

CH # 18 ELECTRONICS

ELECTRONIC:

"It is the branch of physics which deals with the development of electrons emitting devices and their utilization and controlling of electrons flow in electrical circuits designed for various purposes."

SOME USEFUL TERMS

SEMI-CONDUCTORS:

"These are the materials whose conductivity lies between conductors and insulators."

N-TYPE SEMI-CONDUCTORS:

"Material which is formatted when a silicon or germanium crystals is doped with a penta-valent elements (Arsenic) to form a better conductor called n-type semi-conductor."

P-TYPE SEMI-CONDUCTORS:

"Material which is formatted when a silicon crystals is doped with a tri-valent elements (Indium) to form a better conductor called p-type semi-conductor."

DOPING:

"Process by which the electrical conductivity of elements such as silicon or germanium is increased by adding in them a small amount of an element which has either three or four electrons in its atom is called doping."

HOLE:

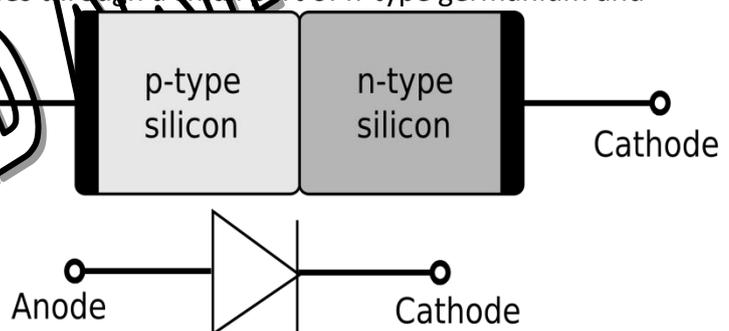
"In P-type substances when tetra-valent substance is doped with a tri-valent element an unoccupied space developed due to the shortage of an electron and are known as a hole. This hole behaves like a positive charge."

P-N-JUNCTION DIOD:

"It is an electronic device. A p-n junction is formed by placing a p-type (Indium) on a plate of n-type (Germanium)."

Formation:

Small amount of indium or Boron is placed on a plate of n-type Germanium. Indium on heating to about 550°C melts and diffuses through a small part of n-type germanium and converts that part into P-type germanium. Thus a junction is formed between p-type and n-type semi-conductors. A brass base is used to fix the P-N junction to which leads are attached. This enclosed in a metal or glass container.

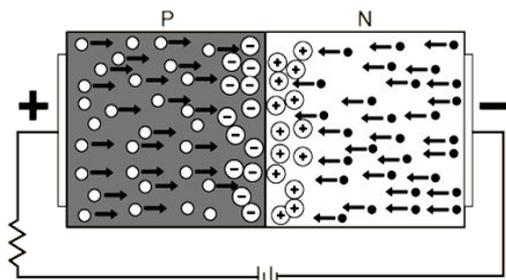


Working:

P-type substance has excess of mobile positive charge (holes) and n-type substance has excess of negative charges (electrons). Hence hole from P-type substance and electron from n-type substance flow towards the junction and combine. In this way a positive charge layer and negative charge layer is formed.

FORWARD BIASED:

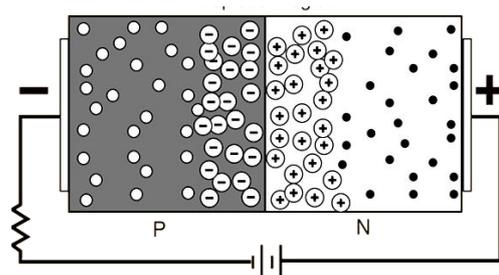
When a semi-conductor diode is connected to D.C. source in such a way that p-side is connected to the positive terminal and n-side to the negative terminal and holes move from the p-type to n-type



and electrons move from the n-type to the p-type material across the junction it is called forward biased. It has very low electrical resistance.

REVERSE BIASED:

When a semi-conductor diode is connected to D.C. source in such a way that p-side is connected to the negative terminal and n-side to the positive terminal and holes and electron move away from the junction it is called reverse biased. Reverse biased diodes developed very high resistance.



RECTIFIER:

“Rectifier is a device which converts alternating current (A.C) to direct current (D.C).”

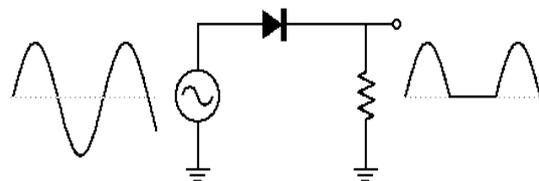
RECTIFICATION:

“The conversion of alternating current (A.C) to direct current (D.C) is called rectification.”

TYPES OF RECTIFICATION:

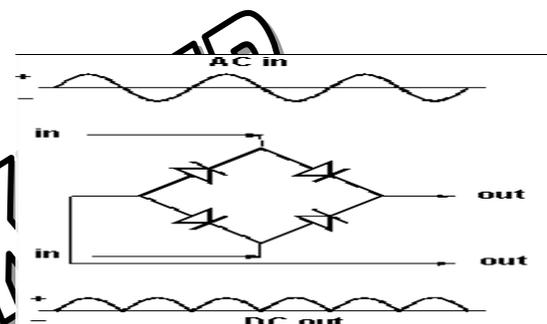
1. HALF WAVE RECTIFICATION:

“When D.C voltage obtained only for the positive half cycle of input A.C voltage, the rectification is called half wave rectification.”



2. FULL WAVE RECTIFICATION:

“When D.C voltage obtained only for both positive and negative half cycle of input A.C voltage, the rectification is called full wave rectification.”



WORKING OF DIODE AS RECTIFIER:

During the positive half cycle of the A.C the P-section of diode is positive which make it forward biased and allow the flow of current through the load 'R'. But during negative half cycle of the A.C the P-Section of diode is negative which make it reverse biased and stop the flow of current across the junction. Thus only positive half cycle of the A.C pass through diode and this rectification is called half wave rectification.

PAPADAW

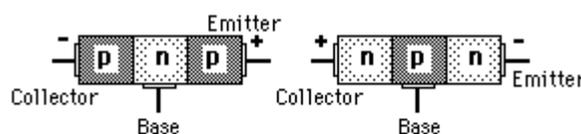
TRANSISTOR:

“Transistor is a semi-conductor which consists of a thin central layer (3-5µm) of one type semi-conductor material sandwiched between two relatively thick pieces of the other type.”

PARTS OF TRANSISTOR:

BASE:

“It is a very thin and central part of the transistor.”

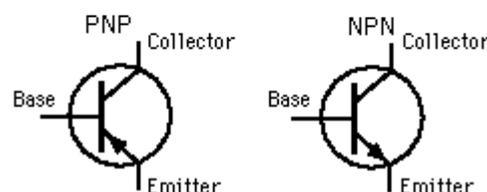


EMITTER:

“It is a thick piece and placed on one side of the base.”

COLLECTOR:

“It is also relatively thick piece and placed



on the other side of the base.”

TYPES OF TRANSISTORS:

NPN-TRANSISTOR:

“The npn transistor has a thin piece of p-type material sandwiched. Between two pieces of n-type material.”

PNP-TRANSISTOR:

“The PnP transistor has a thin piece of n-type material sandwiched. Between two pieces of p-type material.”

AMPLIFIER:

“An amplifier is a device used to increase the amplitude of an input signal without changing the shape of wave.”

USE OF TRANSISTOR AS AN AMPLIFIER:

In transistors a small change in the base current produce a large change in the collector current. Due to these characteristics a transistor is used as an amplifier.

ADVANTAGES OF TRANSISTORS:

- Transistors are small in size.
- Transistors are light in weight.
- Transistors are not easily broke.
- Transistors produce light heat.
- Transistors use very little potential.
- Transistors are cheap.
- Transistors have long operating life.

USES OF TRANSISTORS:

- Radio, television, telephone.
- Audio/video recorders, computers, voltage stabilizer.

TELECOMMUNICATION:

“Branch of physics, which deals with the production and proper use of different frequencies of radio waves, known as telecommunication.”

ELECTROMAGNETIC WAVES:

“Wave, which are produced by vibrating electrical and magnetic field which are at right angle to each other, called electromagnetic waves. These waves travel with the speed of light.”

TELEGRAPH:

“The telegraph is a device, which is used for sending and receiving messages between two distant areas by an electric current flowing through a wire connecting the two areas.”

TELEPHONE:

“It is an electronic device which is used for conversation over long distance.”

RADIO:

“A radio is an electronic device which is designed to receive radio or electromagnetic wave in the radio range.”

TELEVISION:

“It is an electronic device which utilizes electromagnetic wave of very high frequency for simultaneous transmission and reception of sound as well as pictures.”

SOUND RECORDER:

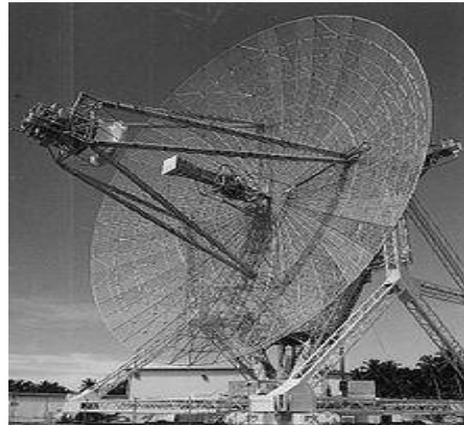
“When someone speaks in microphone of the recorder, the recorder converts the sound waves into fluctuating electric current which after amplification fluctuates a magnetic recording head. This continuously fluctuating magnetic field magnetizes different parts of the tape passing in front of head and sound is recorded on the tape in magnetic pattern.”

SATELLITES:

“An orbit in which a communication satellite moves around the earth but appears to be stationary at a point is called geostationary orbit. The satellite which moves along a geostationary orbit, are called hovering satellite.”

RADAR:

“Radar stands for Radio Detection and Ranging. The device which is used for knowing the wave velocity of the distance object is called radar. ”



USES OF RADAR:

- It is used to beware of surrounding ships, ice bergs hidden rocks under water and hills hidden by mist and cloud.
- It is use for air traffic control.
- It helps in navigation in low visibility.
- It helps to detect enemy planes.

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