**SOLAR CELL**

A solar cell is basically a p-n junction diode. Solar cells are a form of photoelectric cell, defined as a device whose electrical characteristics – such as current, voltage, or resistance – vary when exposed to light. Solar cell, also called photovoltaic cell, any device that directly converts the energy of light into electrical energy through the photovoltaic effect.

**WORKING PRINCIPLE OF SOLAR CELL**

When light reaches the p-n junction, the light photons can easily enter in the junction, through very thin p-type layer. The light energy, in the form of photons, supplies sufficient energy to the junction to create a number of electron-hole pairs. The incident light breaks the thermal equilibrium condition of the junction. The free electrons in the depletion region can quickly come to the n-type side of the junction.

Similarly, the holes in the depletion can quickly come to the p-type side of the junction. Once, the newly created free electrons come to the n-type side, cannot further cross the junction because of barrier potential of the junction.

Similarly, the newly created holes once come to the p-type side cannot further cross the junction became of same barrier potential of the junction. As the concentration of electrons becomes higher in one side, i.e. n-type side of the junction and concentration of holes becomes more in another side, i.e. the p-type side of the junction, the p-n junction will behave like a small battery cell. A voltage is set up which is known as photo voltage. If we connect a small load across the junction, there will be a tiny current flowing through it.

**ACTIVE COMPONENTS**

An active component is an electronic component which supplies energy to a circuit. Active elements have the ability to electrically control electron flow (i.e. the flow of charge). All electronic circuits must contain at least one active component.

Common examples of active components include:

* Voltage sources
* Current sources (e.g. DC current source)
* Generators (such as alternators and DC generators)
* All different types of transistors (such as bipolar junction transistors, MOSFETS, FETs, and JFET)
* Diodes (such as Zener diodes, photodiodes, Schottky diodes, and LEDs)

**ACTIVE CIRCUIT ELEMENTS**

**VOLTAGE SOURCES**

A voltage source is an example of an active component in a circuit. When current leaves from the positive terminal of the voltage source, energy is being supplied to the circuit. As per the definition of an active element, a battery can also be considered as an active element, as it continuously delivers energy to the circuit during discharging.

**CURRENT SOURCES**

A current source is also considered an active component. The current supplied to the circuit by an ideal current source is independent of circuit voltage. As a current source is controlling the flow of charge in a circuit, it is classified as an active element.

**TRANSISTORS**

Although not as obvious as a current or voltage source – transistors are also an active circuit component. This is because transistors are able to amplify the power of a signal (see our article on transistors as an amplifier if you want to know exactly how).

As this amplification is essentially controlling the flow of charge – transistors are hence classified as an active component.

**PASSIVE COMPONENTS**

A passive component is an electronic component which can only receive energy, which it can either dissipate, absorb or store it in an electric field or a magnetic field. Passive elements do not need any form of electrical power to operate.

As the name ‘passive’ suggests – passive devices do not provide gain or amplification. Passive components cannot amplify, oscillate, or generate an electrical signal.

Common examples of passive components include:

* Resistors
* Inductors
* Capacitors
* Transformers

**RESISTORS**

A resistor is taken as a passive element since it can not deliver any energy to a circuit. Instead resistors can only receive energy which they can dissipate as heat as long as current flows through it.

**INDUCTORS**

An inductor is also considered as passive element of circuit, because it can store energy in it as a magnetic field, and can deliver that energy to the circuit, but not in continuous basis. The energy absorbing and delivering capacity of an inductor is limited and transient in nature. That is why an inductor is taken as a passive element of a circuit.

**CAPACITORS**

A capacitor is considered as a passive element b­ecause it can store energy in it as electric field. The energy dealing capacity of a capacitor is limited and transient – it is not actually supplying energy, it is storing it for later use.

As such it is not considered an active component since no energy is being supplied or amplified.