

INFORMATION AND COMMUNICATION TECHNOLOGY

17.1 Information and Communication Technology

Q.1 What is difference between data and information?

“A representation of facts, concepts or instructions in the formalized manner suitable for communication, interpretation or processing by humans or machines is called data.” OR
“Data is a collection of facts. It is raw material of information.”

Information

The raw facts arranged in suitable manner provide information. OR “Processed data is known as information.”

Q.2 What do you understand by information and communication technology?

Information and communication technology is scientific and technical methods and means to store, process and transmit vast amounts of information in seconds with help of electronic equipment.

OR

“The technology developed by combining computing data with high speed and transmit it with the help of telecommunication links for carrying data is called information and communication technology.”

Explanation

Information and communication technology is the combination of information technology and telecommunication. So, ICT is basically electronic (telecommunication) based systems which are used for transmission, reception, processing and retrieval of data.”

Q.3 Define the terms.

(i) Information technology

(ii) Telecommunication

Information Technology

The scientific method used to store information, to arrange it for proper use and to communicate it to others is called information technology.

Telecommunication

The method that is used to communicate information to far off places instantly is called telecommunication.

17.2 Component of Computer Based Information

Q.4 What are the components of information technology? Clearly indicate the function of each component . OR Explain CBIS?

(i) Hardware

(ii) Software

(iii) Data

(iv) Procedure

(v) People

Hardware

The hardware of computer system consists of physical components installed in main computer box and all associated equipments interconnected in an organized way. Main unit which consists of Central Processing Unit (CPU) and disk drives is called system unit. The supporting equipments are input and output devices. Storage devices and communication devices. That is why hardware of computer referred to machinery.

Software

The term software refers to computer programs and the manuals that give the set of instruction to the hardware of compute that tells the CBIS parts what to do. After instruction the hardware part of CBIS produce the useful information from raw data. Computer software further divide into system software and application software.

(i) System software

The software that control the working of the different parts of computer hardware.

(ii) Application software

The soft ware that help the user to perform a specific task on compute is called application software.

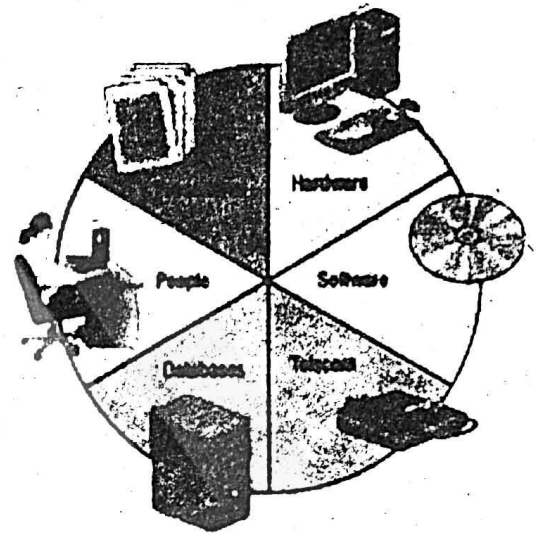
Data

Data is collection of facts used by user by entering it in computer to produce some useful and meaningful information.

The computer data can be classified into following types.

(i) Graphic (ii) Audio/video (iii) Text
(numeric, alphabetic, alphanumeric).

Like software programs, data generally stored in machine – readable form on disk or tape unit the computer needs them.

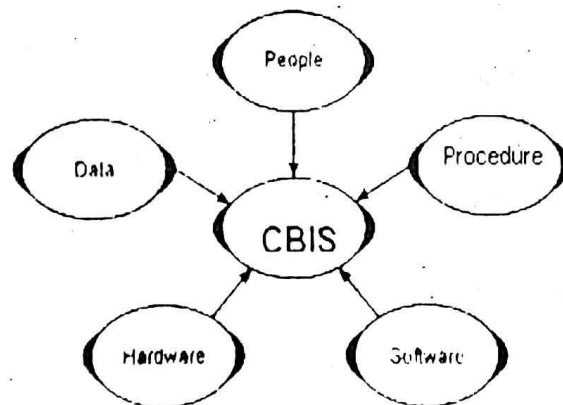


Procedures

The set of instructions and rules to design and use information system. These care in the dorm of manuals and documents. These rules methods may change from time to time and information system must be flexible to accept the new rules.

People (User)

A CIBS need people if it is to be useful. Who influence the success or failure of information system. People design and operate the software, they feed the input data, build the hardware for smooth running of nay CIBS. People write the procedures, instructions, rules and it is ultimately people who determine success or failure of CIBS.



Flow Chart of Component of CBIS

17.3 Flow of Information

Q.5 Write a note on flow of information briefly describes its main parts.

Flow of information

The transformation of information from one place to another place is known as flow of information. The information transferred in different way through telecommunication equipments.

Information flow methods

Some of information flow methods are give as

Information flow through Telephone: In telephone system information sent through copper wires in the form of electrical signals.

Information flow through Radio, Television and Cell phone:

The information e sent either through the space in the form of electromagnetic waves in radio, TV and Cell phone system.

Information flow through Optical Fibers:

In optical fiber system, the information flow in the form of light.

The essential parts of communication system:

(i) Transmitter

(ii) Transmission Channel (medium)

(iii) Receiver

(i) **Transmitter:**

Transmitter is part of communication system which process the input signal and convert the input signal according to equipment of transmission channel.

(ii) **Transmission Channel:**

Its part of communication channel which sends the signal from source to destination. It is a medium which cause the transformation of information. Types of transmission channels are given below.

(a) Pair of Wires

(b) Coaxial Cable

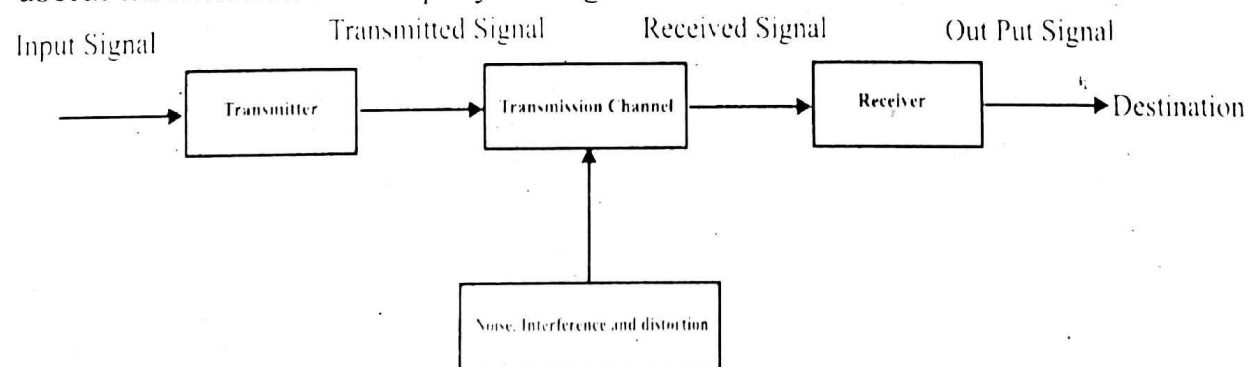
(c) Radio waves/ electromagnetic waves

(d) Optical fiber cable

The power of signal decrease by increasing the distance between source and destination.

(iii) **Receiver**

In part of communication system, which receive the information from transmission channel and delivers to transducer. The transducer process the signal and convert it to useful information and amplify the signal to comensate for transmission loss.



Q.6 Why satellite communication system is based on microwaves instead of radio waves.

The radio waves are refracted by the different layers in the earth's atmospheric system. But the microwaves are not refracted. This does not lead weaken signal and easy to receive the information over long distance. That is micro-waves are used in satellite communication system.

17.4 Transmission of Electrical Signals

Q.7 Briefly describe the transmission of electrical signal through wires.

OR

Write a note on telephone.

Telephone:

A single telephone system was made by Alexander Graham in 1876. In telephone system, sound transmitted from one place to another place.

Construction and Working:

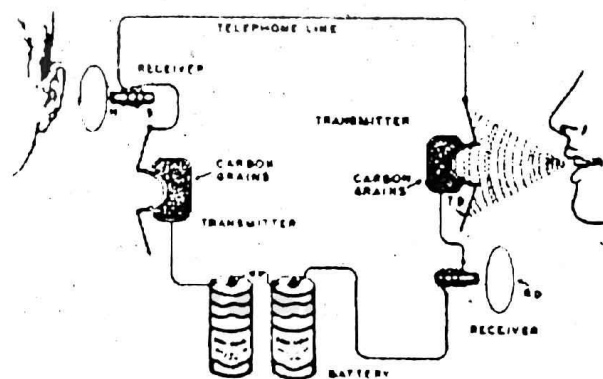
It consist of Metal reed, Electrical coil and Diaphragm .Modern telephone also has diaphragm to turn voice into electrical signals by vibration which are transmitted over phone lines.

Telephone system has two main parts:

- (i) Mouthpiece / Transmitter
- (ii) Earpiece / Receiver

Mouthpiece

The mouthpiece has carbon granules and thin metal diaphragm. When compressional waves of voice strike with diaphragm, the diaphragm also vibrated which compress the carbon and electrical signal produced. These electrical signals flow through the wire in the form of electrical current.



Earpiece

The receiver also consists on carbon granules and the metal diaphragm. The reverse process is done in receiver. Receiver received electrical signal which flow through the electromagnet. The electromagnet produces a varying field cause the vibration in metal diaphragm. This vibration of the diaphragm produces sound waves.

17.5 Transmission of radiowaves through space

Q.8. Explain the transmission of radio waves through space.

Electrical signals represents the information. These signals produced by microphone T.V, camara or computer and sent from one place to another place via cables or radio waves. But for long distance communication, the information is superimposed on electromagnetic waves.

Modulation:

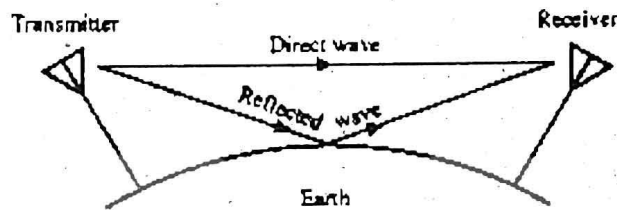
The process in which we superimpose information on electromagnetic waves called modulation.

The transmission radio waves consists on two parts.

- (i) Radio station (ii) Receiver

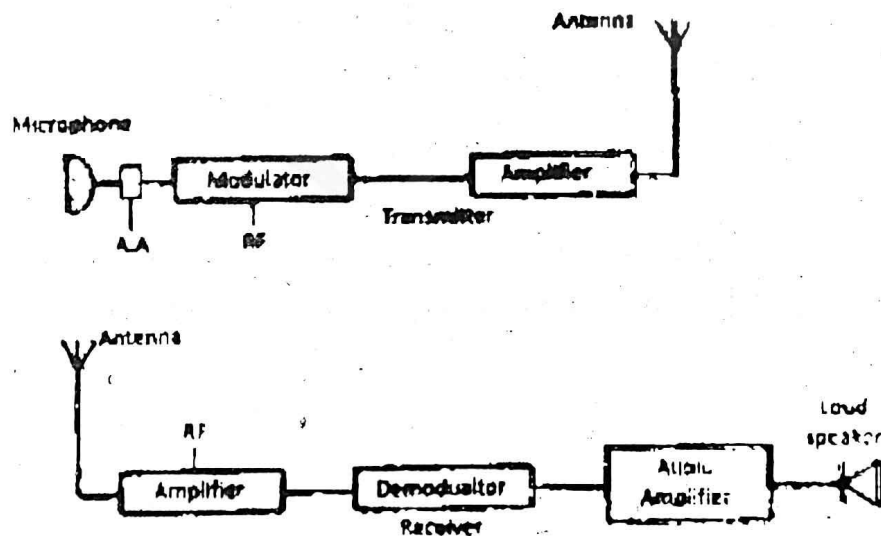
(i) Radio Station

The information (sound) waves produce at radio station which is changed into electrical signals through microphone. These electrical signals are given to transmission antenna which consists on two metal rods. When electrical signals introduced to transmission antenna, its oscillate the electric charges in antenna which emits the electrical signals in the form of electromagnetic waves.



(ii) Receiver

At the receiving end, receiver receives the modulated signals. The demodulator in receiver demodulate the signals and extract information. This extracted information given to amplifier which amplify the information delivers into the receptor.



Q.9 What is fax machine?

Fax machine is also known as 'Telefacsimile's'. Fax machine is used to send the copy of documents from one place to another place.

Fax machine scans the documents page and convert it into electrical signals and transmit it to another fax machine through telephone lines.

The receiving fax machine receive these electrical signals and converted these signals into copy with the help of printer

Q.10 What is cellphone? How it works and describe its main parts.

Cell Phone:

A cellphone is device which consists on radio transmitter and radio receiver and used for two way communication. It send and receive the information with help of electromagnetic waves.

Construction and Working:

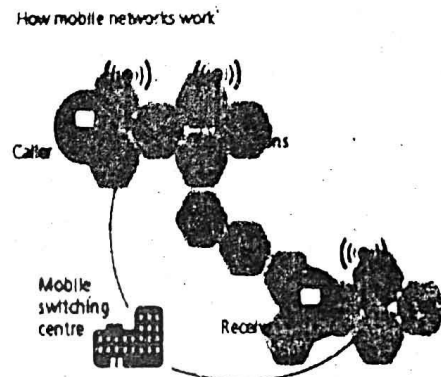
Main parts of cellphone network are as followin

(i) MSC (Mobile Switching Centre)

(ii) Bs (Base Stations)

(iii) BTS (Base transceiver system)

A 'BTS' is set up at particular geographical location. The BTS signal is known as cell. This cell is in hexagonal form. The large number of 'BTS' are connected with base station. So, a very large area is converted by base station. The group of cells forms a cluster. With in cluster all BSc are connect with MSC (Mobile Switching Center) through, optical fiber. In MSC, the data of subscriber is stored and up dated time by time. MSc also route the calls.



When caller calls another cell phone, sound waves of callers converted into radio waves. These radio signals of particular frequency is sent at local base station of the caller, where the signal is assigned a specific radio frequency. Then these signals sent to the base staton of receiver through MSC. Then the call is transferred to the cellphone of receiver. Mobile receiver radio waves and changes into sound.

Q.11 What do you know about photo phone?

In common telephone system, we can transfer and receiver sound only but in photo phone. We can send and receive sound the picture also. By using the photo and phone number of our friends or family members on this telephone you can call them by pressing pad with their photos. Thus we can communicative with our relatives or fiends on photo phone with the physical appearance of each other.

17.6 Transmission of Light Signals through optical fiber

Q.12 Describe the transmission of light signals through optical fibers. How light signals are sent through optical fiber.

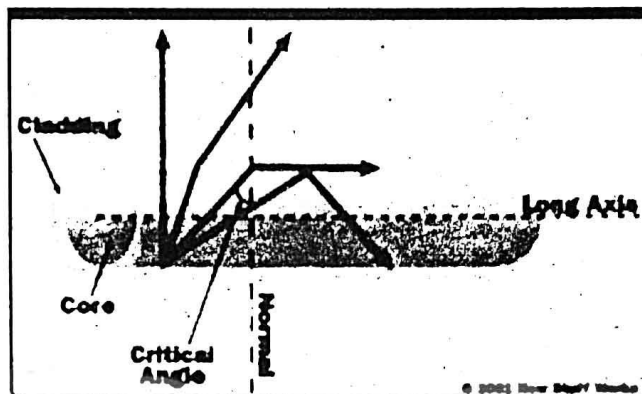
Optical Fibre:

An optical fiber or optical fibre is a flexible, transparent fiber made of high quality extruded glass or plastic, slightly thicker than a human hair. It can function as a waveguide, or "light pipe" to transmit light between the two ends of the fiber. The field of applied and engineering concerned with the design and application of optical fibers is known as fiber optics.

The frequency of visible light is greater than that of radio waves. That is why the large amount of information can be transmitted through visible light than that of microwaves and radio waves.

Working Principle:

The light enters the core at one end of optical fiber. These light beams hit the core-cladding interface and reflect back into the core. If the angle of incidence is less than critical angle the light beam escapes from core which causes data loss. If incidence angle is greater than critical angle then the light beams totally reflect into the core. In this way large amount of data can be transferred from one place to another place in the form of light. This feature of fiber optic differentiates it from wires.



Multimode:

When electrical signals are transmitted through wires, the signal loss increases with increasing data rate. This decreases the range of the signal. The optical fiber of multimode is 10 times bigger than fiber optics used in single mode cable. The light beams in core can travel by following different paths, that is why it is called multimode.

Advantage:

Multimode fiber optics are used to link the computer networks together and it can send information relatively short distances.

Q.13 What is computer? What is the role of computer in everyday life? Briefly describe the types of computer.

Computer

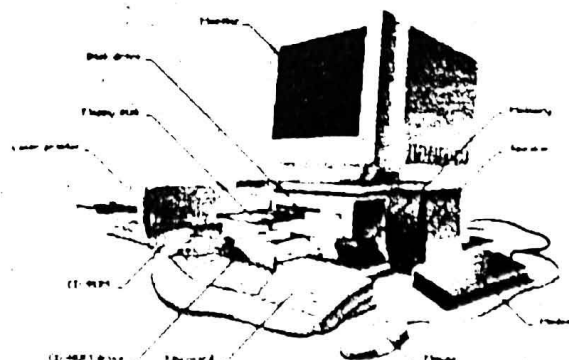
Computer is machine that can be programmed to accept the data (input) process it (processing) to give useful information (output) and store it (storage) for further.

OR

"Computer is electronic machine which give useful processed data in short time after analyzing and arranging."

Computer work through an instruction of hardware and software. The some main parts of computer are given below

- (i) Input devices
- (ii) Central processing unit (CPU)
- (iii) Output devices



Input Devices

The device which are used to give the instructions to computer are known as input devices. Keyboard, mouse, scanner, trackball, touchpad, pointing stick, touch screen, light pen etc are the examples of input devices.

Central Processing Unit (CPU)

The most important part of the computer, which consist on a box containing motherboard inside with a small chip (called microprocessor) in it is known as CPU.

This part of computer receive the instructions and translates them and perform specific task according to the given instruction. So, it performs all computational, logical and analytical functions. It is the brain of computer.

Output Devices

The device takes results from computer and presents it in human readable form is called output devices. There are number of output devices. For example:

Video display unit/ visual display device or monitor, printers, floppy drives, hard disk, CD writer and speaker etc.

Use of Computer in Everyday life

Computer becomes a necessary part of everyday life because its fast working, accurate solutions of information, large memory and capability for deriving results.

- Computer is used in offices for preparing letters, documents and reports.
- In hotels computers are used for advance booking of rooms, preparing bills and providing equity service.
- In railways, computers are used for rail reservation, printing of tickets and preparations of reservation charts.
- In medical field, doctors use computer for diagnosing illness and treatment of diseases.
- An architect engineer use computer for building designing and city planning.
- In meteorology department, computers are used for weather forecasting.

Types of Computer

There are main types of computer.

1. Personal Computer:

It is general use. These are less powerful machine as compared to micro-computer.

2. Minicomputer:

These low cost computers use integrated circuits. These yet surprisingly powerful computer find their application in business and education. Minicomputer got their names due to their small size and have less powerful then main frame computers.

3. Main Frame:

Mainframe are large scale computer together with their supporting equipment cost millions of dollars. It is usually used in large firms for different functions.

4. **Super computer**

Supercomputers are largest, fastest and most expensive computer for complicated problems. Fastest supercomputer can perform more than one trillion calculations in one second.

Q.14 What is meant by storing devices? Name the different storage devices?

The devices which are used to store any important data or information are called information storing devices.

For Example

Audio, video tap, compact disc (CD), Laser Disc, Floppy Disk and Hard Disk. The storage devices work on different principles using electronics, magnetism and laser technology.

Q.15 Differentiate between primary and secondary memory?

Primary Memory

Main memory is computer's primary storage. It is extension of the central process unit (CPU) and directly accessible to it. Main memory accepts data and instructions from input unit, exchanges data supplies instructions to the other parts of CPU.

It is based on electronics and consists of integrated circuits (Ics). It is random access memory (RAM). It vanishes when the computer is switched off.

Secondary Memory

Secondary memory also referred as backing storage is used to supplement the capacity of main or primary memory.

The data storage devices are generally known as secondary memory. It is used to store the data permanently in the computer. When we open any program, data is moved from the secondary storage into the primary storage.

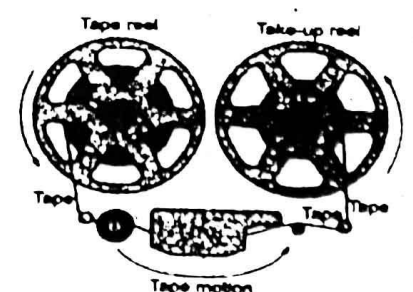
Q.16 Write a note on

- | | |
|-----------------------------|-------------------------|
| (i) Audio – Video Cassettes | (ii) Magnetic Disks |
| (iii) Hard Disk | (iv) Compact Disc (Cds) |
| | (v) Flash Drive |

(i) Audio – video cassettes

Audio-video cassette is storage device, which store the audio-video data on magnetism base. It consists on a tape. Specific magnetic material spread over the tape. For recording the microphone changes sound waves into electrical pulse are made by an amplifier. Magnetic tape is moved across the head of audio cassette recorder which is in fact an electromagnet.

The electric pulses produced by microphone change with respect to sound waves. These electric pulses change the magnetic field produced by electromagnet. Because of this magnetic field the magnetic tap is magnetized in specific form according to rise and fall of electric pulses. In this way this way sound is stored in specific magnetic pattern on this magnetic tape.



A magnetic tape storage mechanism
Fig. 17.13

Now, to produce the recorded sound, the tape is moved past the play head. The current pulses induced in the coil of play back head because variation of magnetic field which was stored on magnetic tape. The loudspeaker reproduce and amplify the recorded sound.

In video tape pictures are recorded along with sound

(ii) **Magnetic Disk**

Magnetic disk is a metal or plastic disk coated with ferrous oxide. The read write head of disks are similar to recorded and play back head of type recorder. The information is stored on magnetic disk by magnetizing of parts on its surface. Magnetic disk is digital data storage medium.

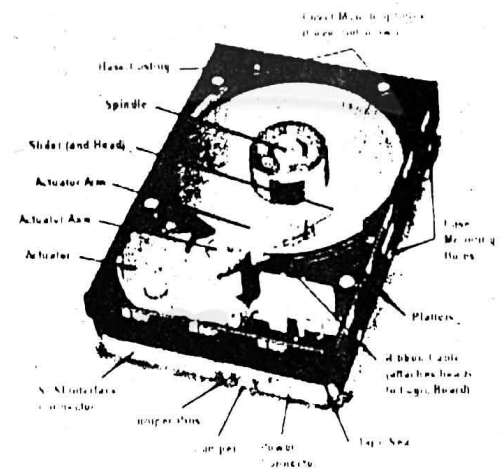
Floppy Disc:

The floppy disc are the most common from secondary storage devices. It is made up of a small magnetically sensitive, flexible plastic wafer which coated with ferromagnetic material and enclosed in a rigid plastic cover which protects it. Most personal computers included at least one disk drive that allow the computer to read write information from on floppy disk.

The read write had of disk drive contacts the diskettes which rotate at speed 300 rmp in plastic cover. Data stored on floppy disk is also subject to loss as result of stray magnetic field. The floppy disks over reliable for short-term storage and cannot be used longer nd no attempts should be made to save data for longer period.

(iii) **Hard Disk**

Hard disk is rigid usually made up of aluminum with surface coating easily magnetized elements, such as iron, cobalt. The hard disk is rigid magnetically sensitive disk the spins rapidly and continuously inside the computer chassis or ain separate box connected to the computer. A typical hard disk consists of several platters each accessed via read/write head on the moveable arm. While typical floppy disc has a storage capacity between 1 and 3MB. But the hard disk might hold hundred or thousands megabytes of information. The information can be transferred quickly to and fro a hard disk much faster than with a floppy.



(iv) **Compact Disc (Cds)**

It is molded plastic disk on which digital data (binary numbers) is stored in the form of microscopic reflecting and non-reflecting spots. The reflecting spots are known as 'pits' and non-reflecting spot knows s "lands".

Pits: Pits are spiral tracks engraved on the top surfaces of CD.

Lands: Lands are the area between the pits.

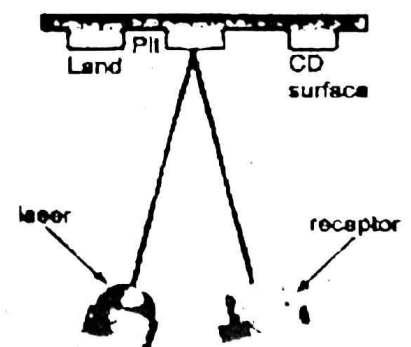


Fig. 17 18

Compact disc is laser based technology.

A fine laser beam scans the surface of rotating disk to read data. Pits and lands reflect different amount of laser light falling on the surface of CD. The reflected light from pits and lands converted into binary data. The presence of pit indicate '1' and absences of pit indicate '0'.

The data stored on CD is only readable data that cannot be altered or erased, therefore CD memory is called read only memory (ROM).

Storage Capacity

A CD can store over 680 megabyte data. A DVD the same size as traditional CD, is able to store up to 17 gigabyte of data.

(v) Flash Drive

Flash drive is an electronic based device and consists of data storage ICs, and used to transfer data from one computer to another. It is small storage device which slightly larger than gum stick. Flash drive is easy to use. We can simply plug flash drive in USB port and can copy past our created papers. Flash drive can separate from computer.

Q.17 What do you understand by the term word processing and data managing?

Word Processing

It is use of computer through specific software, through which we can write a letter, article, book or a paper report.

Explanation

Word processing is computer program which is use to develop any document, see it on the screen after typing. We can edit the documents, add some new text or delete the previous text or make amendments in it. We can write in different styles and different colours. We can also use graphic in word processing. It also helps to point out mistakes in the text. We can move text from one page to another page, even from one documents to another documents. In these days word processing software are also used for designing purpose. The point of word processing documents can also be taken.

Uses of Data Management

The educational institutions, libraries, hospitals and industries store the concerned information by data management. According to requirement, the addition or deletions are made in data. This helps the improvement of the management of institutions. In big departmental store and super market the optical scanners are used to read, with the help of laser beam. The bar codes of product which indicates the number at which this product is recorded in the register.

In this way the detail about its price is obtained. The central computer monitors the bills and related recorded of sold goods. It also helps placing the order of goods being sold in a large quantity and decide about less selling good.

Q. 18 What is internet? Explain that internet is useful source of knowledge and information.

Internet:

"Internet is system in which many computer network all over the world are connected together to communicate with each other through communication medium. " OR"
Internet is a network of computer networks which spread all over the world."

Useful source of Knowledge and Information:

- Internet technology is most useful in modern times that not only helps us in our daily lives, but also our personal development and professional lives. The Internet helps us to achieve this goal in several ways.
- For students and the educational goals of the Internet is widely used to gather information in order to do research or to add to the knowledge of any kind of subject they have. Even business meetings and professionals such as doctors, Internet access to filter information for their use. The Internet is the largest encyclopedia for everyone in all age categories.
- The Internet has served to be more useful in maintaining contact with friends and relatives who live abroad permanently. The easiest means of communication such as the Internet and email systems Chat are the best and most common way to maintain contact with people all over the world.
- Not to mention the Internet is useful for providing the major part of the fun today. Whether all games and conference networking or online movies, songs, plays and quizzes, the Internet has provided a great opportunity for users to eliminate boredom of their lives.
- Internet is also used to upgrade the Internet and use special software to work on projects and documentation work that allows Internet users to download a variety of different software for a variety of different purposes, this which makes it much easier than buying expensive software cds.

Q.19 Write a note on internet .

Internet is actually a process by using which people can contact one another through computer. This contact is usually made via telephone line or cable.

Introduction

Internet is a system with which we can know the global conditions within no time. Not only the information on internet about the whole world are available but it has revolutionized the communication techniques.

Connecting people together

This new invention has given a large projection to communication. One can not imagine a speed greater than that by pressing a button you can send your message anywhere in the world. This source of communication is said to be an E-mail. Internet users are provided the facility to send their messages or graphics and the receiver checks them in his spare time. Another important feature of the internet is world websites which is a wide storage of information.

Internet society

Internet is in fact an interconnection of millions of computers. It is neither for one person, nor is the possession of one. It is beyond imagination that a person or a department individually may run the internet. Internet society is a group of many departments which controls the internet.

Connecting protocol (TCP/IP)

All computers linked with internet use uniform communication process and same code. In the internet terminology, it is called 'protocol' whose name is TCP / IP. It is the abbreviation of transmission control protocol / internet protocol. This protocol controls the transmission and transmits a small portion of the information at a time. This process is repeated millions of times per second.

Hypertext Markup Language (HTML)

The language which is used in the internet web is understood well by all the computers linked with it and this language is called HTML which is an abbreviation of Hypertext Markup Language. Computers linked with the internet can exchange their information or can use the data base.

Extended Communication facilities

In the beginning internet facility was limited to the government departments or big libraries, but the modern ways of communication have broadened this facility. Now-a-days, not only national but at the international level, internet is an important and fastest medium of information.

Medium of information

Students and teachers having contact with the internet can get information of any kind and about any subject. Businessmen can advertise their product by it. Doctors can exchange latest information about medical problems. In short, information concerned with any department can be obtained from the internet.

The main services used on the internet include.

The Internet is a worldwide network of computers connecting thousands and thousands of computers across the globe. It is formed by the joining of many smaller networks around the world to form the largest network in the world.

The computers of the Internet are connected through telephone lines, satellite links, modems and through many other means.

The Internet consists of following applications:

- (i) E-Mail
- (ii) World Wide Web
- (iii) Chatting
- (iv) Video Conferencing
- (v) Searching for information
- (vi) Online Shopping and Trade
- (vii) Education and Research

Q.20 What are browsers? Also write the name of some internet browsers.

Browser:

A browser is a application which provides a window to the web. All the browsers are designed to display the page of information located at the websites around the world

Name of Browsers

The today's most population browsers are

- (i) Internet explorer
- (ii) The world
- (iii) Opera
- (iv) Safari
- (v) Mozilla Fir fox
- (vi) Chrome



Q.21 Write a note on e-mail.

Electronic Mail

Electronic mail (e-mail) is most widely used application of internet, which provides very fast delivery of messages to any enabled site on the internet.

In this way communication through e-mail is more quick and reliable.

Advantages of E-mail

Some advantages of e-mail are as follows.

Fast Communication

We can send messages or graphics anywhere in the world instantly. In this way e-mail is fast way of communication.

Cost free services:

If someone has internet connection. He can avail the e-mail service free of cost.

Simple to use:

After initial set-up e-mail account, it is very easy to use.

More Efficient:

We can send our message to many friends or people only in one action.

Versatile:

Pictures or other files can also be sent through e-mail.

Use of Internet:

Internet is very beneficial for us. Here is the list of use of internet.

- (i) Fast communication
- (ii) Big source information
- (iii) Source of entertainment
- (iv) Access of social media
- (v) Access of online services
- (vi) E-commerce
- (vii) E-learning

Q.22 Explain the risks of ICT to society and the environment

1. Health Problems

In new age we are expected to rely upon information technology. But blind faith in modern technology may be dangerous in many cases. Over use of computer is dangerous for our health.

2. Crime

In these days the computer crimes are also very common. Computer crime is defined as any crime accomplished through knowledge and use of computer technology.

3. Theft

There is also a word theft. Theft is most common form of crime. Computer are used to steal money, goods, information and computer resources. Privacy is another common issue in computer. Illegal duplication of copyright material like books, papers and software on internet is also crime.

4. Hacking

Hacking is still another illegal activity which is committed on computer systems of other person. Computer hackers can damage some organization by stealing their credit cards and valuable information.

Precaution:

One way to reduce the risk of security is to make sure that only authorized person have access to computer equipment. We may be granted access to computer based on passwords as described below.

We can use a key, an ID card with photo, an ID number, a lock combination our voice or finger print as password to secure our computer.

Q.23 What is word processing? Explain its features.

Ans: "To type something by computer's keyboard, to correct, to arrange, to amend the document, to add and delete the written portion when required is called the word processing".

Word processing is such a use of computer through which we can write letters prepare reports and books. Word processing is a computer program.

Features of Word processing

By using word processing, following tasks can be performed.

- We can develop any document; see it on the screen after typing.
- Edit it, add some new text or delete the previous text or do the amendments in it.
- Document can be stored in memory and its print can also be taken.
- By means of modern word processing, we can write it in different styles and in different colors. We can also use graphics.
- In computers, a facility is also available which points out the spellings or grammatical mistakes.
- The content list and index etc. can also be made easily.

Q.24 What is graphic designing? And give its applications.

"The process to draw a required line or pictures on a computer screen using mouse or keyboard is called the graphic designing".

Applications

- Designs of the buildings or components can also be drawn with the help of computers. This process is named as computer aided designing (CAD).
- Three dimensional (3D) colored pictures can be drawn by this process which can be checked by rotating it at different angles. Moreover different colors can also be selected for the pictures. This process because of accuracy and comfort is very popular in industrial field.

Q.25 What do you know data managing and explain its applications.

Ans: "The process of collecting information regarding a subject for any purpose and to store them in the computer in more than one inter linked files which may help when needed, is called data Managing".

Applications in educational institutions, libraries, hospitals and industries

The educational institutions, libraries, hospitals and industries store the concerned information by data management. Additions and deletions are made in the data according to the requirement, which help in the improvement of the management of the institutions.

Applications of Bar Codes

In big departmental stores and super markets optical scanners are used to read, with the help of a Laser Beam, to read the Bar Codes of a product which indicates the number at which this product is recorded in the register. In this way the detail about its price is obtained and the central computer monitors the bills and the related record of the sold goods. It also helps placing the order for goods being sold in a large quantity and to decide about less selling goods.