

# Chapter # 9

## Basic Electronics

### THIS CHAPTER CONSISTS OF

- ◆ Semi conductors.
- ◆ Analogue / Digital Converters
- ◆ Telecommunication.
- ◆ Television .
- ◆ Radio Waves.
- ◆ Radio System.
- ◆ Satellite T.V.
- ◆ Semiconductor Diode.
- ◆ Communication System.

**Q.1. Define electronics and briefly describe its importance.**

**Ans. ELECTRONICS**

Electronics is the knowledge of behaviour and control of electric current.

Electronics uses the electric current to convert information into signals. These signals could be of sound, picture, numbers or other information.

#### IMPORTANCE OF ELECTRONICS

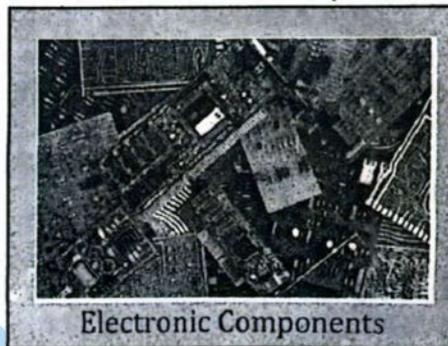
#### ELECTRONICS IN EARLY DAYS

Early radio set was so big that two persons could hardly move it. People used to have huge gramophones to enjoy music.

Conquest of space was confined to only imagination. In the beginning big valves were used in the T.V. set. Computer occupied many rooms.

#### ELECTRONICS IN MODERN AGE

During the last fifty years, there has been much progress in the field of electronics. Today is the age of microchips. By the use of chips, T.V. and computers are reduced in size to such extent that they can be easily shifted from one place to another. Their efficiency has increased to many folds. Communication through satellites has become very common. Transmissions from any place can be watched all over the world. This is all by virtue of electronics.



Electronic Components

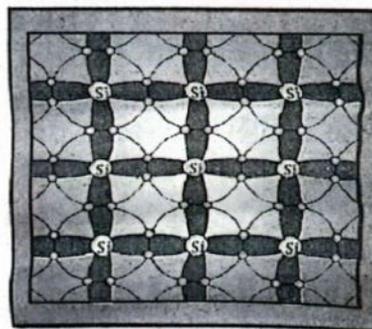
**Q.2. What are semi-conductors? Describe their function. How can we increase its conductivity? (LHR 2015 GII, LHR 2016 GII, DGK 2016 GI, RWP 2019 GI)**

**Ans. SEMI CONDUCTORS**

Semi-conductor is such a substance whose ability to conduct current lies in between conductors and insulators.

#### Example

Silicon and germanium are two common semi-conductors, which belong to fourth group.



## IMPORTANCE OF SEMI-CONDUCTORS

In semi-conductors, no free electrons are available to conduct electric current at very low temperature but at ordinary temperature, some of the electrons get free. This makes it possible to conduct some current through the semi-conductor.

## DOPING

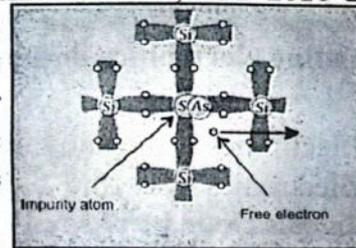
Semi-conductors are made more useful by increasing their conductivity. This is done by adding some quantity of trivalent or pentavalent atoms as impurity while growing the crystals of silicon or germanium. This process is called **doping**.

This addition is usually one in  $10^8$  atoms. N-Type Semi - conductor

**Q.3. What are N-Type and P-Type semi-conductors? What are they used for?**

**Ans. N-TYPE SEMI-CONDUCTOR (LHR 2015 GII, LHR 2018 GII, SGD 2016 GI)**

When a pentavalent impurity such as arsenic (As) is added to silicon crystals, then due to this process the number of free electrons in the semi-conductor increases (Fig: 9.2). Such a material is called as N-Type semi-conductor. Most of the current through N-type semi-conductors is due to free electrons.

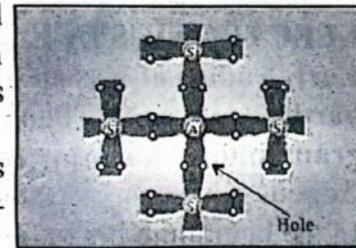


## P-TYPE SEMI-CONDUCTOR

If a trivalent impurity such as aluminium (Al) is doped in silicon crystal, then there is a deficiency of an electron in the outermost orbit of silicon atom. This deficiency of electron is called a hole.

Thus this type of doping increases the number of holes in the semi-conductor. Such material is known as P-type semi-conductor.

The current through it is mostly due to the holes.

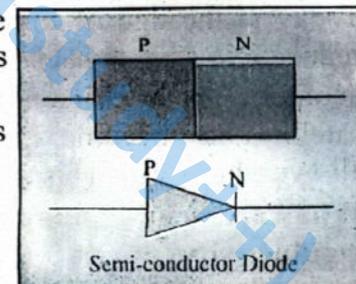


**Q.4. What do you mean by semi-conductor diode? Also describe its types.**

**Ans. SEMI-CONDUCTOR DIODE (LHR 2014 GI, LHR 2015 GI, LHR 2019 GII)**

If the silicon crystal is doped in such a way that its one part becomes N-type and the other P-type then it is called a P-N junction diode or semi-conductor diode.

The P part of the diode is known as anode and N part as cathode (Fig: 9.4)



## TYPES OF SEMI-CONDUCTOR DIODE

There are two basic types of semi-conductor diodes

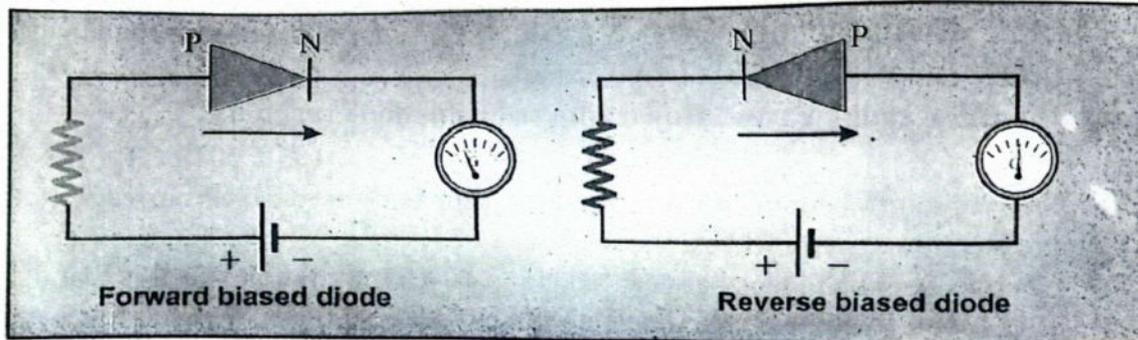
**(i) FORWARD BIASED DIODE**

When the anode of diode is connected to the positive terminal of the battery and the cathode to the negative terminal, the current starts flowing through the diode from P to N. This is known as forward biased diode.

**(ii) REVERSE BIASED DIODE**

When the anode of diode is connected to the negative terminal of the battery and the cathode to the positive terminal, it is known as reverse biased diode. In this mode, the current flowing through the diode is almost zero.

**(LHR 2019 GII)**



**Q.5. What are uses of semi-conductor diode? (LHR 2015 GI, MTN 2016 GI)**

**Ans. USE OF SEMI-CONDUCTOR DIODE**

There are many uses of semi-conductor diode.

Some of them are given below:

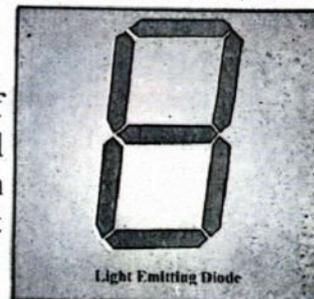
**1. RECTIFIER**

The electricity supplied to the consumers is A.C. But many appliances such as radio, T.V. and computer etc. work with D.C. voltage. For these, A.C. has to be converted into D.C. This process is called rectification.

The device, which is used to convert A.C. into D.C. is known as rectifier. A semi-conductor diode is also used as rectifier.

**2. LIGHT EMITTING DIODE**

Light emitting diodes are made from specific compounds of gallium. It is forward biased. There is such a potential barrier in it at the P-N junction that when an electron occupies the hole after entering into P region from N, light is emitted.



**AVAILABILITY OF DIODES**

Such types of diodes are available in red, green, blue, yellow and white colours. These are also used as indicator lamps.

**AUDIO DECKS**

Now a days these diodes are also used in the audio deck to display ups and downs in the loudness of sound.

**Use of LED's:**

Another important use of LEDs involves the display of seven segment digit in the digital clock, cash register and calculator. The English digit 8 has been divided into 7 segments.

**3. PHOTODIODE**

These are the diodes which are sensitive to light. Such diodes are used in the mode of reverse biased.

When no light falls on them, their resistance is very high (mega ohm). Its resistance goes on decreasing as the light falling on it increases. In this way the reverse current also increases with the increase of incident light.



### TRANSMITTER ANTENNA

At the T.V. station, carrier waves are mixed with these signals and transmitted in air through transmitter antenna.

### TV ANTENNA

When these waves strike T.V. antenna, a slight alternating current of the same frequency is produced in it.

### TV CIRCUITS

The circuits of T.V. separate audio and video signals from it.

### AMPLIFIERS

These signals are then amplified. Audio signal goes to the speaker, which converts it into sound. Video signal goes to the picture tube.

### PICTURE TUBE OF BLACK & WHITE TV

In the picture tube, an electron gun throws beam of electrons on the screen. The beam scans the screen just as you are reading every line of this page. A fluorescent material is coated on the inside of screen. When electrons fall on it, light is emitted. The beam of electrons produces bright dots on the screen according to video signals. Bright and dark parts compose the picture. About 25 pictures are completed on the screen in one second. That is why the picture looks moving.

### PICTURE TUBE OF COLOUR TV

In a colour television there are three electron guns, which form red, green and blue pictures at a time on the screen. These blend into a colorful picture.

### CABLE T.V

Cable T.V. In cable T.V. electrical signals are not converted into radio waves, but these reach a T.V. set from T.V. station through cables.

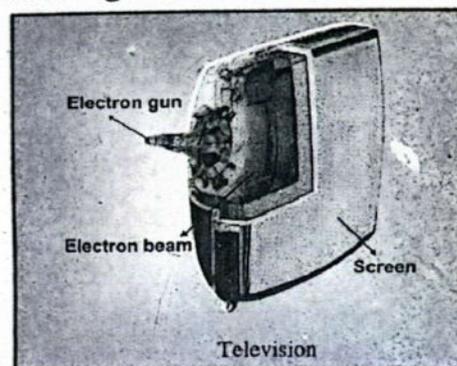
The companies providing cable connections also receive programmes from satellites and thereafter transmit them to their consumers.

High quality picture and sound is received through cable. Satellite T.V.

### SATELLITE TV

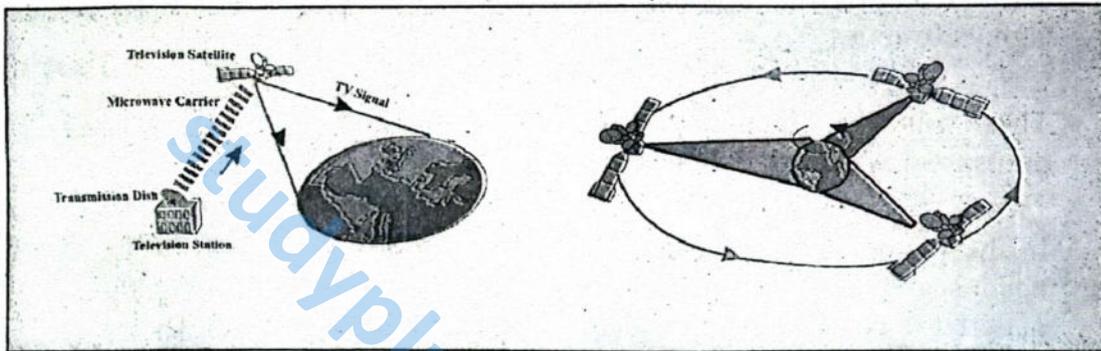
(LHR 2014 GI, LHR 2014 GII, LHR 2017 GII, LHR 2019 GI)

The range of a 100 metres high T.V. transmitter arial is about 30 kilometres. For inland transmissions, boosters or repeaters are installed at suitable distances. They transmit signals onward through microwaves after reinforcing them. However transmissions cannot be carried to far away countries by this method. The reason is that our Earth is a sphere and the microwaves travel in a straight line. Describing a long distance they go much above the surface of Earth.

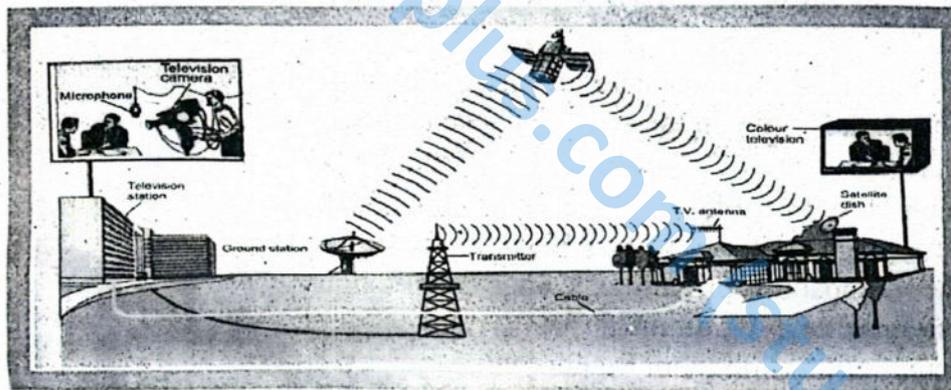


## HOVERING SATELLITES

To carry waves on the other side of the earth, they are transmitted via satellites. Satellites are orbiting the Earth. Such satellites, which seem to be stationary at some particular positions, are called hovering satellites. Their orbits are known as geostationary orbits. A satellite orbiting at a distance of about 36000 kilometres above the equator completes its rotation in 24 hours. In the same interval, the Earth also completes its rotation about the axis. In this way this satellite seems to be stationary at the same position. Microwaves are used to send signals to the satellite from a ground station.



On the ground, these transmissions can be watched by receiving signals through dish antenna. Three hovering satellites can send transmissions to all over the world.



T.V. transmissions through radio waves, cable and satellite are shown.

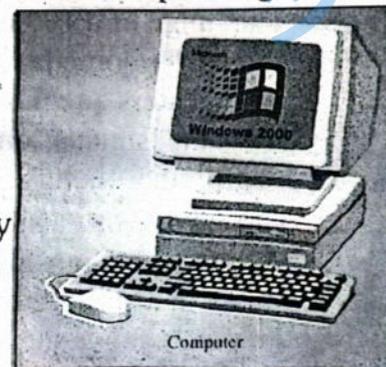
**Q.8. What is the importance of computer in our life?**

**(RWP 2015 GII)**

**Ans. IMPORTANCE OF COMPUTER**

Computer is very important in our daily life as this is the computer age. Hardly a literate person could be unaware of the computer.

- (i) **COMPUTER IN HOMES:** In the homes, we use washing machine, microwave oven, satellite receiver, sewing machine and other electronic devices, which are all, being computerized.
- (ii) **COMPUTER IN GENERAL STORES:** When you buy something from a big store the salesman on the counter just scans its bar code by laser light and all details including price etc, appear on the computer.



- (iii) **COMPUTER IN BANKS:** Banks and other commercial institutes have computerized all of their business.
- (iv) **COMPUTER IN MEDICAL FIELD:** Computerized machines are being used in the medical fields.
- (v) **COMPUTER IN TRAFFIC CONTROL:** Computers are controlling road traffic and air traffic.
- (vi) **COMPUTER IN RECORD ROOMS:** Electricity, water and gas supplying departments are keeping all their records on computers.
- (vii) **COMPUTER IN BILLING:** Preparation of bills and receipts of money are made through computers.
- (viii) **COMPUTER IN CORRESPONDENCE:** Before this, most of the people used to send letters for correspondence, but recently the use of E-mail has become very popular.
- (ix) Revolutionary changes have been brought in the fields of publishing, printing and graphics.
- (x) **COMPUTER IN ARTS:** Even the paintings are made on computers.
- (xi) **COMPUTER IN CAR ASSEMBLING:** Robots are assembling cars.
- (xii) **COMPUTER IN INDUSTRIES:** Computerized machines are being used in industries.
- (xiii) **COMPUTER GAMES:** Computer games have changed the complexion of games.

In short, the computer has brought revolution in our lives.

#### GLOBAL VILLAGE

The computer has made the world so small that people are calling it the global village. Let us know what is a computer?

#### Q.No.9. What are the main parts of a computer and how do they work?

(LHR 2017 GII, FBD 2016 GII, GUJ 2020 GI)

Ans. Computer is an electronic machine that receives raw data and processes it into useful information under the given instructions.

#### USEFUL INFORMATION INCLUDES

- (i) Rearrangement
- (ii) Analysis
- (iii) Explanation
- (iv) arithmetic and logic solutions.

#### PARTS OF COMPUTERS

Apparently computers are very complicated but they are very simple as regards their functions and results.

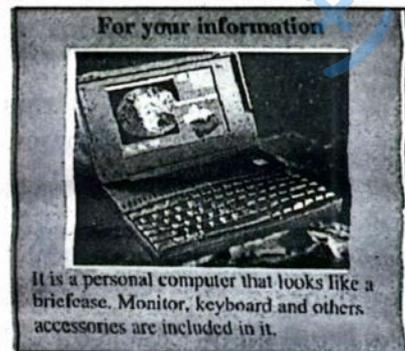
A computer can be basically divided into two

1. Hardware
2. Software

#### 1. HARDWARE

The components of computer that can be physically touched are called the hardware.

For example keyboard, mouse, printer and monitor etc. There are four main parts of hardware.



- (i) Input device
- (ii) Central processing unit.
- (iii) Output devices.
- (iv) Information storage devices.

## I. INPUT DEVICES

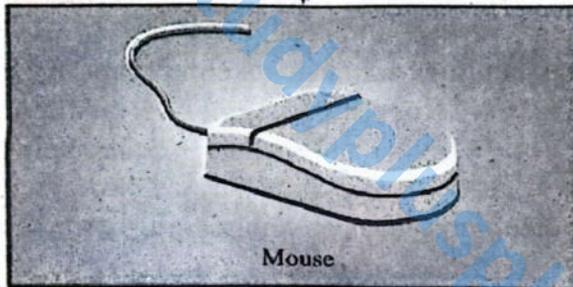
The devices through which data is entered in the computer are known as input devices.

### (a) KEYBOARD

The most common input device is the keyboard (Fig: 9.11). It is similar to a typewriter. Instructions to the computer are typed by keyboard. There are some functional keys on the keyboard, which serve different purposes.

### (b) MOUSE

There is another device commonly used in place of function keys known as mouse. This is also an input device, which is rolled over a pad. This makes the input easier and faster.



### (c) SCANNER

Scanner is another important input device through which pictures and documents can be fed to the computer in their original form. This has facilitated much in the field of publishing.

### (d) LASER PEN

Laser pen is also used to enter data in the computer.

Input devices feed data to central part of the computer called CPU where data is processed.

## II. CENTRAL PROCESSING UNIT

(LHR 2017 GI, LHR 2019 GI)

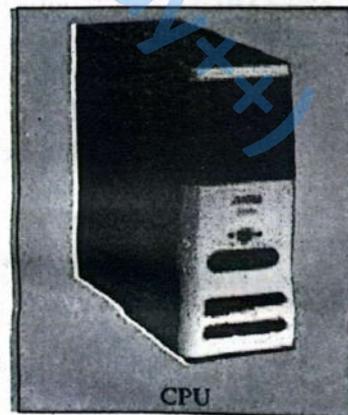
The brain of computer is the central processing unit abbreviated as a CPU.

(i) It controls different parts of computer that includes control unit, memory unit and arithmetic and logic Control unit is the central part of CPU. It OOP interprets instructions and directs other parts how to how operate?

(ii) A major function of this unit is to manage froali the sequence and operations under instructions - (programme).

(iii) The CPU sends data to memory to Fig: CPU ALU where addition, subtraction and other operations are done.

(iv) From there, data is brought back to memory and finally sent to output unit.



- (v) The CPU supervises all the operations carried on by the computer.

### MEMORY UNIT

- (i) The memory unit consists of RAM and ROM, which are abbreviations of "Random Access Memory" and "Read Only Memory" respectively.
- (ii) This unit is also known as temporary memory.
- (iii) Data from input device or hard disk is first carried to RAM before processing it.
- (iv) Some informations are already fed permanently to the ROM.
- (v) When computer is turned on, ROM initiates the operating system.

### ARITHMETIC AND LOGIC UNIT

- (i) Arithmetic and logic unit (ALU) does mathematical operations such as addition, subtraction, multiplication, division etc. and also it performs logical operations such as comparison between two things.
- (ii) In the modern computers, control unit and arithmetic and logic units are included in the same microprocessor.
- (iii) Microprocessor is such an integrated circuit that consists of small silicon chip.
- (iv) Thousands of electronic components are installed on it.
- (v) This chip possesses the entire problem solving capability of a computer.



### III. OUTPUT DEVICES

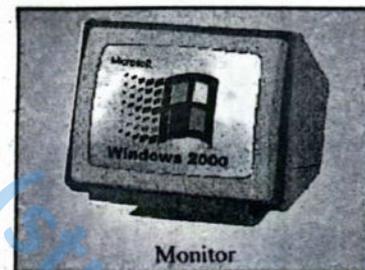
An output device receives information from CPU and displays the operation carried out by computer.

Some common output device are:

- (i) Monitor      (ii) Printer  
(iii) Speaker    (iv) Robot

#### (i) MONITOR

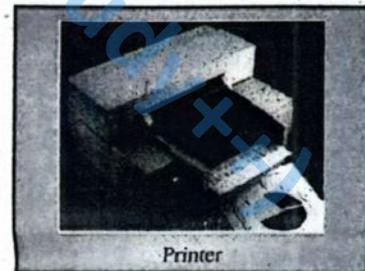
A monitor is such an output device on which all the computer operations can be watched on the screen like television.



#### (ii) PRINTER

Printer is another output device which prints the results of processing on paper.

Printers are of many types that include dot matrix, laser, inkjet and bubble jet etc.



#### (iii) SPEAKERS

Speaker converts signals into sound, so this is also an output device.

#### (iv) ROBOT

A robot acts on the advice of computer, therefore it is included in output devices.

Output of computer can also be recorded on the cassette, floppy disk or C.D. Besides sound, video films and computer data is stored on C.D. That can be thereafter watched on computer or T.V. screen.

## 2. SOFTWARE

The instructions given to the computer for some tasks by electronic method are called software.

It is not possible for a computer to solve any problem unless it is provided instructions in such a language that is understandable for computer. Different instructions are needed for different tasks. These instructions are fed through magnetic tape, C.D. and floppy disk etc.

It includes operating system, computer language and programmes.

### PROGRAMME

Programme is a list of instructions for a particular task. Under these instructions, the computer processes data and converts it into information. Preparing such a list of instructions is called programming or software engineering.

### PROGRAMMER

A person writing a programme is known as programmer. Not everyone does write a programme, but pre written programmes are available in the market. Most of the people use them.

A few of the tasks done by different programmes are given below:

#### (i) WORD PROCESSING

The use of computer for writing matter, editing, storing and printing is known as word processing. In word processing, major task is to type matter by keyboard. Writing words in different styles and colours is possible in it. Word processing has too much importance in printing and publishing books. In such programmes there is also provision for correcting spelling and grammatical mistakes.

#### (ii) GRAPHICS

There are certain programmes, which provide facility to draw straight and curved lines. These programmes are used to draw diagrams and pictures. Colours and shades can also be filled in pictures. Drawing lines, making pictures and designs by computer is called graphics.

#### (iii) DATA MANAGEMENT

To store data in different files and rearrange them to get requisite results when needed is known as data management. Educational institutions, banks, libraries, hospitals, offices and big commercial organisations store informations, make amendments in them, keep different records and run their systems with the data management.

(LHR 2019 GII)

### Q.10. What are the main information storage devices?

Ans. Information Storage Devices (LHR 2017 GI, SGD 2016 GI, DGK 2016 GII)

With the advancement in information technology, following devices have become very popular:

1. Audio , video Cassettes
2. Compact disks
3. Floppy disk
4. Hard disks etc. (LHR 2016 GI)

Offices, banks, universities and other institutions are transferring their records on

these devices rather than to keep it on papers. These devices can store too much information in a little space. Moreover, it is easier to use when is it required.

## 1. AUDIO AND VIDEO CASSETTES

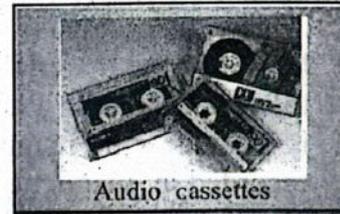
### AUDIO CASSETTES

Audiocassettes are used in a tape recorder.

### VIDEO CASSETTES

Videocassettes in a VCR. Both of them consist of plastic tape, which is coated with a magnetic material. Sound or picture is converted into electrical signals and sent to audio or video heads. Signals produce varying magnetic field in the heads. When tape runs over the head, the magnetic field changes the pattern of magnetic material on the tape.

In this way audio or video signals are recorded on the tape. To reproduce sound or picture, the reverse process is done. This time, head converts magnetic recording into audio and video signals again. The speaker and video signal into picture changes the audio signal into sound by the picture tube of T.V.



Audio cassettes



Video cassettes

## 2. COMPACT DISK

This is an aluminium or plastic disk with shining surface. It is made for digital recording.

**PITS:** In this recording millions of tiny pits are engraved on the disk. Its pattern corresponds to audio and video signals.

**FLATS:** The shining spaces between the pits are called "flats".

**CD READING:** For the replay, a laser beam scans the disk. This is known as reading of C.D.

The flats reflect beam, which is equivalent to "1" in digital language. The pits do not reflect beam, which is 0. All 1's and 0's form digital signal.

**RELAY:** A circuit in the C.D. player converts digital recording to analogue electric signal. This signal is amplified and sent to the speaker or picture tube.

**IMPORTANCE:** The quality of sound produced by digital recording of C.D. is much better as compared to that of cassette tape. Moreover, a head or needle does not touch the C.D. as in case of cassette tape, but instead, only the laser beam touches it. That is why no scratches are formed on the C.D. and it works for a long time with the same performance.



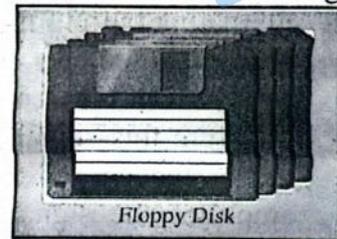
Compact Disk

## 3. FLOPPY DISK

Floppy disk is a soft plastic disk over which a layer of magnetic material such as ferrous oxide is coated.

Informations are stored on it in the form of magnetic pattern. It is kept in a plastic cassette for protection.

When it is inserted in the computer, the floppy driver rotates it fastly. A head reads

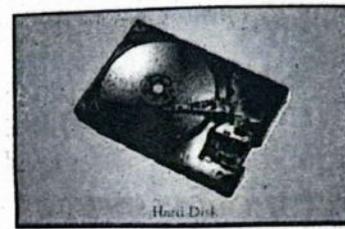


Floppy Disk

or writes data on the disk.

#### 4. HARD DISK

A hard disk consists of two or more plates made of hard metallic material. Plates are mounted on a spindle that rotates fastly. Plates are kept in a case. Each plate is coated with magnetic material on which data is recorded in magnetic pattern.



To read recorded data or to write, each plate is provided with a specific head. Much more information can be stored on the hard disk as compared to floppy disk.

#### STORAGE DISK

Due to high storage capacity hard disk is also known as storage disk. A hard disk is the permanent part of a computer, and is installed inside the computer.

#### Q.11. What are analogue or digital converter?

#### Ans. ANALOGUE / DIGITAL CONVERTERS

Such quantities, which increase or decrease continuously, are known as analogue quantities.

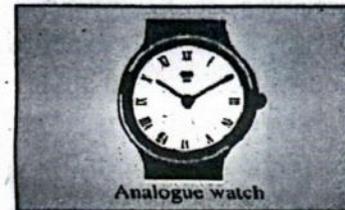
#### Examples

Distance, time, velocity and temperature are good examples of analogue quantities.

When we note time from a watch with arms, it could be any time from zero to twelve hours.

#### ANALOGUE WATCH

As the arms rotate continuously over the dial, the time advances continuously. Thus time is an analogue quantity and the watch with arms would be called analogue watch.



#### DIGITAL QUANTITIES

Digital quantities are not continuous.

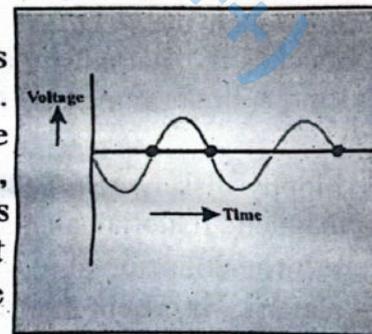
Example: The time on a digital watch does not advance continuously but the display changes once in one second.

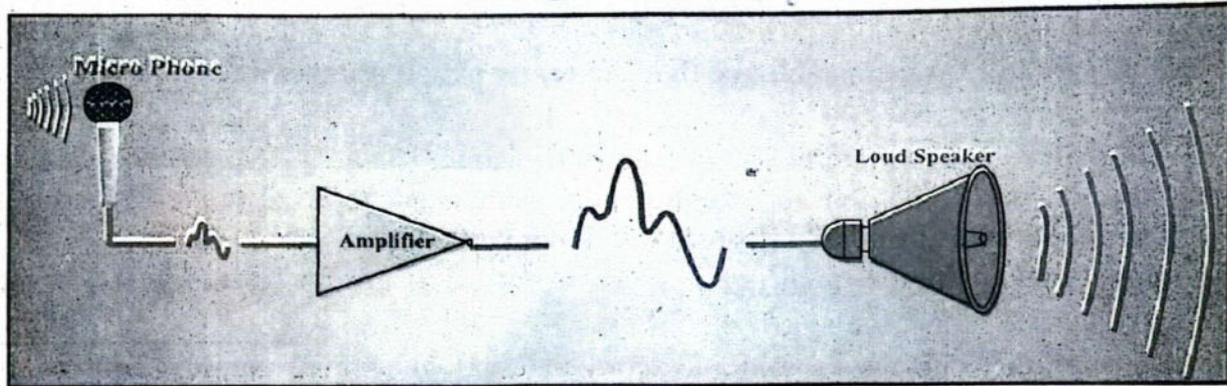


#### ANALOGUE SINGLES

The voltage varies continuously between maximum and minimum values. Hence voltage is an analogue quantity.

When a person speaks into microphone, it produces alternating current in the circuit corresponding to sound. This is called the electric signal of sound. Since the voltage varies continuously according to sound, therefore this signal is analogue signal. If this signal is fed to the amplifier, which is an analogue circuit, it amplifies the signal without changing its shape. The speaker thereafter converts this signal into loud sound.





## DIGITAL SIGNALS

During last few decades, scientists and engineers have device such circuits, which convert information into digital signals.

Digital signals are not continuous.

These consist of two types of electrical pulses; one is the high voltage pulse and the other low voltage pulse.

High voltage pulse is also called as on or "1" while the low voltage pulse as off or "0".

Digital signals consist of discrete on/off electrical pulses.

Digital signals are based on binary number system in which the base of counting is 2. You have learnt to write figures on the base of 2 in junior classes. As a figure 5637 on the base of 10 (in decimal system) is actually:

$$5637 = 5 \times 10^3 + 6 \times 10^2 + 3 \times 10^1 + 7 \times 10^0$$

$$\text{or } 5637 = 5000 + 600 + 30 + 7$$

Likewise, the figure 361 on the base of 2 in binary system has the meaning

$$361 = 1 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$\text{or } 361 = 256 + 0 + 64 + 32 + 0 + 8 + 0 + 0 + 1$$

In the binary system, we will write the figure 361 as

$$361 = 101101001$$

A simple method to write figure 361 in the binary system is that goes on dividing 361 by 2. Write down all the remainders in sequence starting from left side.

This will be the required figure. The division of 361 by 2 is shown. If we write down the remainders in sequence then the figure becomes 101101001. This is the required figure.

2	361	
2	180	— 1
2	90	— 0
2	45	— 0
2	22	— 1
2	11	— 0
2	5	— 1
2	2	— 1
2	1	— 0

## BINARY CODING

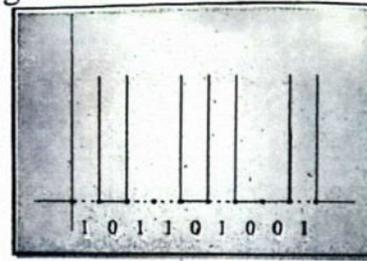
Letters are also changed into binary coding like figures and then converted into voltage pulses. In this way all messages can be converted into digital signals. There are a few problems in interconnecting computers at far off places. It is because most of the communications are made through telephone wires, which are basically laid down for transmission of sound.

### SIGNAL OF SOUND

The signal of sound is analogue that can easily pass through wires

### SIGNAL OF COMPUTER

The signal of computer is digital that cannot pass through wires. Therefore, computer is connected to telephone wires through a device, which converts digital signal into analogue signal.



### CODING

On the other end the same device converts analogue signal coming from wires into digital signal before it is allowed to enter the computer. This device is called modem, which is abbreviated from modulator/demodulator. If you want to interconnect computers in the same room or same building, it does not require modem.

**Q.12. Write a comprehensive note on Information Technology.**

(LHR 2015 GII, LHR 2018 GI, BWP 2015 GII)

**Ans. IMPORTANCE OF I.T INFORMATION TECHNOLOGY**

The scientific method of storing information, processing and using them properly and their communication is called information technology.

With the help of information technology.

- (i) Information can be exchanged.
- (ii) These can be made available for use.
- (iii) Games, music and other entertainment programs being held on the other side of the globe can be watched now.

**Q.13. What do you mean by telecommunication?**

**Ans. TELECOMMUNICATIONS** (RWP 2015 GI, FBD 2015 GII, DGK 2019 GI)

The methods used for instant communication of information to far off places are called telecommunication.

### FIRST TELEGRAPHIC SIGNAL

In 1901, telegraph signal was transmitted and received through electromagnetic waves for the first time without using wires. Its inventor was Marconi.

In 1906, first human voice was transmitted.

### MAIN SOURCES OF CONTACT

Now-a-days, besides telephone, fax machine, computer and Internet etc. are main sources of contact. By these devices informations are transmitted from one place to another in the form of words, sound, pictures and computer data.

The methods used for instant communication of information to far off places are called telecommunication.

### INFORMATIVE SIGNALS:

In all communication methods, informations are transmitted after converting them into electric signals.

**ELECTRIC SIGNALS:** Electric signals are sent through wires, radio signals through air and light signals through optical fibres.

- a) **RADIO SIGNALS:** Radio Signals are sent through air.  
 b) **LIGHT SIGNALS:** Light signals are sent through optical fibers.

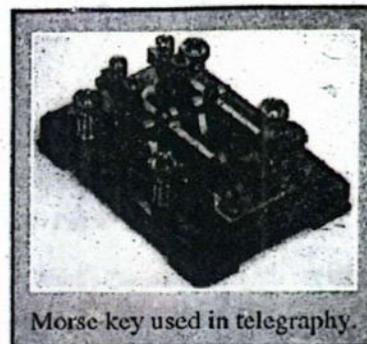
### SOURCES OF TELECOMMUNICATION

Radio and television are the main sources of telecommunication. Some other sources are given below:

- (i) Telegraphy                      (ii) Telephone                      (iii) Mobile Phone  
 (iv) Telex Machine                      (v) Fax Machine

#### (i) TELEGRAPHY

In telegraphy, messages are transmitted in the form of Morse codes. Informations are changed into electric pulses and then transmitted to other places. On the other end these are again converted into audible signals. In this method experts are required to send codes and to decode the message received from the other side. This method is very slow.



Morse key used in telegraphy.

#### (ii) TELEPHONE (LHR 2014 GII)

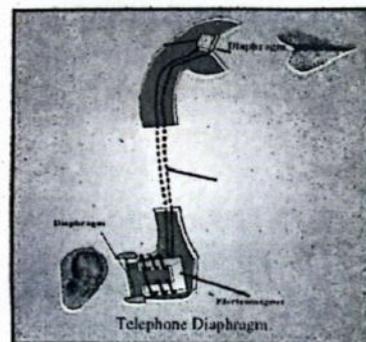
This is an advanced form of telegraphy. Direct conversation is made through telephone instead of using codes.

##### HAND SET

One part of telephone handset is the microphone and the other part is a receiver.

##### MICROPHONE

Carbon granules are filled in microphone over which a metallic diaphragm is fitted.



Telephone Diaphragm

### CONVERSION OF SOUND WAVES INTO ELECTRIC SIGNALS

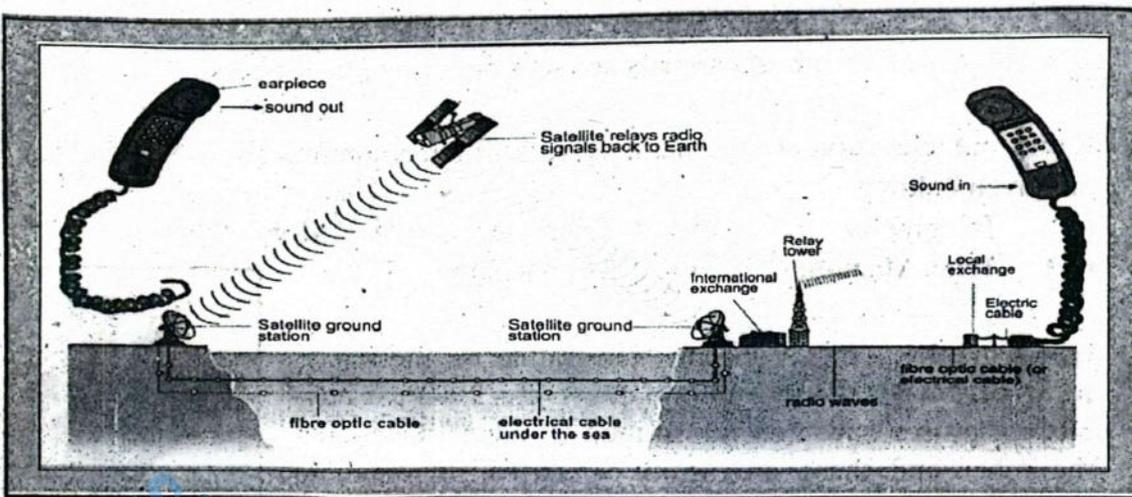
When someone speaks into microphone, the diaphragm vibrates that causes variation in pressure on the carbon granules. Change of resistance occurs due to variation in pressure and the current in the circuit varies. Thus microphone changes sound into electric signals, which are transmitted through wire to the receiver at the other end of line. There is also an iron diaphragm in the receiver under which an electromagnet is placed.

### CONVERSION OF ELECTRIC SIGNALS IN SOUND:

The variation in the current passing through the coil of magnet causes variation in the force of magnet, due to which diaphragm moves back and forth in accord with the signal. The vibrating diaphragm produces sound.

### MICROWAVE TRANSMISSION (SATELLITE)

Electric signals of telephone pass through metallic wires. In the modern system, electric signals are first converted into light signals and then transmitted through optical fibres. In every country, there is a network of telephone exchanges that provide a contact between two telephones. For international contacts, microwave transmissions or satellites are used.



### (iii) MOBILE TELEPHONE

Now-a-days the use of mobile telephone is very common. A mobile phone sends and receives messages through radio waves. It carries a radio transmitter and a receiver inside it. The transmitter converts sound into radio waves which are received by a nearby station linked with the telephone network. It transmits the radio signals onward.



Mobile Telephone

### CELL

The area of each station of the network is called a cell. When a call reaches from one cell to another, it is connected to the required station by an automatic system.

### PHONE

Mobile phone is also called as cellular telephone by virtue of cell system. The receiver of mobile phone again changes the radio signals into sound.

### (IV) TELEX MACHINE

This consists of: (i) A teleprinter (ii) An exchange machine.

**A TELEPRINTER:** Message is sent from one place to another by this machine. Message is typed on the telex machine.

**EXCHANGE MACHINE:** Changes it into electric signals that reach the other telex machine through telephone line.

**The teleprinter** prints the message on paper. Since the whole message has to be typed on this machine, therefore too much time is wasted. This machine has been now replaced by fax machine.

### (V) FAX MACHINE

This machine is used to send and receive documents and pictures from one place to another. The word "Fax" is the short name of "Facsimile" that means to reproduce a document or picture in exactly the same form.



Fax Machine

### WORKING OF FAX MACHINE

Fax machine first make the image of document, changes it into electric signal and then transmits it through telephone line. The fax machine, that receives the signal on the other side, reproduces it in the form of image print on the paper.

**Q.14. Write a note on communication system.**

**Ans. COMMUNICATION SYSTEMS**

The electronic transfer of information from one place to another is known as communication.

#### COMMUNICATION SYSTEM

The electromagnetic devices used for this and method to transfer information is known as communication system.

#### COMMUNICATING DATA

The data to be transferred may consist of sound, text, video and graphics etc.

The devices involved in the transfer of information could be telegraph, telephone, radio, television or computer.

The distance could be short as the next room and could be as long as the information may be sent to the other end of the solar system.

#### COMPUTER COMMUNICATION

When we talk with reference to computer, communication means the contact of one computer with the other due to which they exchange information with each other.

The communication between the computers takes place only when data reaches from one computer to the other in the form of electronic signal.

#### COMPONENTS OF COMMUNICATION SYSTEMS

Three basic components of communication system are:

- (i) The sending device
- (ii) A communication link or medium
- (iii) The receiving device

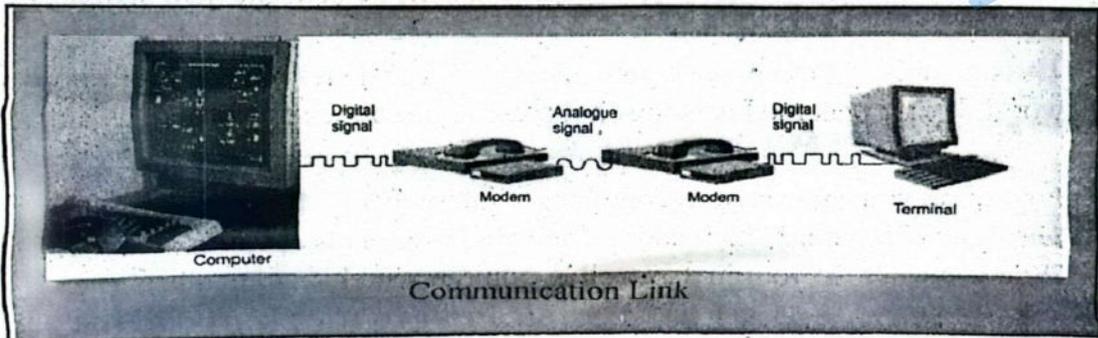
#### SENDING DEVICE

The information sending device in most of the case is a computer, which gives information in the form of digital signal.

These are converted into electric signals by a modem so that these can be transmitted.

#### LINKS

For the transmission of electric signals, a medium or link is required. On the receiving end signals are again changed into digital ones before allowing them to enter into the computer.



Commonly used links are of three kinds.

a. The telephone wires, which are also called, boosted pairs.

b. The fibre optic technology. The transmission of data through optical fibres is much faster, and thousands of signals can pass through a fibre at a time. Moreover, signals do not suffer loss of energy in the way.

c. The third link is the microwave transmission. T.V. Signals are transmitted to the satellite through microwave by a ground station. The satellite retransmits them to the required ground station after amplifying them.

From there signals are transmitted onwards through other media.

**Q.15. Write short notes on: 1. Internet 2. E-mail**

**Ans.1. INTERNET**

Internet is the name of interconnection of millions of computer.

#### **Importance**

We can exchange information through internet and can get information of every type too.

#### **WEBSITES**

The individuals and organization from all over the world have stored information on the internet in the form of websites.

Websites is a huge collection information. You can make use of it when needed.

Companies can also provide details of their products on websites and can advertise them.

Professionals such as doctors and engineers etc. can exchange latest information about their problems.

#### **INTERNET SERVICE PROVIDER (ISP)**

You make contact with Internet service provider ISP through your computer and it provides you the international contact.

#### **PROTOCOL**

The computers linked with an Internet use uniform communication process called the protocol.

#### **TCP/IP**

The protocol used in Pakistan is the "Transmission Control Protocol/Internet Protocol" which is abbreviated as TCP/IP.

**2. E-MAIL**

**(LHR 2015 GI)**

A major use of Internet is the quick mailing called electronic mail or simply E-mail.

#### **IMPORTANCE OF E-MAIL**

Through this, you can send your message immediately to any person all over the world. If the concerned person is not present, he can read the message later as well.

#### **STEPS FOR MAIL READING**

- (i) First of all you connect your computer to internet.
- (ii) Then you type your E-mail address and password. This opens your mailbox.
- (iii) Here you can read your mail as well as you can send E-mail to others.

## STEPS FOR MAIL SENDING

To send E-mail to someone:

- (i) You type the E-mail address of that person.
- (ii) You type the message.
- (iii) The press send button. The message goes to the mailbox of the required person.

## VOICE MAIL

Now a days voice-mail has become possible in which your voice reaches the receiving end in original.

You can also make two-way conversation.

## VIDEO CONFERENCE

In a video conference, television, video and sound technology is linked with computer through which persons at different places can see, listen and conversant with one another.

## Important Key Points

### 1. Define electronics.

Ans. Electronics is the knowledge of behaviour and control of electric current.

### 2. What are semiconductors?

Ans. Semi-conductor is such a substance whose ability to conduct current lies in between conductors and insulators.

### 3. What are PN junctions or semiconductors?

Ans. If the silicon crystal is doped in such a way that its one part becomes N-type and the other P-type then it is called a P-N junction diode.

### 4. What is a rectifier?

Ans. That device which is used to convert A.C. voltage to D.C. voltage is called rectifier.

### 5. What are carrier waves?

Ans. Radio waves are a type of electromagnetic waves. These are also called carrier waves.

### 6. What is a computer?

Ans. Computer is an electronic machine that receives raw data and processes it into useful information under the given instructions.

### 7. What is hardware?

Ans. The components of computer that can be physically touched are called the hardware.

### 8. What is software?

Ans. The instruction given to the computer for some task by electronic method is called software.

### 9. What is a computer programmes?

Ans. Programme is a list of instructions for a particular task. Under these instructions, the computer processes data and converts it into information.

### 10. What is word processing?

Ans. The use of computer for writing matter, editing, storing and printing is known as word processing.

### 11. What is graphics ?

Ans. Drawing lines, making pictures and designing through computer is called graphic.

**12. What is data management?**

Ans. To store data in different files and rearrange them to get requisite results when needed is known as data management.

**13. What are analogue quantities?**

Ans. Such quantities, which increase or decrease continuously, are known as analogue quantities.

**14. What does Analogue Signal represent?**

Ans. Analogue signals represent continuously varying voltage.

**15. What are digital signals?**

Ans. Digital signals consist of discrete on/off electrical pulses.

**16. What is information technology?**

Ans. The scientific method of storing information, processing and using them properly and their communication is called information technology.

**17. What is telecommunication?**

Ans. The methods used for instant communication of informations to far off places are called telecommunication.

**18. What is communication?**

Ans. The electronic transfer of information from one place to another is known as communication.

**19. What is meant by communication system?**

Ans. The electromagnetic devices used for this and method to transfer information is known as communication system.

## Glossary

<b>Electronics:</b>	Knowledge of behaviour and control of electric current.
<b>Semi-conductor:</b>	Material with conductivity in between conductors and insulators.
<b>N-type Semi-conductor:</b>	That has more free electron.
<b>P-type Semi-conductor:</b>	That has more holes.
<b>Rectifier:</b>	Device to change A.C. into D.C.
<b>Computer:</b>	Machine that changes raw data into useful information.
<b>Hardware:</b>	Components of computer, which can be physically touched.
<b>Input Devices:</b>	Devices to enter data in the computer.
<b>Central Processing Unit:</b>	Part of computer that controls all operations in the computer.
<b>Output Devices:</b>	Devices, which display computer operations.
<b>Devices:</b>	Information Storage On which information can be stored. Audio and Video Cassettes: Magnetic tapes to record audio and video signals.
<b>Compact Disk:</b>	Disk for digital recording in the form of pits and flats.
<b>Floppy Disk:</b>	Soft plastic disk for digital recording.

<b>Hard disk:</b>	Disk consisting of metal plates for digital recording.
<b>Software:</b>	Instructions to computer for any task.
<b>Programme:</b>	List of instructions for computer to do a particular task
<b>Word Processing:</b>	Writing, editing and printing through computer.
<b>Graphics:</b>	Drawing pictures and designs on computer.
<b>Data Managing:</b>	Storing data in files, its rearrangement and obtaining

### Exercise

1. Four answers are given for each sentence, select the correct answer:

- (i) In P-type semi-conductor, most of the current is due to  
 (a) free electrons (b) holes  
 (c) positive ions (d) heat
- (ii) Diodes are used to  
 (a) convert A.C. into D.C. (b) convert D.C. into A.C.  
 (c) store charge (d) change voltage
- (iii) Electric signal is converted into digital signal by  
 (a) keyboard (b) monitor  
 (c) scanner (d) modem
- (iv) In binary system, 37 is written as  
 (a) 101101 (b) 100101  
 (c) 110011 (d) 101011
- (v) Analogue signal is recorded on  
 (a) magnetic tape (b) floppy disk  
 (c) hard disk (d) C.D.

### Answers

(i)	(b)	(ii)	(a)	(iii)	(d)	(iv)	(b)	(v)	(a)
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2. Fill in the blanks:

- (i) Electronics is the knowledge of behaviour and control of \_\_\_\_\_
- (ii) A beam scans C.D. for replay \_\_\_\_\_
- (iii) Programme is a list of \_\_\_\_\_
- (iv) The orbit of a hovering satellite is known as orbit \_\_\_\_\_
- (v) In the picture tube, an electron gun throws a beam of \_\_\_\_\_ on the screen.

### Answers

(i)	Electric current	(ii)	LASER	(iii)	Instructions for a particular task.
(iv)	Geo stationary	(v)	Electrons		

Q.3. Mark (✓) against true and X against false statement in the following sentences.

- (i) The quality of sound from digital recording of C.D. is much better as ✓  
 compared to that of cassette tape.
- (ii) Analogue signal consists of distinct on/off electrical pulses. x
- (iii) In cable T.V. electrical signals are converted into radio waves. x
- (iv) Fax machine is used to send and receive documents and pictures from one ✓  
 place to another.

(v) At least four hovering satellites are required to send transmissions to all over the world. ×

**Q. 4. What are N-type and P-type semi-conductors? Where are they used for**

Ans. See Q. No. 3

**Q. 5. How is diode forward and reverse biased? Describe different kinds of diodes and few uses of them.**

Ans. See Q. No. 4

**Q.6. What are radio waves? How radio transmissions reach us?**

Ans. See Q. No. 6

**Q. 7. How does television work? Explain briefly the satellite T.V.**

Ans. See Q. No. 7

**Q. 8. Write an explanatory note on television.**

Ans. See Q. No. 7

**Q. 9. What are the main parts of a computer and what do they work?**

Ans. See Q. No. 9

**Q. 10. Write a note on communication system.**

Ans. See Q. No. 14

## ❑ IMPORTANT MULTIPLE CHOICE QUESTIONS (MCQ's)

Each question has four options. Encircle the correct answer.

- 1. Output device is:** (LHR 2014 GI)  
(a) Keyboard (b) Mouse  
(c) Scanner (d) Printer
- 2. The components of communication are:** (LHR 2014 GII)  
(a) Two (b) Three  
(c) Four (d) Five
- 3. The computer has made the whole world:** (LHR 2014 GII)  
(a) Global city (b) Global village  
(c) Global town (d) Global society
- 4. The area of each station of the network of mobile phone is called as:** (LHR 2015 GI)  
(a) Drum (b) Pace  
(c) Pack (d) Cell
- 5. For communication system, we use:** (LHR 2015 GI)  
(a) Lenses (b) Optical fibres  
(c) Mirrors (d) Telescope
- 6. The study of weather for short time is called:** (LHR 2015 GI)  
(a) Morphology (b) Zoology  
(c) Meterology (d) Radiology
- 7. Analogue signals is recorded on:** (LHR 2015 GI)  
(a) Magnetic tape (b) Floppy disk  
(c) Hard disk (d) C.D

8. Cellular phone is also known as: (LHR 2015 GI)  
(a) Set (b) Cell  
(c) Mobile phone (d) Telephone
9. In binary system, 37 is written as: (LHR 2015 GI)  
(a) 101101 (b) 100101  
(c) 110011 (d) 101011
10. How main electron guns are used in colour T.V: (LHR 2015 GII)  
(a) One (b) Two  
(c) Three (d) Four
11. In air, radio waves are transmitted through which: (LHR 2015 GII)  
(a) Antenna (b) Radiator  
(c) Receiver (d) Transmitter antenna
12. The light emitting diodes are called: (LHR 2015 GII)  
(a) Galium (b) Calcium  
(c) Carbon (d) Magnesium
13. The Radio Set is a: (LHR 2015 GII)  
(a) Radiator (b) Receiver  
(c) Insulator (d) Transmitter
14. The process of radioactivity was discovered by Henry Becquerel in: (LHR 2015 GII)  
(a) 1596 (b) 1696  
(c) 1796 (d) 1896
15. For communication system, we use: (LHR 2015 GII)  
(a) Optics (b) Mirrors  
(c) Telescope (d) Optical fibres
16. The study of weather for short period is called: (LHR 2015 GII)  
(a) Morphology (b) Zoology  
(c) Meteorology (d) Radiology
17. The speed of sound waves in meter per second is: (LHR 2016 GI)  
(a) 820 (b) 530  
(c) 340 (d) 860
18. It is not an input device: (LHR 2016 GI)  
(a) Keyboard (b) Mouse  
(c) Printer (d) Scanner
19. It is a temporary memory: (LHR 2016 GI)  
(a) C.D (b) RAM  
(c) Floppy disk (d) Hard disk
20. In N-type semi-conductors, most of the current is due to: (LHR 2016 GI)  
(a) Free electrons (b) Holes  
(c) Positive ions (d) Free protons
21. The name of Pakistan's first artificial satellite is: (LHR 2016 GI)  
(a) Badar-I (b) Rahbar  
(c) Sputnik-I (d) Skua
22. Which frequency carrier waves are used for radio transmission?

- (a) 30 kilo hertz (b) 40 kilo hertz (LHR 2016 GII)  
 (c) 50 kilo hertz (d) 60 kilo hertz
23. In a colour television, the number of electron guns are: (LHR 2016 GII)  
 (a) One (b) Two  
 (c) Three (d) Four
24. Converts electrical signal into digital signal: (LHR 2017 GI)  
 (a) Keyboard (b) Monitor  
 (c) Scanner (d) Modem
25. Analogue signals are recorded on: (LHR 2017 GI)  
 (a) Magnetic tape (b) Floppy disk  
 (c) Hard disk (d) CD
26. It is a storage device: (LHR 2017 GII)  
 (a) Keyboard (b) Mouse  
 (c) Monitor (d) Hard disk
27. The source of electrical power for satellites is: (LHR 2017 GII)  
 (a) Solar cell (b) Wind  
 (c) Radiations (d) Moon
28. It is a semi-conductor: (LHR 2017 GII)  
 (a) Tin (b) Silicon  
 (c) Cobalt (d) Silver
29. In how many parts, a computer is divided: (LHR 2018 GI)  
 (a) Two (b) Four  
 (c) Six (d) Eight
30. The number of components of communication system are: (LHR 2018 GI)  
 (a) Two (b) Three  
 (c) Four (d) Five
31. Brain of computer is called: (LHR 2018 GI)  
 (a) CPU (b) VCR  
 (c) CD (d) HD
32. The area of each station of mobile network is called: (LHR 2018 GI)  
 (a) System (b) Fax  
 (c) Telex (d) Cell
33. Analogue signal is recorded on: (LHR 2018 GII)  
 (a) Magnetic tape (b) Floppy disk  
 (c) Hard disk (d) C.D
34. Indicate the output device: (LHR 2018 GII)  
 (a) Keyboard (b) Mouse  
 (c) Printer (d) Scanner
35. Step-up transformer is used in: (LHR 2019 GI)  
 (a) Radio (b) Tape-recorder  
 (c) T.V (d) Computer
36. Most of the current flows through N-type semi-conductor due to: (LHR 2019 GI)  
 (a) Protons (b) Free electrons

- (c) Neutrons (d) Holes
37. How many hovering satellites can send transmissions to all over the world?  
 (a) 2 (b) 3 (LHR 2019 GI)  
 (c) 4 (d) 5
38. The instructions which are given by electronic way to do work by computer, called:  
 (a) Pulse (b) Signals (LHR 2019 GI)  
 (c) Hardware (d) Software
39. The sensitive diodes of light are called:  
 (a) Photo diodes (b) Amplifier (LHR 2019 GII)  
 (c) Crystals (d) Rectifier
40. It is an input device:  
 (a) Printer (b) Monitor (LHR 2019 GII)  
 (c) Scanner (d) Speaker
41. Hard disk is called:  
 (a) Floppy disk (b) Compact disk (LHR 2019 GII)  
 (c) Storage disk (d) Monitor
42. Knowledge of behaviour and control of electric current is called:  
 (a) Information technology (b) Electronics  
 (c) Conductance (d) None of the above
43. Most of the current through N-type semi-conductors is due to:  
 (a) Free electrons (b) Free protons  
 (c) Free neutrons (d) Free atoms
44. The current flowing through the diode in reverse biased diode is almost:  
 (a) One (b) Zero  
 (c) Ten (d) 100
45. Conversion of A.C. to D.C is called:  
 (a) Conversion (b) Alternation  
 (c) Conduction (d) Rectification
46. Inventor of radio system is:  
 (a) Edison (b) Ohm (DGK 2019 GII)  
 (c) Marconi (d) Stanley
47. A satellite orbiting at a distance of about 36000 kilometers above the equator completes its rotation in:  
 (a) 24 hours (b) One month  
 (c) One year (d) One light year
48. Which of the following is not an output device?  
 (a) Printer (b) Floppy disk  
 (c) Keyboard (d) Compact disk
49. The area of each station of the network of a mobile phone is called:  
 (a) Mobile station (b) Cell  
 (c) Telephone (d) Receiver
50. The name of interconnection of million of computers is: (FDS 2020 GII)

- (a) Telecommunication (b) Internet  
(c) Television (d) Telex machine
51. Components of computer, which can be physically touched, are called  
(a) Hardware (b) Software (GUJ 2019 GII)  
(c) Input device (d) Output device
52. Programs, which provide facility to draw straight and curved lines, are called:  
(a) Software (b) Data  
(c) Graphics (d) Audio videocassettes
53. Which of the following is the result of modern age electronics? (SDG 2019 GII)  
(a) Computer of many rooms (b) Huge gramophones  
(c) Travel in space (d) Big valves in T.V.
54. Light emitting diodes are made from specific compounds of: (RWP 2020 GI)  
(a) Aluminium (b) Gallium  
(c) Platinum (d) Uranium
55. Diodes, which are called:  
(a) Photodiode (b) Diode  
(c) Light emitting diode (d) Rectifier
56. How many types of semi conductor diodes are there?  
(a) Three (b) Two  
(c) Four (d) Five
57. Which of the following is a part of computer?  
(a) Hardware (b) Software  
(c) Both a and b (d) None of them
58. Which of the following computer device is rolled over a pad? (SWL 2019 GI)  
(a) Key board (b) Monitor  
(c) CPU (d) Mouse
59. Which of the following is not software?  
(a) Graphics (b) Robots  
(c) Data management (d) Word-processing
60. In word processing, major task is to:  
(a) Open the computer (b) Install the software  
(c) Install the program (d) Type the text matter
61. A hard disk consists of two or more plated made of hard: (BWP 2019 GI)  
(a) Metal (b) Plastic  
(c) Wood (d) None of them
62. The shining spaces between the pits of compact disk are called:  
(a) Rounds (b) Squares  
(c) Flats (d) Bits
63. Floppy disk is a soft plastic disk, which is coated by:  
(a) Aluminium sulphide (b) Ferric oxide  
(c) Ferric sulphide (d) Calcium oxide
64. Radio signals are sent through: (SWL 2020 GI)

- (a) Air (b) Wire  
(c) Optic fibres (d) Data cable
65. Which of the following is not a source of telecommunication?  
(a) Telex machine (b) Fax machine  
(c) Mobile phones (d) None of them
66. The area of each station of the network is called a:  
(a) Chamber (b) Cell  
(c) Station (d) Diode
67. Telex machine consists:  
(a) A tele printer (b) A television  
(c) An exchange machine (d) Both a and c
68. The word 'fax' is the short name of:  
(a) Faxmodem (b) Faxile machine  
(c) Facsimile (d) Faxem
69. Machine that changes raw data into useful information is called:  
(a) Rectifier (b) Semi-conductor  
(c) Diode (d) Computer

## Answers

1	(d)	2	(b)	3	(b)	4	(d)	5	(b)
6	(c)	7	(a)	8	(c)	9	(b)	10	(c)
11	(d)	12	(a)	13	(b)	14	(d)	15	(d)
16	(c)	17	(c)	18	(c)	19	(b)	20	(a)
21	(a)	22	(a)	23	(c)	24	(d)	25	(a)
26	(d)	27	(a)	28	(b)	29	(a)	30	(b)
31	(a)	32	(d)	33	(a)	34	(c)	35	(c)
36	(b)	37	(b)	38	(d)	39	(a)	40	(c)
41	(c)	42	(b)	43	(a)	44	(b)	45	(d)
46	(c)	47	(a)	48	(b)	49	(b)	50	(b)
51	(a)	52	(c)	53	(c)	54	(b)	55	(a)
56	(b)	57	(c)	58	(d)	59	(b)	60	(d)
61	(a)	62	(c)	63	(b)	64	(a)	65	(d)
66	(b)	67	(d)	68	(c)	69	(d)		

## Important Short Questions

■ Answer the following short questions.

1. Define doping (LHR 2014 G-II, LHR 2015 G-I, LHR 2017 G-II, LHR 2018 G-I)  
**Ans.** Semiconductors are made more useful by increasing their conductivity. This is done by adding some quantity of trivalent or pentavalent atoms as impurity while growing the crystals of silicon or germanium. This process is called doping.

2. What is the process of arithmetic logic unit? (LHR 2014 G-II)  
Ans. Arithmetic and logic unit (ALU) does mathematical operations such as addition, subtraction, multiplication, division, etc. and also it performs logical operations such as comparison between two things.
3. Define Microchip. (LHR 2014 G-I)  
Ans. "The chip possesses the entire problem-solving capability of a computer" is called microchip.
4. What is meant by carrier waves? (LHR 2014 G-I)  
Ans. Radio waves are also called carrier waves, because these are used to carry radio and T.V. transmission from one place to another.
5. What are audio and video signals? (LHR 2014 G-I)  
Ans. Audio or video signals are recorded on the tape. To reproduce sound or picture, the reverse process is done. This time, head converts magnetic recording into audio and video signals again.
6. Write two uses of a computer. (LHR 2014 G-I)  
Ans. Two uses of a computer are as follows:  
(i) Arithmetic and logic unit solution.  
(ii) Rearrangement
7. Define computer. (LHR 2014 G-II)  
Ans. Computer is an electronic machine that receives raw data and processes it into useful information under the given instruction.
8. What is word processing? (LHR 2014 G-II, LHR 2015 G-II, LHR 2016 G-II)  
Ans. The use of computer for writing matter, editing, storing and printing is known as word processing. In word processing, major task is to type matter by keyboard. Writing words in different styles and colours is possible in it. In such program, there is also provision for correcting spelling and grammatical mistakes.
9. Define hardware and give example. (LHR 2014 G-II, LHR 2015 G-I)  
Ans. Hardware (LHR 2016 G-II, LHR 2018 G-I, LHR 2018 G-II, LHR 2019 G-I)  
The components of computer that can be physically touched are called the hardware. Examples: Keyboard, mouse, printer and monitor, etc
10. Write two parts of computer. (LHR 2014 G-II)  
Ans. A computer can be basically divided into two parts:  
(i) Hardware (ii) Software
11. What are P-type and N-type Semi-conductors?(LHR 2015 G-II, LHR 2019 G-I)  
Ans. N-type Semi-conductor  
When a pentavalent impurity such as arsenic (AS), is added to silicon crystals, then, due to this process, the number of free electrons in the semi-conductor increases. Such a material is called as N-type semi-conductor.  
P-type Semi-conductor (LHR 2016 G-I, LHR 2019 G-II)  
If a trivalent impurity such as aluminum (Al) is doped in silicon crystal, then there is a deficiency of an electron in the outermost orbit of silicon atom. This deficiency of electron is called a hole. Thus this type of doping increases the number of holes in the semi-conductor. Such material is known as P-type semi-conductor.

12. **What is meant by voice mail?** (LHR 2015 G-I)  
**Ans.** In voice mail, your voice reaches the receiving end in original. You can also make two-way conversation. Voice mail is possible through internet access.
13. **Define Communication and Communication System.** (LHR 2015 G-I)  
**Ans.** **Communication and Communication System**  
The electronic transfer of information from one place to another is known as communication. The electromagnetic devices used for this and method to transfer information is called communication system.
14. **What is meant by Rectification?** (LHR 2015 G-II, LHR 2017 G-II, LHR 2019 G-II)  
**Ans.** Process of converting alternating current to direct current is called rectification.
15. **Write the use of Optical Fibres.** (LHR 2015 G-II)  
**Ans.** **Use of Optical fibres are:**  
(i) These days, in telecommunication, optical fibres are replacing metal cables for transmitting telephone calls in a battery way.  
(ii) In this way, each caller's voice is changed into a light signal.  
(iii) A single optical fibre can transmit thousands of telephone calls.
16. **What is function of light emitting diode?** (LHR 2016 G-I)  
**Ans.** When an electron occupies the hole after entering into P region from N, light is emitted. These are also used as indicator lamps. Nowadays these diodes are also used in the audio deck to display ups and down in the loudness of sound.
17. **What is function of video cassettes?** (LHR 2016 G-I)  
**Ans.** Video cassettes are used in a VCR. These consist of plastic tape, which is coated with a magnetic material. Picture is converted into electrical signals and sent to video head. Signals produce varying magnetic field in the heads. When tape runs over the head, the magnetic field changes the pattern of magnetic material on the tape.
18. **Define telegraphy.** (LHR 2016 G-I)  
**Ans.** In telegraphy, messages are transmitted in the form of Morse code. Informations are changed into electric pulses and then transmitted to other places. On the other end, these are again converted into audible signals. In this method, experts are required to send codes to decode the message received from the other side. This method is very slow.
19. **Write a short note on e-mail.** (LHR 2016 G-I)  
**Ans.** A major use of Internet is the quick mailing called electronic mail or simply E-mail. Through this, you can send your message immediately to any person all over the world. If the concerned person is not present, he can read the message later as well.
20. **Differentiate between weaving and knitting.** (LHR 2016 G-I)  
**Ans.** In weaving, the fabric is made on looms while knitting, fabric is knitted on machines.
21. **What are input devices?** (LHR 2016 G-II)  
**Ans.** The devices through which data is entered in the computer are known as input devices.
22. **Differentiate between floppy disk and hard disk.** (LHR 2016 G-II, LHR 2017 G-I)  
**Ans.** Floppy disk is a soft plastic disk over which a layer of magnetic material such as

ferric oxide is coated. Information is stored on it in the form of magnetic pattern. While a hard disk consists of two or more plates made of hard metallic material on which data is recorded in magnetic pattern. Much more information can be stored on the hard disk as compared to floppy disk.

23. **What are hovering satellites? (LHR 2017 G-I, LHR 2018 G-II)**  
**Ans.** Such satellites, which seem to be stationary at some particular positions, are called as hovering satellites.
24. **What is difference between RAM and ROM? (LHR 2017 G-I)**  
**Ans.** Data from input device or hard disk is first carried to RAM before processing it while some informations are already fed permanently to the ROM. When computer is turned on, ROM initiates the operating system.
25. **Write types of computer printer. (LHR 2017 G-I)**  
**Ans.** Computer printers are of many types that include:  
(i) Dot Matrix (ii) Laser Jet (iii) Ink Jet (iv) Bubble Jet
26. **Define semi-conductor. Write name of two semi-conductors. (LHR 2017 G-II)**  
**Ans.** Semi-conductor is such a substance which has the ability to conduct current lies in between conductors and insulators.  
(i) N-type semi-conductor (ii) P-type semi-conductor
27. **What are radio waves? What is their frequency? (LHR 2017 G-II)**  
**Ans.** Radio waves are electromagnetic waves. Radio waves are also called carrier waves, because these waves are used to carry radio and T.V transmissions from one place to another. Their frequency ranges between 10 Hz and 10 KHz and their speed is that of light.
28. **Write use of scanner. (LHR 2018 G-I, LHR 2019 G-II)**  
**Ans.** Scanner is an important input device through which pictures and documents can be fed to the computer in their original form. This has facilitated much in the field of publishing.
29. **Write two uses of photodiodes. (LHR 2018 G-I)**  
**Ans. Uses of Photodiodes**  
(i) Photodiodes are used for detection of light and in the computer and video games, etc.  
(ii) These are also used as automatic switches in the circuits.
30. **What is meant by information storage devices? (LHR 2018 G-II)**  
**Ans.** Not more than a few years before, it was assumed that the only device to store and get informations are the books. But with the advancement in information technology, other information storing devices such as audio, video cassettes, compact disks, floppy disks, hard disks, etc. have become very popular.
31. **What is compact disk? (LHR 2018 G-II, LHR 2019 G-I)**  
**Ans.** This is an aluminium or plastic disk with shining surface. It is made for digital recording.
32. **Describe the function of a fax machine. (LHR 2018 G-II, LHR 2019 G-I)**  
**Ans.** The function of fax machine is to send and receive electronic documents and pictures from one place to another.

- 33. Write the function of electron guns in colour television. (LHR 2019 G-II)**  
**Ans.** In a colour television, there are three electron guns, which form red, green and blue pictures at a time on the screen. These three colours blend into a colourful picture.
- 34. Define programming or software engineering. (LHR 2019 G-II)**  
**Ans.** Programme is a list of instructions for a particular task. Under these instructions, the computer processes data and converts it into information. Preparing such a list of instructions is called programming or software engineering.
- 35. Which compounds are used to make light emitting diodes?**  
**Ans.** Light emitting diodes are made from specific compounds of gallium.
- 36. Name some used of semi-conductor diode.**  
**Ans.** Semi-conductor diodes are used for:  
(i) Rectifier (ii) Light emitting diode (iii) Photo diode
- 37. What is the difference between the waves of light and sound?**  
**Ans.** Sound waves require certain medium for their propagation to reach elsewhere but the light waves do not require any medium for its propagation.
- 38. What do you mean by electromagnetic waves?**  
**Ans.** When the waves of light pass through a vacuum, these are called electromagnetic waves.
- 39. What do you mean by P-N junction diode? (LHR 2017 G-II)**  
**Ans.** If the silicon crystal is doped in such a way that its one part becomes N-type and the other P-type then it is called a P-N junction diode or semi-conductor diode.
- 40. Define reverse biased diode.**  
**Ans.** When the anode of diode is connected to the negative terminal of the battery and the cathode to the positive terminal, it is known as reverse biased diode.
- 41. Who invented the radio system?**  
**Ans.** Marconi was the inventor of radio system.
- 42. Which part of a computer can be regarded as its brain?**  
**Ans.** The brain of a computer is the central processing unit, abbreviated as CPU.
- 43. Name some output devices of computer. (LHR 2018 G-I)**  
**Ans.** Output devices of a computer are:  
(i) Monitor (ii) Printer (iii) Floppy disk  
(iv) Compact disk (v) Speakers
- 44. Define software of computer. (LHR 2015 G-I, LHR 2017 G-I, LHR 2018 G-I)**  
**Ans.** The instructions given to the computer for some task by electronic method are called software.
- 45. What is the difference between analogue signals and digital signals?**  
**Ans.** Analogue signals represents continuously varying voltage while digital signals consists of discrete on/off electrical pulses.
- 46. Define information technology in the field of computers. (LHR 2016 G-II)**  
**Ans.** The scientific method of storing information, processing and using them properly and their communication is called information technology.
- 47. What do you mean by telecommunication?**  
**Ans.** The methods used for instant communication of information to far off places is called telecommunication.

48. Define the term electronics. (LHR 2016 G-II)  
Ans. Knowledge of behaviour and control of electric current is called electronics.
49. What do you mean by websites?  
Ans. Websites is a huge collection of information on internet, stored by the individuals and organizations from all over the world.
50. Define the protocol. (LHR 2018 G-I)  
Ans. The computer linked with an internet; use uniform communication process called the protocol.
51. What do you mean by data management?  
Ans. To store data in different files and rearrange them to get requisite result when needed is known as data management.
52. What is telecommunication?  
Ans. The methods used for instant communication of information, processing and using them properly and their communication is called information technology.
53. What is the difference between hard ware and soft ware of a computer?  
Ans. Components of computer, which can be physically touched, are called hardware while instructions to computer for any task are called software.
54. What are graphics? (LHR 2016 G-II)  
Ans. Drawing pictures and designs on computer are called graphics.
55. What are the components of telex machine?  
Ans. Telex machine consists of:  
(a) An exchange machine (b) A teleprinter
56. Define information technology. (LHR 2015 G-II, LHR 2019 G-I)  
Ans. The scientific method of storing information, processing and using them properly and their communication is called information technology.
57. What do you mean by analogue quantities?  
Ans. Such quantities, which increase or decrease continuously, are know as analogue quantities.
58. What are the uses of photodiode?  
Ans. Photo diodes are used for:  
(i) Detection of light (ii) In the computer of light  
(iii) Automatic switches in the circuits.
59. What is the function of a rectifier? (LHR 2015 G-I, LHR 2017 G-I)  
Ans. The device, which is used to convert A.C. into D.C. is known as rectifier. A semi conductor diode is also used as rectifier.
60. What frequency of carrier waves is used for radio transmission?  
Ans. The carrier waves upto 30 kHz are used for radio transmission.
61. What are geostationary orbits?  
Ans. The orbits of hovering satellite are called geostationary orbits.
62. Name few input devices of a computer.  
Ans. Key board, mouse, scanner, laser pen, etc. are input devices of a computer.
63. What do you mean by Morri codes?  
Ans. In telegraphy, messages are transmitted in the form of Morri codes.