11

INFORMATION-COMMUNICATION TECHNOLOGY

Have you ever thought about how much time you spend reading, writing, talking, listening to music or the radio and watching television? These are activities that go on almost continuously. If these things are not there then we will never know what is happening around us? We tell our mind to others, listen to them. For this, we exchange information and notify through talking, writing, signs and gestures. In the last two decades, there has been an unprecedented development of various means of transmitting messages from one place to another through this type of transfer and exchange of information or communication. You can talk on the telephone with your friend or relative sitting in any corner of the world right from home, watch a variety of entertaining and educative, etc. programs on television.

In this lesson you will read about the need and means of communication. Apart from this, we will also know briefly about the journey of development of communication technology.

OBJECTIVES

After reading this lesson you will be able to:

- communication and to know its need;
- To get to know the development journey of communication;
- Knowing the means of communication; And
- understanding its utility in the field of satellite communication and information technology.

11.1 COMMUNICATION

You may have noticed that we keep exchanging our thoughts, information and feelings with other people, this is called communication. Hence communication is a process in which various facts, figures, ideas, information and feelings are exchanged with each other with the help of some common measures.

following four components are necessary for any communication:

1. The remitter or the source means the sender of the information,
2. The information that is to be spoken,
3. The communication medium through which the information is to be sent,
4. The receiver, that is, the information receiver.

For example, whenever your teacher is teaching you, at that time, the teacher is the observer, the things he is telling are information, the things he is speaking is the medium and you are the receiver of information.

Similarly, now you think that when you are talking to your friend on the telephone, what are the essential elements of communication in it.

The need and importance of communication

We spend a lot of our time every day reading, writing, talking, listening to music or radio or watching television. These are all forms of communication. If we stop doing all this then we will be deprived of the events around us. It means to say that communication is an essential activity of human beings, because the need to carry information and ideas from one person to another always remains. The ability to exchange ideas with each other is an essential element for every living being. Without this, neither human beings can work together nor develop and progress.

We communicate with our mother, father, brother and sister every day through various means like signs and gestures. This type of mutual communication increases cooperation with family members and able to solve problems together.

We receive information through radio and television and also watch entertainment programs. Newspapers also serve as communication. Through them we get national and international news, sports information stories and other printed material.

Teachers and students in the school constantly communicate among themselves for the purpose of sharing information and knowledge. In classrooms, students listen to their teacher, discuss, write and read a book. In the field of business too, exchange of information is very important from time to time. We see that

communication takes place by telephone, magazines and correspondence etc.

Now with the increasing development of science and technology, the use of modern means of communication is increasing. Modern communication tools such as fax machines, teleprinter, internet and computer communication have made the system smaller. In seconds radio spreads human sound throughout the world. Communication satellites have made it possible to broadcast television programs throughout the world. Do you know that in our country, the great scientist Aryabhata first gave information about the position of planets etc. We can watch live events in other parts of the world such as election related information, Olympic Games, Nobel Prize celebrations etc. sitting in our homes.

Types of human communication

When we talk to each other, we use a variety of means such as smiling, raising eyebrows or doing a gesture or writing etc. Let us know more about them.

1. **Gesture:** You must have felt this in your daily life that a lot of our communication happens without words in front of you. Sometimes we smile and sometimes we raise eyebrows. When we welcome our guest, we raise our hands in a particular way, but in the event of restraining someone or anger, we raise our hands the other way. In this way, we get information about each other's mouth postures and gestures.
2. **Signs:** Humans had learned to use signals to communicate long distances from a very old time. With an axe markings

were made on the trees to guid in the forest. You must have noticed that the bells at the entrance of our houses indicate the arrival of a visitor. Lighthouses made in the group, signal the ships to indicate the direction of the site. In this way the light of the traffic signs on the routes also indicate the vehicles to stop, to get ready or to go.

3. **Picture:** Investigators have found colorful images of prehistoric animals and predators on the walls of the caves. These images show that humans are in a more advantageous position than animals in the field of communication.

4. **Symbol:** You must have seen many types of signs and symbols around you. For example, at the doctor's clinic, you must have seen the sign of sum (+) and the symbol for prohibition of smoking. All these have a special significance. We can make symbols for other objects using letters and objects. Words are the simplest of all the symbols used. Even in ancient times, humans named the forest, day and night, food, water, and animals. There are many types of signs and symbols at the international level as well, which are used in mathematics and science subjects.

5. **Language:** Everyone cannot easily understand the meaning of the pictures and symbols mentioned above, as each symbol has a special meaning. Therefore, to solve this problem, a special type of language was designed and alphabets were discovered. Writing and reading became easier after the discovery of the alphabet. In this way communication became easier due to the language and its help in reading and writing.

The text you are reading at this time has also been written in a language, English. With the help of this language, you can know our thoughts. Similarly, many types of languages are used in the world such as Hindi, Urdu etc. for communication.

Communication between animals

Have you ever thought that animals also understand each other's feelings? For this, they express a variety of voices, gestures and express facial expressions. Animals cannot talk like humans, but they communicate with each other about things related to their daily needs and experiences by voice and gesture.

Sound is important for animals and birds, they often use different sounds to call their child and peers. Have you seen any monkeys or chimpanzees? They also display many gestures that match us. They display their anger in a way that matches us.

Sometimes they show a punch to demonstrate their anger and sometimes bang their feet on the ground. They groom each other, which increases love between them. In the same way, dolphins produce a variety of sounds. Some of these sounds are considered as a warning cry, so that some of the dolphins can recognize each other. Smell is an important means of animal communication. When dogs meet each other, they smell each other, by this they recognize their companion. The ants emit a strong odor, called pheromones. This smell helps the ants to reach their target and they follow each other in a row with the help of the smell.

Mass Communication

So far you have read that we use many types of means to communicate with each other. You may have read the newspaper, heard the news on television, or may have taken a lot of information with the help of other newspapers-magazines. In all these, information and news can be reached to many people present at different places simultaneously and at the same time. This is called broad communication i.e. mass communication. In this, information is exchanged using machines. Machines made, magazines, newspapers, radio, television etc. are the medium of mass communication.

Not only do we get information about the country and abroad through mass media, but they also help in transmitting any kind of special information to every person present at any place in a moment. Nowadays, mass media is also being used for the promotion of education and awareness programs related to common problems in the general public.

As you know that, on television, cricket matches or Olympic Games broadcasts, election broadcasts etc. can reach crores of people simultaneously. In this way we see that communication is becoming a part of our daily life day by day.

INTEXT QUESTIONS 11.1

1. Why was communication needed?
2. What are the essential components of communication?
3. What is the difference between animals and humans communication system?

11.2 DEVELOPMENT JOURNEY OF COMMUNICATION

Nowadays we are living in the modern communication era, but the story of the communication system is as old as human civilization. In the old times, people used to communicate with each other with the help of different types of signs, symbols and pictures etc. Pigeons were used for long distance telecommunication. But with the development of the alphabet, people learned to read - write and letters etc. were used for the exchange of information. Facts and information began to be presented in the form of books. You should know that the people of China first made a block printed book. Initially, the printing of books was done with the help of letter press. In this process, the ink was properly applied to the embossed blocks of letters and pictures etc. and pressed on a sheet of paper. By doing this, the desired thing was printed on paper.

This was followed by the next invention of photo-typesetting, in which the photography method was used for typesetting. Nowadays computer typesetting is used extensively for composing and various presses are used in printing of most of the books you read. With the invention of the printing press, not only books but also newspapers and magazines started being published for communication. Let us move forward in the development journey of communication and know about the development of other communication tools.

Telegraph

Although the communication system is very ancient, but the

introduction of telecommunication was possible only after the invention of electrical telegraphy. Through this device, messages can be sent from far to far places via electrical wires or through radio waves in seconds. Samuel Morse and his colleagues developed a simple telegraph in 1838 and sent messages in the form of Dots And dashes called Morse codes. This was the first time that the information was electrically driven. In Morse code, each word, numbers and other signs of the alphabet are displayed by groups of dots (short sign) and dash (long sign). By 1860, big cities of the world were connected by telegraph lines. Thus the telegraph became a major tool for communication over long distances. Morse sent the first message on 24 May 1844 in Morse code via telegraph line from Baltimore to Washington (America).

Telegraph messages are sent from one place to another by pressing the telegraph key. A dot is created by pressing the key and leaving it soon. It generates small electrical signals that reach the receiver telegraphic station via electrical wires. In the case of a radio telegraph, when the key is pressed, radio waves develop through the antenna of the telegraph transmitter. Coded messages are sent by radio waves, which are received by a telegraph subscriber with the frequency of the telegraph being sent.

Each telegraph station has a transmitter and receiver so that it can transmit the message and receive the message sent by another telegraph. Nowadays telegraph messages are sent through teleprinter and automatic fax.

Telephone

Telephone is an important medium of communication nowadays.

You can interact with stakeholders in a moment. You can talk to your relatives, friends and business people. Alexander Graham Bell invented the first telephone in 1876, which made it possible to transmit human voice by wire.

Working methods of a telephone

The handset of a telephone device has two parts - for mouth a mouthpiece and for ears a earpiece. The mouthpiece acts like a transmitter and has a microphone. When you speak in front of the mouthpiece, its microphone produces a variable electric current and converts your sound energy into electrical signals.

These electrical signals are mixed with the carrier wave (high frequency radio wave) and then sent through the wire to the receiver at the other end. At the receiving end, the variable electrical signals are separated from the carrier waves and the earpiece re-convert the electrical signals into sound waves. The sound generated by the earpiece is similar to the way you speak in the mouthpiece.

Similarly, when a person at the receiving end speaks in the mouthpiece, you hear his voice in your ear. Thus, telephone equipment consists of both a transmitter and a receiver.

As soon as you pick up the handset of your telephone to contact another telephone number, a switch turns off, which makes your telephone contact the telephone exchange.

When we press the button to dial the telephone number, many electrical pulses are generated, these are captured in the electronic

circuit of the electrical exchange. This electronic circuit operates a series of switches that connect your telephone to the telephone of the person with whom you wish to communicate.

Telephone exchanges and your telephones in cities are connected to the cable and these cables usually stay underground. These cables are often made of copper or aluminum. Cables are inserted under the sea to connect various continents via telephone. Now the process of placing telephone lines inside the ground is coming to an end due to the invention of artificial satellites, which revolve around the earth.

Teleprinter

The invention of the teleprinter is an important tool in the history of telecommunication. Teleprinter is also known as a "teletypewriter". It is used to send and receive messages and other information in writing. The Teleprinter's keyboard has letter numbers, symbols, all signs of communication and other letters. The teleprinter operator presses the appropriate key to send the message. This generates electrical pulses which are sent to one or more teleprinters to remote locations via wire or radio waves. Messages sent by teleprinter are automatically printed on the paper by remote teleprinter. In this way, notifications can be sent easily from one place to another.

Teletext

With the development of modern communication tools, Teletext developed. The sending of data implanted on Doordarshan's signals is called teletext. Doordarshan viewers see data on the

television screen. Information sent from Doordarshan center is collected in the computer system. These information are placed in pages in a sequential manner. These are sent in a circular manner via TV signals so that every page that is assembled on the computer can be automatically broadcast again after every 15-20 seconds. Decoder is required by the viewers. It remembers the words of the pages and also includes the method by which the signals received are converted into text or graphic form. Viewers can select the page they like with the help of a key head on the decoder related numbers. Initially, Doordarshan used teletext and featured news headlines. But nowadays it tells the time of arrival and departure of trains and ships, reservation status of trains, sports information, weather etc. Teletext has proved to be very useful in news operations to capture the world's smallest events.

Radio

Radio is an extremely important instrument in the field of communication. It is a powerful means of wireless communication. In 1887, Henry Hertz detected radio waves. He found that radio waves are a type of electromagnetic waves, which can move in air or vacuum. They spread from the source in the same way that a wave propagates through the water by throwing a stone in a pond . He discovered that radio waves behave like light. When Marconi came to know that radio waves move at the speed of light and can be reflected, he thought of using waves to send information. By that time, information was sent by electric wires from Morse code. By 1895, Marconi had developed an

instrument that could transmit radio waves up to a mile away. By 1897, they crossed the English canal and sent radio signals for 31 miles and by 12 December 1901 the S letter was sent across the Atlantic Sea in Morse code. It has brought the field of communication to create a sensation all around and the era of wireless communication began. Nowadays there have been many ways of communicating wireless messages - such as radio, television (Doordarshan), telephone, telegraph, teletext, teleprinter etc. We are studying some of them here.

Television

Television ie Doordarshan has revolutionized the field of communication. With the help of Doordarshan, we not only get information about news and important events but also watch entertainment and education related programs. The Doordarshan station accepts Doordarshan signals sent from the Antenna Doordarshan Center as a signal to send mixed video signals and modulate the sound signals. Mixed video and sound signals come

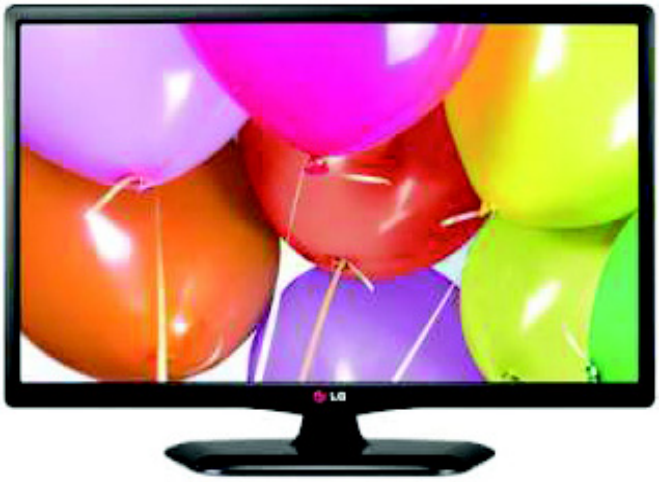

Fig. 11.1 Television

in the form of photos from the circuit of common signals. The sound signals are separated and sent to the sound circuit, where they come in the form of sound and go into the loudspeaker and thus produce sound. The video signal comes as a photo from the video circuit and is sent to the picture tube, this video signal changes the intensity of the electrons moving around the tube. Due to this, the brightness varies. This is the reason for the change of luminosity in the picture tube, which produces a picture on the television screen.

Accepting the Doordarshan signal sent by Doordarshan to a place depends on the height of the antenna of the transmitter. If we want to send the Doordarshan signal at a greater distance, then we have to increase the height of the antenna of the transmitter. The Bombay Doordarshan Antenna Tower is 300 meters in height. Suppose we want to send a signal to Doordarshan through a single transmitter station, Then the height of the antenna has to be kept more than about 210 kilometers. But it is not possible to make an antenna of that height. Now the question arises that how are the National Doordarshan broadcasts taken all over India? National Doordarshan broadcasting is seen in most parts of India with the help of Earth's satellite system. National T.V. program signals are first sent to the satellite. These T.V. signals are captured by antenna by satellite, and are sent back to different parts of the country. More information about the satellite communication system is given in the next section.

Computer

After the invention of the computer, the communication system

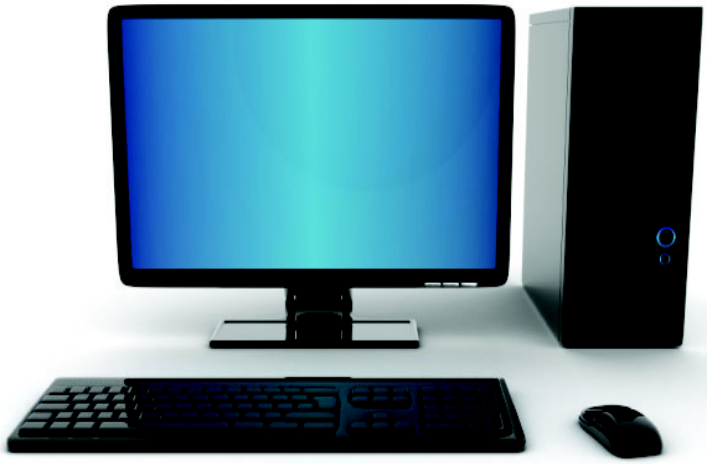

Fig. 11.2 The main components of the computer

has become such that you can not only exchange information, but can also collect information and data and also send your feedback. Apart from communication, computers are also being used in the fields of industry, medicine, science, education, traffic and entertainment.

A computer is not just a calculator making arithmetic calculations, it is an electronic machine that sorts, mimics, compares and also performs those arithmetic functions in different alphabets, numbers and signs from which data with some information is revealed. In simple words, the computer accepts the data, prepares its block by photo and returns the result of the block. Since the computer gives data by making blocks by photo, it is also known as a data making machine.

There are mainly three components in any computer.

1. Input
2. Central Processing Unit.
3. Output

Special tools mainly convert data and information into readable form in computer machines. A computer can have a variety of input devices such as keyboards, floppy disks and scanners etc.

The Central Processing Unit (CPU) is the core of any computer. It can also be called the brain of a computer, where data and information are collected and processed. This unit mainly consists of the following tasks:

- Gathering of data, information and instructions,
- Controlling the various actions according to the collected instructions,
- Control of the actions of all the units of the computer, their proper coordination with management,
- Changing the processed result as necessary.

The output is the third important part of the computer. In this, the result of computer processed data etc. is obtained in a special form which a person using a computer can understand. It includes magnetic tape, floppy disks and printers.

INTEXT QUESTIONS 11.2

1. How does the telegraph work?
2. What is the function of a microphone?
3. What is the difference between Teleprinter and Teletext?
4. Who detected radio waves?
5. What needs to be done to transmit the signal over a television?.

11.3 SATELLITE COMMUNICATION

Technology in the field of telecommunications today is advancing at such a high speed that messages and information are being transmitted simultaneously through space through satellites all over the world. Whether it is television or internet or telephone, the role of satellites is very important in all areas.

You already know about the Earth's satellite moon. It is a natural satellite that orbits around the Earth in a fixed orbit, but has no utility in the field of communication. Man-made satellites have an important role in making telecommunications easier. These satellites are placed in an orbit in space at 35900 km above the Earth. The speed of these satellites is equal to the Earth's rotation speed. Because of which these satellites seem stable to the observers sitting on Earth. Therefore, these man-made satellites are called Geostationary satellites and the orbit from which the satellites are placed is called Geostationary orbit.

In 1965, the first geostationary communication satellite was placed in an orbit over the Atlantic Ocean. Within four years, many satellites were installed, some of which were placed over the Pacific Ocean and some over the Indian Ocean. Subsequently, communication by satellites between countries of the world became possible. Today many modern satellites are placed in orbits around the earth, each of which maintains a communication link with stations built on continents.

Artificial satellites have significant use mainly in the field of information technology and communication. Apart from this,

weather forecasts can be made with their help. Different types of probe satellites can detect such events that are otherwise impossible. Everything from mobile phones to television, internet etc. depends on the satellite communication system.

INTEXT QUESTIONS 11.3

1. What is meant by a geostationary classroom?
2. How high above the earth are man-made satellites?
3. Why does the Earth's natural satellite moon have no utility in the field of communication?

WHAT HAVE YOU LEARNT

- We need communication to exchange messages and information with each other.
- Communication basically requires source, message, medium and receiver.
- Animals and birds also communicate with their voices and gestures.
- Human communication requires gestures, signs, images and symbols, language and mass communication.
- Revolutionary progress has been made in the field of information communication with the development of modern communication systems from ancient communication systems.
- Wireless communication is being used by radio waves in modern communication systems.

- Television, teletext, telegraph and computer are Modern communication equipment.
- The computer mainly consists of three essential components - input, central processing unit and output.
- In satellite communications, man-made satellites are placed in the Earth's geostationary orbit.
- Man-made satellites are helping to establish faster communication and weather forecasting.

TERMINAL QUESTIONS

1. What is communication and why was it needed?
2. What is the contribution of the computer to the communication system?
3. What is a computer? Write two uses of it.
4. What is the usefulness of man-made satellites in the field of communication?
5. Describe any two means of communication.
6. How do animals and birds communicate with each other?
7. Highlight the importance of gestures for human communication.
8. Explain the usefulness of mass communication in the modern era.
9. What is Mass Communication? Write down its main means.
10. Explain the similarities and differences in radio and television communication systems.

ANSWERS TO INTEXT QUESTIONS

11.1

1. To exchange information and ideas with each other.
2. Sender, information, communication medium and receiver.
3. Humans can communicate in many ways, such as gestures, signs, images, symbols, language, etc.

11.2

1. Data on Doordarshan signals are implanted and sent to Doordarshan screen.
2. Converting sound energy into electrical signals.
3. Data etc. can be read or seen on the screen of Doordarshan in Teletext but teleprinter can be sent and received.
4. Henry Hertz
5. Mixed sound and video signals are sent as module signals.

11.3

1. The orbit is located at an altitude of about 35900 km above the Earth, in which the speed of the satellites is equal to the rotation speed of the Earth.
2. 35900 km
3. Since the Moon circles around the Earth in a certain orbit.