Al-Saudia Virtual Academy
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Electronics

Q1. What do you mean Electronics?

Ans: ELECTRONICS:

It is that branch of Physics which deals in the structure and analysis of devices which emit electrons. In electronics, uses and flow and controlling of those devices are studied. Additionally which circuit designed for emitting, flow and control of electrons are called Electronic circuits.

Q2. Give application of electronics in everyday life.

Ans: Applications of electronics in every day-life are as follows:

(i) Radio (ii) TV (iii) Motion Pictures liv) Computers (v) VCR

APPLICATION IN MODERN ELECTRONICS:

(i) Automatic Washing Machine (ii) Microwave oven

(iii) Robots (iv) Telephones (v) Pocket Calculator.

Q3. Define Insulator and Semiconductor.

Ans: INSULATOR:

Those things which do not conduct electricity or which do not posses, free electrons are called insulator. For example, Non-metallic objects as Gases and liquids.

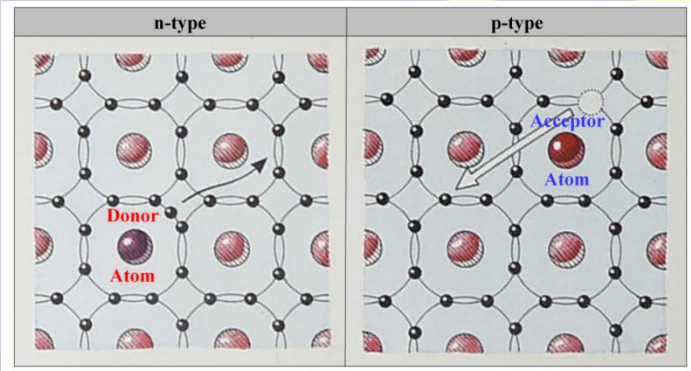
SEMICONDUCTOR:

Those things which possess intermediate qualities between conductor and non-conductor, like IVA group elements. When Carbon or Germanium or Silicon is combined with Radium, then the mixture possesses free-electrons and these electrons are responsible for the flow of electric current.

Q4. What are P-type materials?

Ans: P-TYPE METRIAL:

Germanium and Silicon like elements possess four electrons in the outermost shell. If Any atom is mixed with such atoms. Who possess three electrons, then three electrons? From each side will make a covalent bond but an incomplete one. Because Germanium And Silicon needs four electrons in the outermost shell. Therefore, the substance made From the mixture of Germanium and Silicon with Radium would possess greater Amount of positive charges. Hence the material which possess positive charges, is Called P-type material.



Q5. Define N-type material.

Ans: N-TYPES:

If an atom of five electrons, is mixed with crystal of Germanium and Silicon, for example Arsenic. Then four electrons will form covalent bond and one electron will remain free Since this material possesses negative charges, therefore it is called N-type material.

Q6. Differentiate between N-type and P-type.

N – TYPE	P – TYPE
It is formed when Germanium like, atom is combined with Arsenic like atom having 5+ ve valency.	It is formed when Germanium like atom is mixed with Indium like atom having 3 + ve valency
It has excess of negative charge.	It has excess of positive charge
Conductivity is produced because of One additional electron.	Conductivity is produced because fewer electrons
This is semiconductor	This also a semiconductor

Q7. What is P-N junction?

Ans: P-N JUNCTION:

When a block of P-type element is placed with block of N-type element then their Mutual boundary is called P-N junction and device formed is called Semi diode. If a P-N junction, concentration of free electrons is high in N-type where as P-type Element has concentration of holes. Now P-type elements diffuse free-electrons in Matter and holes diffuse in N-type. Hence, this junction is known as P-N junction.

Q8. Prove how P-N diode works.

Ans: P-N JUNCTION AS A DIODE:

When a P-N junction is joined with a battery in such manner that P-type material is Connected to positive terminal and N-type is joined with negative potential, then Positive terminal pulls the whole P-type and negative terminal will repel the electrons. Now current will flow around the junction. If negative terminal is connected with P-Type and positive terminal is with N-type then negative potential attract the holes and Positive terminal will attract the electrons. Therefore, no current will passes across the P-N junction. This proves that current passes in one direction in P-N junction and same ss in diode. Hence diode works as P-N junction.

Q9. What is diode?

Ans: DIODE:

This consists of two electrodes placed in a high standard glass tube. That is why it is called Diode. Among two of them, one electrode is made by a tungsten filament coated with metal e.g. Barium Oxide or Strontium, which is called Cathode. The other electrode consists of a Nickel plate which is called Anode. When filament is heated, it emits electrons and makes an electron-cloud around the cathode. When positive potential is supplied to positive anode, then it attracts the electrons and hence current is passed.

Q10. Define hole, Thermionic emission and Doping.

Ans: HOLE:

When atom like Indium is mixed with atom like Silicon then three electrons of Indium make covalent bond with three electrons of Silicon and one electron remains alone. Hence, covalent bond is not a complete one because of that single electron and a place remains vacant. The vacant place is called Hole.

THERMONIC EMISSION:

Such process in which a cathode of diode emits electrons on heating is known as thermionic emission.

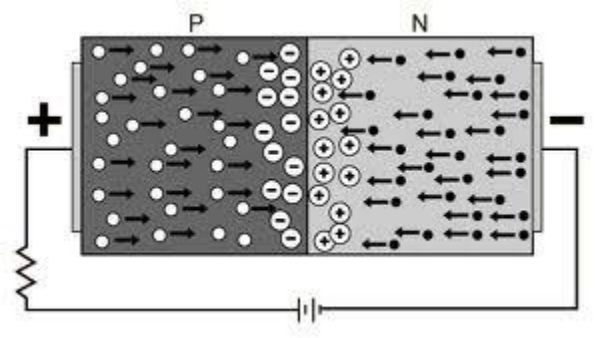
DOPING:

It is a process in which an element is made semiconductor P-type and N-type by mixing.

Q11. Define Forward Biased.

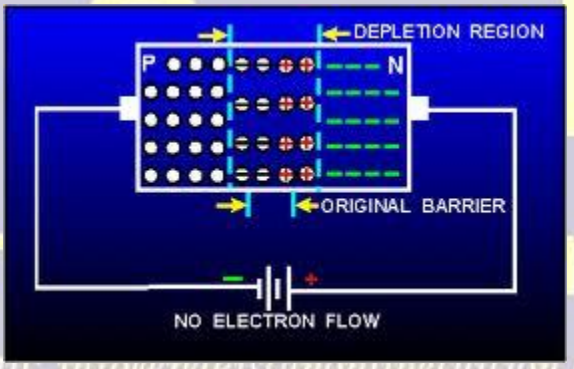
Ans: FORWARD BIASED:

When a P-N junction is joined with a battery in such a manner that its P-type is connected with positive terminal and N-type with negative terminal, then current will flow this phenomenon is known as Forward Biased. The Potential produces an electric field, due to which resistance in height of junction falls down. Since the height of potential resistance is 0.7 to 0.1, therefore an increase in Potential will vanish the resistance and resistance falls down to zero and current flows in circuit.



Q12. Explain Reverse Biased.

Ans REVERSE BIASED:



When a P-N junction is joined with a battery in such a way that its P-type is connected to negative terminal and N-type is connected with positive terminal then a reverse potential creates an electric field which acts in the direction of field of Potential resistance. Therefore, a powerful field produces on the junction. And height of resistance raises. The high of resistance resists against the flow of electrons. Hence, no current flows. This whole process is known as Reverse Biased.

Q13. What is meant by Rectification?

Ans: RECTIFICATION:

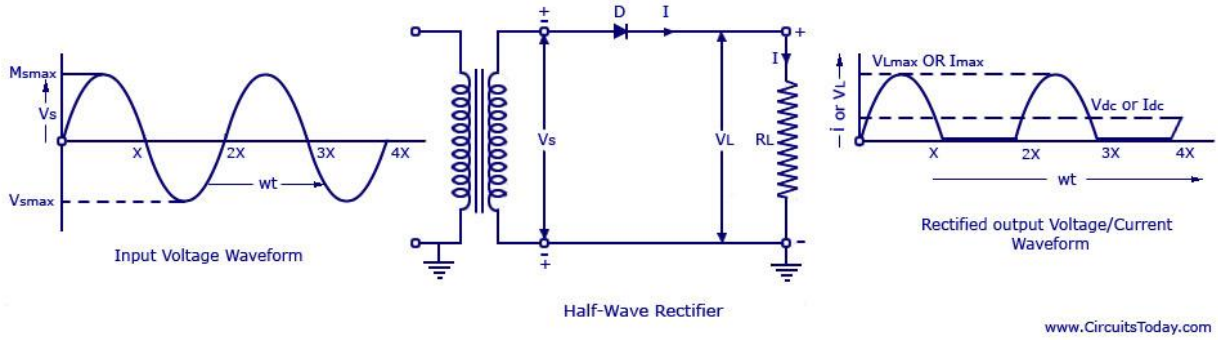
The process, in which D.C is changed to AC, is called Rectification. The producing current is used for charging battery and plating. Usually semiconductor is used for this purpose. The device which converts AC to D.C is called Rectifier. There are two types of rectifier.

i. Half-wave Rectifier ii. Full-wave Rectifier

Q14. Explain Half-wave rectifier.

Ans: HALF- WAVE RECTIFIER:

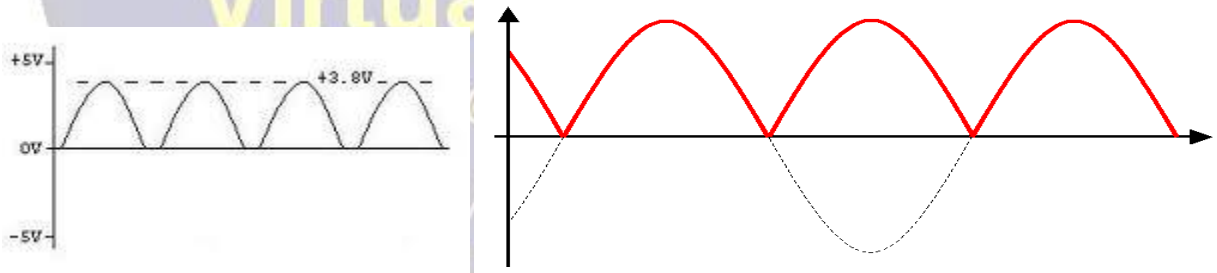
Wave of current always consists of two parts. One part is positive and other one is negative. Only positive part conducts A.C in half-wave rectifier where as negative charged does not. Consider the given circuit Diode and Resistance are connected parallel and transformer is also connected parallel to them. When diode passes the current during half positive round, where as stops the half negative round. Hence there is only one direction for flow of current.



Q15. Give complete structure of Complete wave Rectifier.

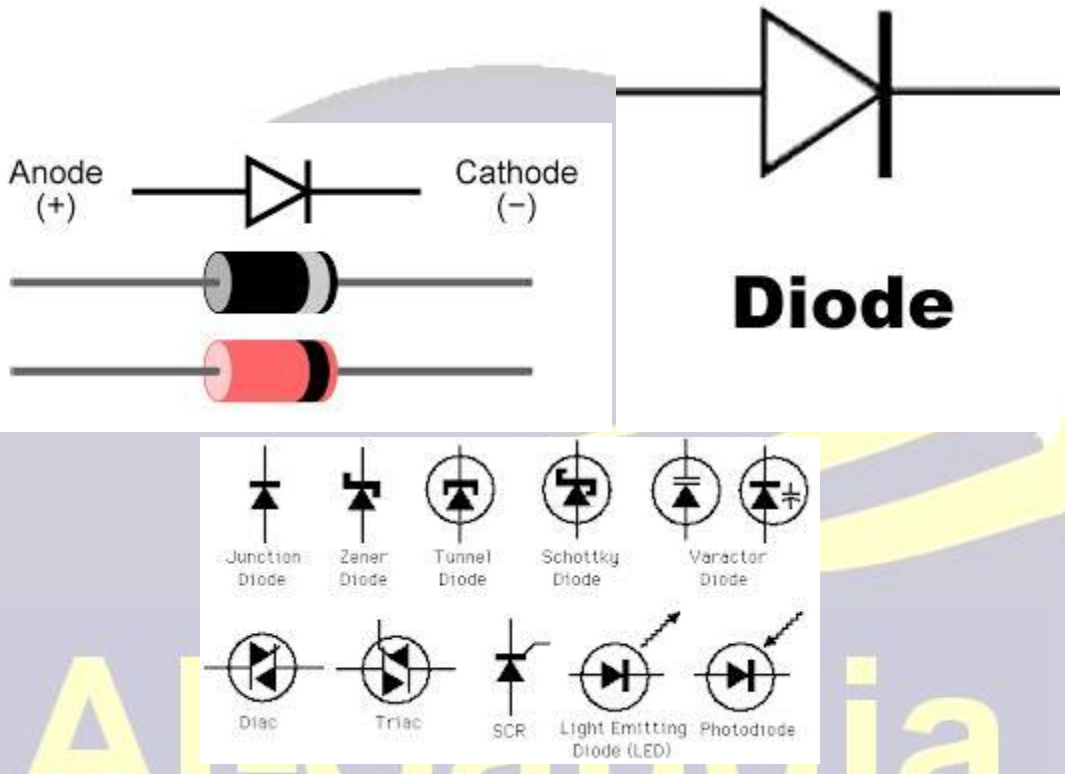
Ans: COMPLETE WAVE RECTIFIER:

In this process, A.C conducts with both parts of voltage, which consists of two parts? This process is performed with two diodes which alternately work for each other. One diode provides current to load during half positive cycle of voltage where as the other does the same thing in next half cycle of voltage. Hence current flows only in one direction. Therefore, complete wave rectifier uses both half cycles of voltage to provide DC output.



Q16. Diode works as Rectifier. Explain.

Ans: DIODE AS A RECTIFIER:



Such device which change A.C voltage in DC are called Rectifiers and Phenomena is called Rectification Voltage is supplied as Input, which is rectified necessarily. During positive half cycle, P-type of diode is positive, holes are pulled towards junction. Hence resistance of junction falls and current flows in the circuit. It becomes negative in other negative half cycle and holes pulled away from junction. Now resistance of junction raises and no current flows. So, it is proved that Diode only allow to pass positive cycle, means that Diode works as a Half-wave Rectifier.

Q17. What are Transistors? How many types of transistors are?

Ans: TRANSISTORS:

Word “Transistor” is composed of two words, one is “Transformer” and other is “Resistor”. Schematic construction

PNP		NPN	
p-type	Collector	n-type	Collector
n-type	Base	p-type	Base
p-type	Emitter	n-type	Emitter

It is a semiconductor device which consists of three electrolytes. First one is “BASE”. second is “Emitter” and third one is “Collector”. Detail of their work is as follows:

BASE:

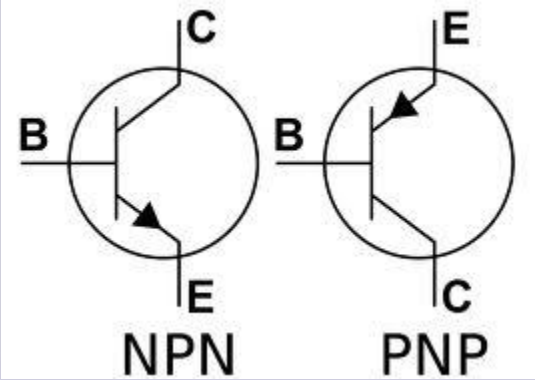
It is central parts of the transistor which separates the collector and emitter.

EMITTER:

This part supplies charges.

COLLECTOR:

This part of transistor receives charges.



TYPES OF TRANSISTORS:

i. N.P.N.Types transistors:

In this type of transistor, layer of P-type is placed between two parts of N-types of material. Central part is called Base; other two parts are Emitter and Collector respectively.

ii. P. N. P Type Transistors:

P.N.P type transistor consists of N-type material sandwiches between two P-type materials Central core is called Base, and other two are Collector and emitter respectively.

Q18. How transistors work?

Ans: WORKING OF TRANSISTORS:

There are two paths for the flow of current in transistors.

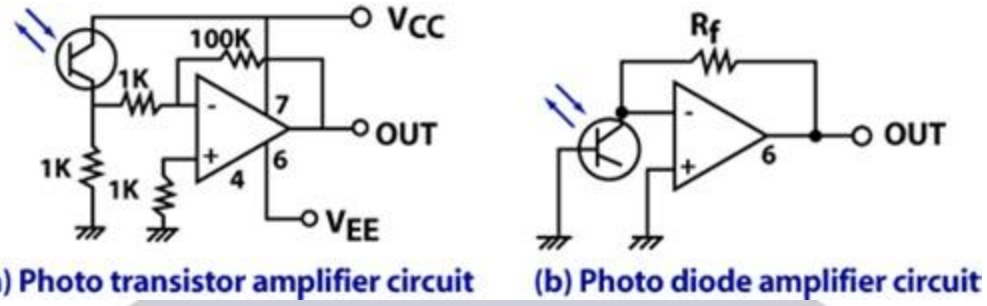
i. Base Emitter path where transistors receive current.

ii. Collector emitter path from where current is received from transistors.

Q19. How does a transistor work as an Amplifier?

Ans: TRANSISTOR AS AMPLIFIER:

Amplifier means an accumulator of transistor, if amount of current is increased in Base, quantity of current reaches maximum in Collector such maximization of current shows that transistor has qualities of an amplifier.



(a) Photo transistor amplifier circuit (b) Photo diode amplifier circuit

NPN Transistor Amplifier

USES OF TRANSISTORS:

Transistor is used in following apparatus.

i. Radio
ii. Television
iii. Computer
iv. Telephone Set.
v. Stabilizers voltage
vi. VCR

Q20. What do you mean by Electromagnetic Waves?

Ans: ELECTROMAGNETIC WAVES:

Such waves which are produced when magnetic and electric field make a right angle in a vibrating state is called Electromagnetic Waves. They do not need any medium to transportation. Examples are light waves Radio waves, Ultraviolet waves etc.

Q21. Explain Telecommunication.

Ans: TELECOMMUNICATION:

The branch of Physics which studies the production and uses of radial waves of different frequencies, transporting audible and visual impression, is called Telecommunication. Following devices works as telecommunication devices

i. Telephone
ii. Telegraph
iii. Radio
iv. Television

Q22. Write the names of parts used in Telegraph.

Ans: Basically, there are two parts in Telegraphy.

i. Electric bell
ii. Transmitter

i. Electric Bell:

It consists of following parts.

a. Electric magnet:

It is connected with a metal strip by the help of a small spring on opposite hole.

b. Metal Strip:

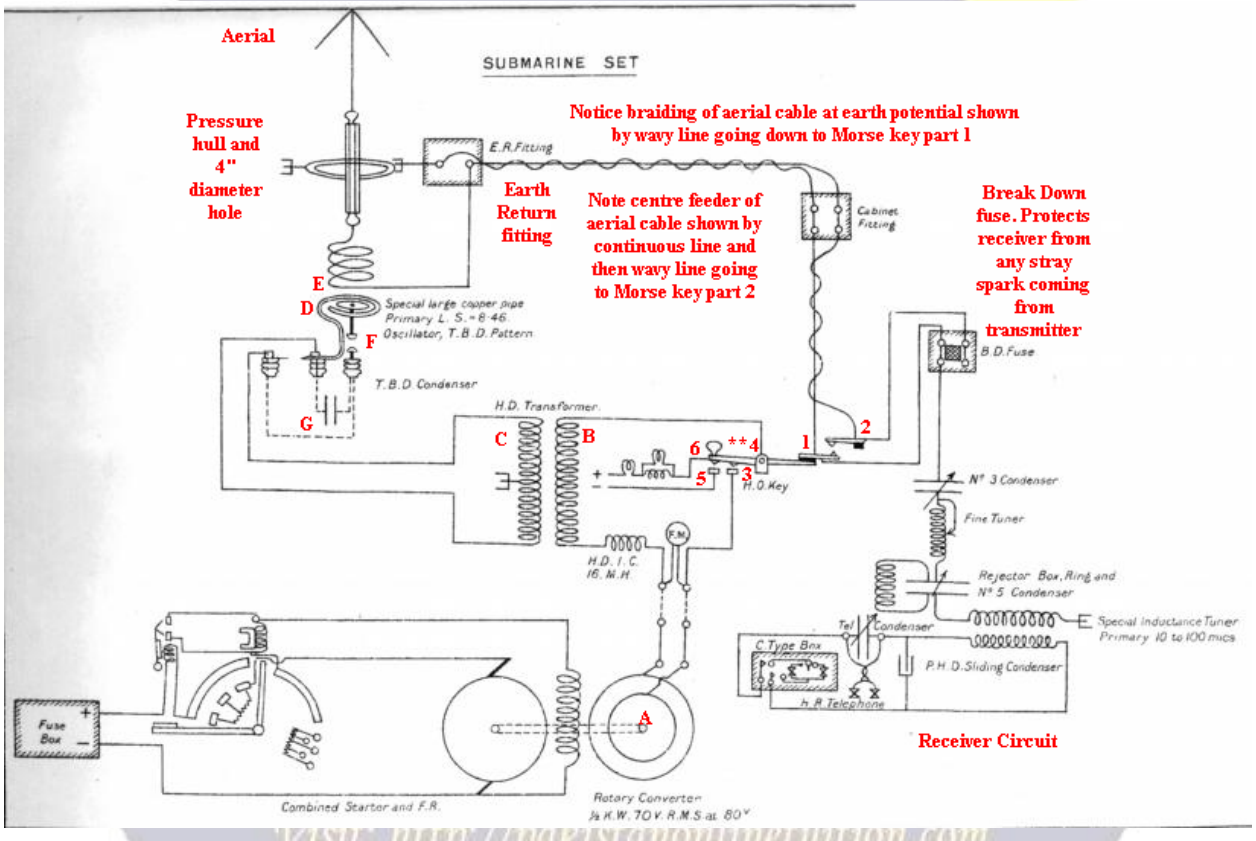
A metal strip which based on a support.

ii. Transmitter:

It consists of a metal strip, also called Taping Key connected to a battery. On pressing it, receiver produces round.

Q23. How telegraphing machine work?

Ans: TELEGRAPHY:



A battery is connected with a tapping key. The other end of tapping key is connected with an Electromagnet. One end of receiver is joined with earth and whiles a terminal of battery is connected to earth. Here, earth works a conductor. In telegraphy messages are consist of dot and dash like codes. These messages press tapping key. The short interval between pressings of key is called dot and long interval is known as dash. When tapping key is pressed, then electric current passes through the coil of electromagnet and this electromagnet attract the bar. Due to this attraction electric Circuit is disconnected and current stops its flow. Now the attraction vanishes and spring takes the bar back to contact point and current starts flowing. Hence with the press of tapping key the iron bar vibrates and produces buzzing sound which are received in the form of message by Morse Code...

Q24. Give the structure and working of Telephone.

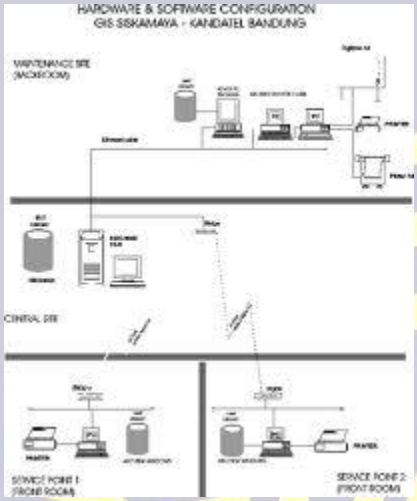
Ans: STRUCTURE OF TELEPHONE:

Telephone consists of two parts.

i. Carbon microphone,

ii. Air phone

The lines coming from Exchange are connected to these two parts Likely, There are two lines in telephone which work for the communication A battery in Exchange supplies current to these lines.



WORKING:

Carbon microphone consists of a sensitive diaphragm. There are packed granules of carbon in front of diaphragm, Diaphragm vibrates when a contraction or expansion occurs in these granules. When voice of speaker strikes diaphragm, it also fluctuates. Similarly, there is a constant magnet placed in earphone which is connected with two soft cores.

TRANSMISSION OF MESSAGE:

When a person speaks in front of microphone, due to compression and rarefaction in sound waves the diaphragm tends to vibrate. When the diaphragm is compressed, granules of carbon also compress and inter-granule distance decreases... With decrease in distance, resistance lowers in flow of current, and current fluctuates due in the form of sound waves.

RECEPTION OF MESSAGE:

When current fluctuate in the form of electric current, it passes through the electromagnetic waves of receiver and disturbs these waves. Due to this, a plate in front of electromagnet experiences a force on it. These fluctuations are transformed into sound waves and receiver hears the sound.

Q25. How does the radio propagate sound?

Ans: RADIO:

First, the voice of speaker is formed in front of speaker. This sound produces fluctuation in microphone, then these sound waves is converted into Electromagnetic waves. These electromagnetic waves are amplified by an amplifier. These amplified waves are transported to transmitter which converts them into Radial waves. Now these radial waves are transmitted to radio sets with the help of powerful devices. Where these waves strike with the antenna of radio set and then converted into alternating current Amplifier placed in radio set, amplifies these waves and transfers towards the loud speaker. Loud speaker works as a headphone and electromagnetic waves are heard in the form of sound waves.

Q26. How Television transmits picture? Give the principle of Colored Transmission.

Ans: There are two types of TV transmission.

i. Black and White Transmission.
ii. Color Transmission.

BLACK AND WHITE TRANSMISSION:

The picture of persons, in a program, is taken with the help of a particular camera. These pictures are converted into electromagnetic waves. Now, these waves are amplified with the help of an amplifier. These amplified waves are transformed into radial waves with a transmitter, so that these waves can reach the television set located in remote regions. In TV set, these radial waves are transformed into electromagnetic waves. Then these waves are mobilized to Electron gun with the help of amplifier. This electron gun fires them in the form of rays on the television screen where they form a picture.

COLOUR TRANSMISSION:

A camera consists of three or four tubes are used in color transmission. These tubes resolve a picture into color component. Then, these colors pictures are converted first into electromagnetic waves and secondly in radial waves. These radial waves are transmitted to TV Sets with the help of transmitter where they form a picture on TV Set...

Q27. What do you mean by Sound Recording System?

Ans: SOUND RECORDING SYSTEM:

Sound recording system means to record or capture sound. When voice of person strikes to microphone, then microphone convert it into fluctuating current. This fluctuating current is amplifier by a transistor and transferred to a magnetic heat. This head is called Recording Head. A plastic tape coated with magnetizable material of Ferric Oxide and Chromium oxide is placed in front of recording head. Magnetic field varies with fluctuating current which magnetize the different parts of tape and sound is recorded in a magnetic pattern on the tape.

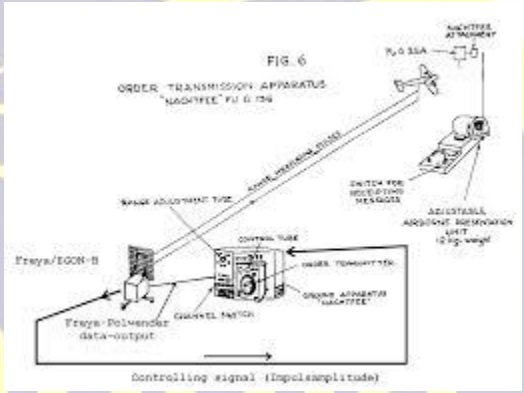
Q28. What is Radar?

Ans: RADAR:

Radar, intuitively means to defect and find range of an object with radial methods radar is large used for the war purposes. This device works as guidance for aero planes and sea-ships on airports and sea-ports respective.

STRUCTURE OF RADAR:

Radar consists of a transmitter receiver and other several indicating devices electromagnetic waves of high frequency i.e. more than 600 MHz produced from a transmitter which are sent in required direction with the help of a concave antenna of radar. When these waves strike a body, they reflect back with this reflection, we can detect and find range of a body. These waves travel with velocity of light.



USES OF RADAR:

i. Radar is used for the forecasting of weather, tornadoes and aviation.

ii. It is used to locate the track of satellite, and for military purpose on land and sea.

Q29. How does a satellite transmit?

Ans: SATELLITE:

Satellite is a spherical object which consists of different device it suspends in a particular position of space several satellites are revolving around the earth in their orbits. Satellite is mainly used for the communication purposes. It is necessary to remain static relative to earth, in order to match the orbital velocity of satellite with the spinning velocity of the earth solar power is used in satellite nuclear energy is also used for this purpose.

TRANSMISSION FROM SATELLITE:

Due to high power, satellite receives signals from an object or a body. Then it amplifies these signals and transmits these amplified signals towards a particular part of the earth where these amplified signals are received by TV and Radio etc. On earth, these signals are received with the help of Dishes, Feed-harms and Satellite receivers. We often see games, news, and other world affair from other distant parts of the world by this principle.