda	P
CEC 2021018	Sirpurapu Neelima	III mpc	GDC palakonda	P
CEC 2021019	Sodai Suneetha	II mpc	GDC palakonda	P
CEC 2021020	Vavilapalli Pradeep	III mpc	GDC palakonda	P
CEC 2021021	D. Bhavani	II mpc	GDC palakonda	P
CEC 2021022	B. Rama Krishna	II mpc	GDC palakonda	P
CEC 2021023	K. Geetha ^{Gowri Sankar} Geetha	II mpc	GDC palakonda	P
CEC 2021024	V. Anantha Rao	II mpc	GDC palakonda	P
CEC 2021025	P. Harika	II mpc	GDC palakonda	P
CEC 2021026	R. Kumari	II mpc	GDC palakonda	P
CEC 2021027	S. Narayana Reddy	II mpc	GDC palakonda	P
CEC 2021028	M. Swapna Kumar	II mpc	GDC palakonda	P
CEC 2021029	A. Lokesh	II mpc	GDC palakonda	P
CEC 2021030	R. Pavan Bheskar	II mpc	GDC palakonda	P
CEC 2021030	A. Mamatha	II mpc	GDC palakonda	P

Marks and Issue of Certificate

30-12-2021

S.N	Reg. NO	Name of the student	Marks Obtained	Certificate Received Sign
1.	CEC2021001	Abotuba Sandhyarani	24	A. Sandhya Rani
2.	CEC2021002	Allu Rajiv	21	A. Rajiv
3.	CEC2021003	Allubojina Ramya	24	A. Ramya
4.	CEC2021004	Botta Raj Kumar	23	A. Raju Kumar
5.	CEC2021005	Chintada Hemalatha	24	C. Hemalatha
6.	CEC2021006	Chokkara Dharmajanthi	25	Ch. Damajanthi
7.	CEC2021007	Gondela Sandhyarani	24	G. Sandhya Rani
8.	CEC2021008	Jampa Rajasekhar	22	J. Rajasekhar
9.	CEC2021009	Majji Syamala	20	M. Syamala
10.	CEC2021010	Majji Himaja	21	M. Himaja
11.	CEC2021011	Mamidi Dileep	20	M. Dileep
12.	CEC2021012	Martina Parvathi	21	M. Parvathi
13.	CEC2021013	Nagalla Simbachalam	22	N. Simbachalam
14.	CEC2021014	Naigopalka Sandhyarani	22	N. Sandhyarani
15.	CEC2021015	Pappala Lavanya	24	P. Lavanya
16.	CEC2021016	Utlapu Rajeswari	24	U. Rajeswari
17.	CEC2021017	Vavilapalli Triveni	25	V. Triveni
18.	CEC2021018	Siripurupu Neelima	25	S. Neelima
19.	CEC2021019	Sodai Suneetha	25	S. Suneetha
20.	CEC2021020	Vavilapalli Pradeep	22	V. Pradeep
21.	CEC2021021	D. Bhavani	23	D. Bhavani
22.	CEC2021022	B. Ramakrishna	22	B. Ramakrishna
23.	CEC2021023	K. Gowri Sankar	24	K. Gowri Sankar
24.	CEC2021024	V. Anantha Rao	22	V. Anantha Rao
25.	CEC2021025	P. Harika	21	P. Harika
26.	CEC2021026	R. Kumari	20	R. Kumari
27.	CEC2021027	S. Narayana Rao	20	S. Narayana Rao
28.	CEC2021028	A. Lokesh	22	A. Lokesh
29.	CEC2021029	R. Mahesh	23	R. Mahesh
30.	CEC2021030	A. Mamatha	23	A. Mamatha





Government Degree College Palakonda

CERTIFICATE

This is to certify that A MAMATHA has successfully completed two months training on Electrical Components from 14th Dec 2021 to 16th Feb 2022.

Signature of the Principal

Principal

Govt Degree College
Palakonda-532 440

Signature of HOD

TO AC
GDC Palakonda
Parvathipuram, Vijayam DE



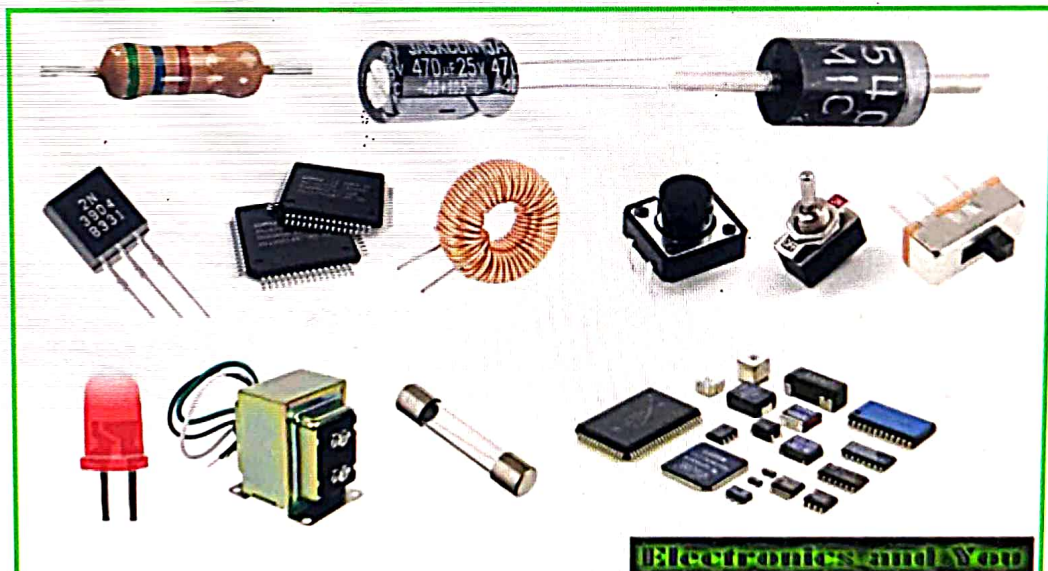
Basic Electronic Components – Types, Functions, Symbols

BY SANTOSH DAS | LAST UPDATED ON DECEMBER 12, 2023

List of Types of Basic Electronic Components, Functions, Symbols.

Basic Electronic Components are electronic devices or parts usually packaged in a discrete form with two or more connecting leads or metallic pads. These devices are intended to be connected together, usually by soldering to a [Printed Circuit Board \(PCB\)](#), to create an [electronic circuit](#) with a particular function (for example an amplifier, radio receiver, oscillator, wireless).

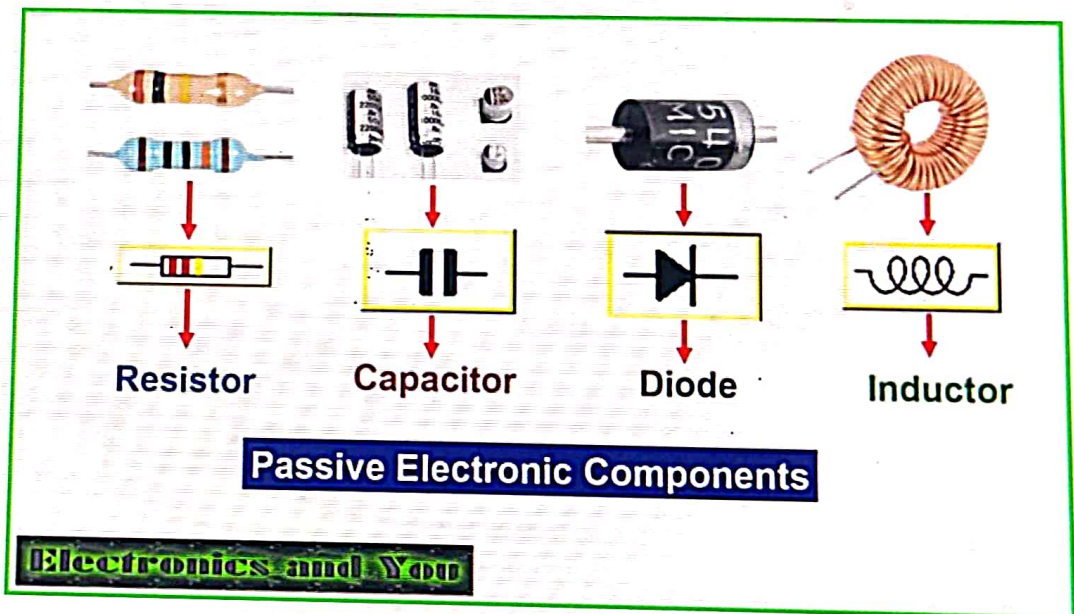
Some of the Basic Electronic Components are: resistor, capacitor, transistor, diode, operational amplifier, resistor array, logic gate etc.



1. Passive Components

These components are those that do not have gain or directionality. They are also called Electrical elements or electrical components.

Example: Resistors, Capacitors, Diodes, Inductors.



2. Active Components

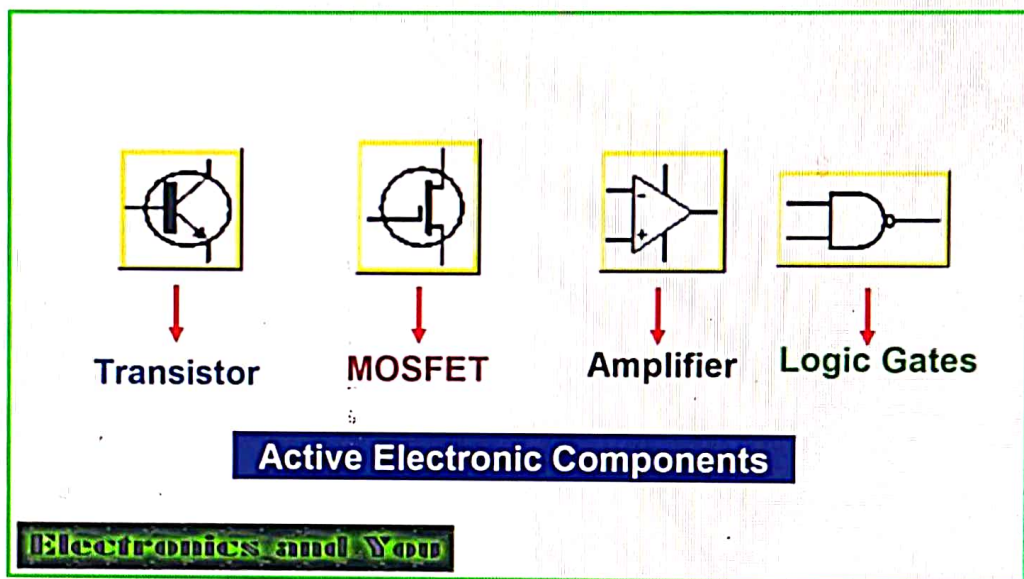
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Example: Transistors, Integrated Circuits or ICs, Logic Gates.

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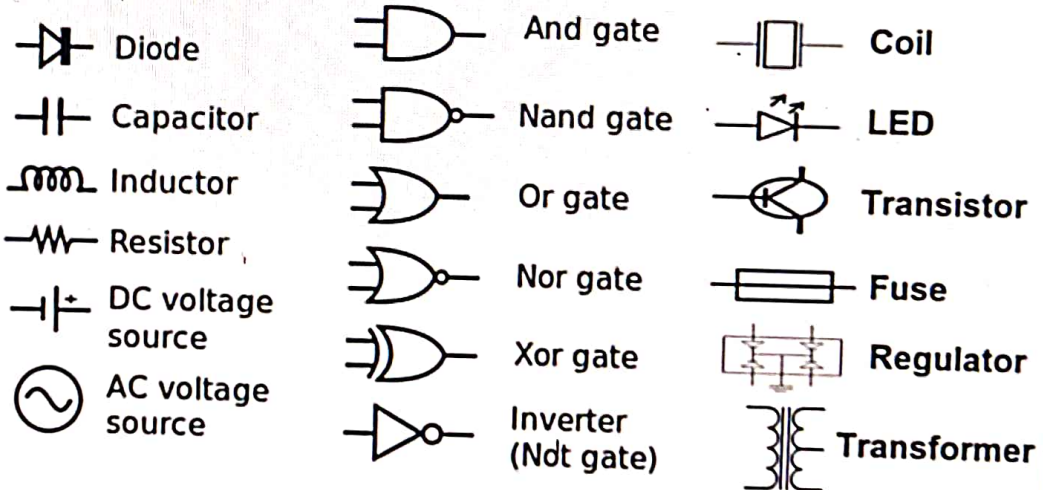


Active Components	Passive Components
Light Emitting Diode (LED)	Resistor
Transistor	Capacitor
Integrated Circuit (IC)	Inductor
Battery	Circuit Breaker
Relay (<i>Can also be used as Passive</i>)	Fuse
Diode	Switch
Solar Cell	Transformer
Current Sensor	Electrical Wires & Power Cables

Function of Basic Electronic Components

1. **Terminals and Connectors:** Components to make electrical connection.
2. **Resistors:** Components used to resist current.
3. **Switches:** Components that may be made to either conduct (*closed*) or not (*open*).
4. **Capacitors:** Components that store **electrical charge** in an electrical field.
5. **Magnetic or Inductive Components:** These are Electrical components that use magnetism.
6. **Network Components:** Components that use more than 1 type of Passive Component.
7. **Piezoelectric devices, crystals, resonators:** Passive components that use piezoelectric. effect.
8. **Semiconductors:** Electronic control parts with no moving parts.
9. **Diodes:** Components that conduct electricity in only one direction.
10. **Transistors:** A semiconductor device capable of amplification.
11. **Integrated Circuits or ICs:** A microelectronic computer circuit incorporated into a chip or semiconductor; a whole system rather than a single component.

Circuit Symbols of Electronic Components





Electronic Components

Read



Electronic Components play an important role in understanding the workings of electrical circuits. The application of electronic science is widely growing due to the large variety of electronic components. Most of the success in the electronic field over electricity is due to various characteristics of components, like nonlinear performance, integration, cost, and size of the electronic components.

If you observe any electronic circuit, there are only five varieties of Electronic Components. The circuit may appear complicated because several different components, but each type belongs to any of these five types. Electronic Components are classified into two groups Passive Components and active components. In this article, we will learn about the electronic components and applications of electronic components.

In this article, We will be going Through what is an Electronic Component, we will go through Types of Electronic Components which are classified as Passive and Active elements, and then we will look at their respective Symbols. At last, we will through its Functions, Advantages, and Disadvantages with its Applications.

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What is an Electronic Component?

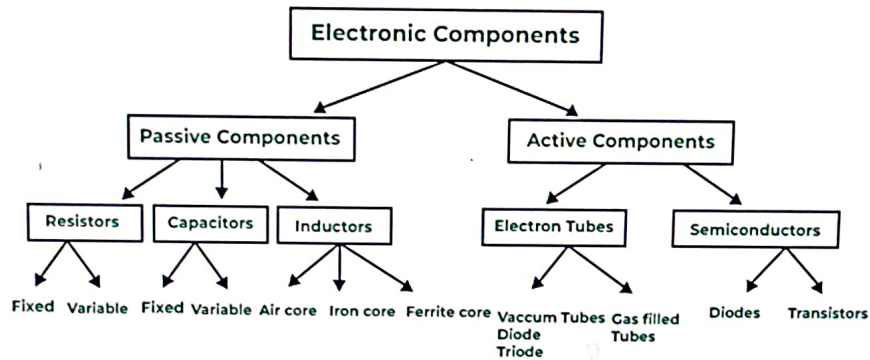
Electronic components are the elements of the circuit which help in its functioning the electrical circuit. Electronic components are the basic building blocks of an electronic circuit any electronic system or any electronic device. They can control the flow of electrons in an electronic system or electronic circuit. Electronic components are very small. So that they are easy to carry them from one place to another place. The cost of electronic components is also low. Electronic components consist of two or more terminals. When a group of electronic components is connected together in an electronic board such as a printed circuit board (PCB), a useful electronic circuit is formed. Each electronic component in a circuit performs a particular task. They can be classified into two types Active and Passive Components.

Types of Electronic Components

An electrical circuit is an interconnection of Electronic Components. Based on their capability to generate energy these elements are classified into active or passive electronic Components.

Electronic Components are classified into two groups:

- Passive Components
- Active components



Electronic Components

Passive Components

Passive components are electronic devices that don't need an external power source to operate actively. They mainly resist, store, or control the flow of electric current or voltage in a circuit without actively amplifying or generating signals. These Passive components belongs to inactive functions of components, these Passive components do not have capacity to amplify the voltage or to rectify the supply. Without these components assembly of electronic circuit is not possible.

- Resistors, Capacitors, Inductors are called as passive components.
- Other Passive components include transformers, diodes, thermistors, varactors, transducers, and many other common components. These components are available as through-hole and components, and many are available in common packages with standard land patterns.

Resistors

- Resistors control the flow of current by offering resistance. They are used to limit current, divide voltage, and set biasing conditions in electronic circuits.
- Resistors are again classified into fixed type and variable type components.
- A resistor is a passive two-terminal electrical device that resists the flow of current. It is probably the simplest element in an electronic circuit. It is also one of the most common components as resistance is an inherent element of nearly all electronic circuits. They are usually color-coded.

Resistors have plenty of applications, but the three most common ones are managing current flow, dividing voltage, and

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- Resistors have plenty of applications, but the three most common ones are managing current flow, dividing voltage, and resistor-capacitor networks.

Capacitors

- Capacitors store and release electrical energy. They are commonly used for decoupling, filtering, and energy storage in electronic circuits.
- Capacitors are again classified into fixed type and variable type components.
- The capacitor continues to hold its charge even if you disconnect it from the source. The moment you connect it to a load, the stored energy will flow from the capacitor to the load.
- Capacitance is the amount of energy stored in a capacitor. The higher the capacitance, the more energy it can store. You can increase the capacitance by moving the plates closer to each other or increasing their size.

Inductors

- Inductors store and release magnetic energy. They are used for applications such as filtering, energy storage, and impedance matching
- An inductor, also known as a reactor, is a passive component of a circuit having two terminals. This device stores energy in its magnetic field, returning it to the circuit whenever required.
- Whenever the current passes through a wire, it creates a magnetic field. However, the unique shape of the inductor leads to the creation of a much stronger magnetic field. This powerful magnetic field, in turn, resists alternating current, but it lets direct current flow through it. This magnetic field also stores energy.

Active Components

Active components are electronic devices that need an external power source to work. They actively control and manipulate the flow of electric current in a circuit. These components can amplify, switch, or generate electrical signals. These components are capable of performing active functions like amplification, rectification and switching they are called as active components. They are classified into two groups

- The different types of active components include:
- Diode, Transistor, Integrated circuit are called as active components.
- Electron tubes like vacuum tubes like Diodes, triode.
- Semiconductor devices like diodes, LED, Transistor etc.

Diodes

- Diodes allow current to flow in one direction while blocking it in the opposite direction. They are used for rectification, signal modulation, and switching applications.
- Diode blocks electric current when it is Reverse biased.
- Diode allows electric current when it is Forward biased.
- Examples include transistors, integrated circuits (ICs), and sensors that require power to perform their functions.

Transistors

- Transistor is an electronic component that amplifies electrical signals.
- They are commonly used in amplifiers, digital logic circuits, and voltage regulators.
- Transistors function as both, switches and amplifiers in most electronic circuits. Designers often use a transistor as a switch because unlike a simple switch, it can turn a small current into a much larger one.
- Transistors are often hooked up with logic gates to build a unique piece of an arrangement called a flip-flop.
- A Transistor can store a zero when it's off or a one when it's on, which is the working principle of computers.

Integrated Circuits (ICs)

- Transistors are often hooked up with logic gates to build a unique piece of an arrangement called a flip-flop.
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Integrated Circuits (ICs)

- An integrated circuit (IC) is a small semiconductor chip on which millions of electronic components such as resistors, capacitors and transistors are fabricated.
- The integrated circuit function is mainly to offer high-level functions and tasks like amplification, complex digital calculations i.e. microprocessors, and signal processing.
- The sole purpose of ICs is to increase the efficiency of the electronic devices, while reducing their size and manufacturing cost.

Working of Electronic Components

Electronic Components play an key role in working of electrical circuits. Every component in electronic components has specific function in electrical circuit. Passive components in electronic components do not require an external power source to operate actively. They mainly resist, store, or control the flow of electric current or voltage in a circuit without actively amplifying or generating signals.

Resistor

- Working of Resistor include, It works on the principle of electrical resistance. It works mainly on resistance of an electrical circuit. Resistance has a property to opposes the flow of electric current.
- Resistor working principle can be explained using Ohm's Law, which states that the current (I) flowing through a conductor is directly proportional to the voltage (V) across it and it is inversely proportional to its resistance (R). Mathematically, Ohm's Law is represented as follows : $V = I * R$.
- A resistor is an electronic component that limits the flow of electric current in a circuit. It is used to control the amount of current flowing through a circuit and to create voltage drops.
- A resistor absorbs energy when electrical current flows through it. The energy absorbed by the resistor is usually discharged in the form of heat.

Capacitor

- Capacitor is one of the basic components of the electric circuit, which can store electric charge in the form of electric potential energy. It consists of two conducting surfaces such as a plate or sphere, and some dielectric substance (air, glass, plastic, etc.) between them.
- A capacitor is an electronic component that stores and releases electrical energy. It consists of two conductive plates separated by an insulating material. It can store charge and release it when needed, acting as a temporary energy storage device.
- Capacitors store the electrical energy and release in the form of electrical field.

Inductors

- Inductance is an electrical circuit attribute that opposes any change in current in the circuit. Electrical circuits have an intrinsic feature called inductance.
- The inductor supplies energy to the circuit to keep current flowing during the "off" switching periods and enables topographies where the output voltage is higher than the input voltage.
- Inductors store the electrical energy and release in the form of magnetic field.

Transformer

- Working of Transformer include ,The fundamental principle of how the transformer functions are mutual induction between the two coils or Faraday's Law of Electromagnetic Induction.
- When a positive voltage is applied to base-emitter junction, it allows the flow of electrons from emitter to the base. The flow of electrons from the emitter to the base creates a path for majority charge carriers to flow from collector to the emitter.
- This controlled flow of holes from the collector to emitter constitutes the output current and it can be amplified based on current flowing into the base.
- Transformers are used to change the voltage in alternating current (AC) circuits by using electromagnetic induction.

Diodes

- Working of diode include, In the N-type region, the majority of charge carriers are electrons and the minority of charge carriers are holes. Whereas, In the P-type region, the majority of charge carriers are holes and the minority of charge carriers are electrons. Because of the concentration difference, the diffusion takes place in majority charge carriers and they recombine with the minority charge carriers which are then collected near the junction and this region is known as the Depletion Region.
- Diodes allow the flow of electric current in one direction only. They consist of a semiconductor material with a P-N junction.







Integrated Circuit

- Integrated circuits are a combination of diodes, microprocessors, and transistors in a minimized form on a wafer made of silicon. Each of these components has a specific function.
- These can perform calculations and multiple tasks when combined with each other Integrated circuits is used to that combine multiple electronic components such as transistors, resistors, capacitors, into a single chip.
- An IC can be used as an amplifier, oscillator, timer, counter, logic gate, computer memory, microcontroller or microprocessor.

Transistors

- The working of a transistor is based on the control of current flow between the emitter and collector by the current flowing into the base.
- When a positive voltage is applied to base-emitter junction. it allows the flow of electrons from emitter to the base.
- The flow of electrons from the emitter to the base creates a path for majority charge carriers to flow from collector to the emitter.
- This controlled flow of holes from the collector to emitter constitutes the output current and it can be amplified based on current flowing into the base.
- Transistors act as amplifiers or switches, work by controlling the flow of current between two terminals based on the third terminal's input voltage.

Circuit Symbols of Electronic Component

Electronic Components	Circuit Symbol
Resistor	
Capacitor	
Inductor	
Transformer	
Transistor	
Diode	



Function of Electronic Components

Functions of each electrical component are described below:

- Resistors
- Electric Switches
- Capacitors
- Magnetic or Inductive Components
- Diodes
- Transistors
- Integrated Circuits or ICs

- **Resistors** : Function of Resistor is to limit and control the flow of current in circuit, resistors are mainly used to resist current. Resistor functions based on Ohm's law. According to Ohm's law, voltage applied across a resistor's terminal has a direct proportion to the electrical current, that flows via it. Resistors have variable or fixed resistances. Resistor functions when there is a need to control current flow at a desired level.
- **Electric Switches** : Electric Switch is a device that is used to break or complete an electric circuit. It helps in opening and closing the electrical circuit. When the electric switch is in 'ON' position the circuit is complete and allows the current to pass through. When the electric switch is in 'OFF' position it breaks the circuit and does not allow the current to flow in the circuit. Components that may be made to either conduct (closed) or not (open).
- **Capacitors** : The basic function of the capacitor is to store energy. Its common usage includes energy storage, voltage spike protection, and signal filtering. It is a electronic component that store electrical charge in an electrical field.
- **Magnetic or Inductive Components** : These electrical component functions according to the Inductance law by Faraday. According to this law, a current passes into its coil and from its left to right. In this case, the coil produces a magnetic field. These are Electrical components that use magnetism. An inductor resists changes in a current.
- **Diodes** : Diodes are widely used in modern-day circuits to secure circuits from over-voltage and they are also used to change AC current to DC current. Diodes are electronic components that conduct electricity in only one direction.
- **Transistors** : The function of transistors is ,in electric circuits or electrical systems it usually functions as an amplifier or a switching device. A transistor can build complex electrical systems. It is a semiconductor device capable of amplification.
- **Integrated Circuits or ICs** : Function of an integrated circuit is ,it can act as a microprocessor, oscillator, and timer. This component is the foundation of several devices like computers, cell phones, and more. For example IA microelectronic computer

Advantages and Disadvantages of Electronic Components

Each electronic component has its own Advantages and Disadvantages:

Electronic Component	Advantages	Disadvantages
Resistor	<ul style="list-style-type: none">• It is used to control voltage and current in electrical circuit.• Low cost.• It Provide precise resistance value• Widely available in Market.	<ul style="list-style-type: none">• It produces heat when current flow in it.• It does not store energy.
Capacitor	<ul style="list-style-type: none">• It stores electrical energy in it.• It is used in timing circuits.• It is used to stabilize voltage in circuit.	<ul style="list-style-type: none">• It stores limited energy only.• It may leak its charge over time.
Inductor	<ul style="list-style-type: none">• It stores electrical energy in it.• It is used in transformers.• It is used to stabilize voltage in circuit.	<ul style="list-style-type: none">• It can be heavy.• It causes voltage spikes when current in the circuit changes.

Transformer	<ul style="list-style-type: none"> • It is used in changing the voltage. • It offers isolation between input and output in circuits. 	<ul style="list-style-type: none"> • It can be heavy • It is only limited to AC circuits.
Transistor	<ul style="list-style-type: none"> • It acts as an amplifier or switch in circuit. • It acts as a key component in amplifiers. 	<ul style="list-style-type: none"> • It requires proper configuration. • It is sensitive to environmental factors.
Integrated Circuit (IC)	<ul style="list-style-type: none"> • It combines multiple electronic components. • It reduces component size • It reduces power consumption. 	<ul style="list-style-type: none"> • It is complex to troubleshoot. • It offers limited customization.
Diode	<ul style="list-style-type: none"> • It allows current in only one direction. • It is used for rectifying AC circuit to DC circuit. • It protects circuit from reverse voltage. 	<ul style="list-style-type: none"> • It limits to only one-way current flow. • It drops voltage across the diode.

Applications of Electronic Components

- Electronic components are used for Industrial automation and motion control.
- Electronic components are used for Machine learning, motor drive control.
- Electronic components are used for Mechatronics and robotics.
- Electronic components are used for Power converting technologies, Photo voltaic systems.
- Electronic components are used for Renewable energy applications, Power electronics, and Biomechanics.
- Electronic components are used in Aerospace & Defense and Medical Devices like Advanced devices are being