Chapter = 17

INFORMATION AND COMMUNICATION TECHNOLOGY

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INFORMATION AND COMMUNICATION TECHNOLOGY

Definition:- The infrastructure and components that enables modern computing to create, access , analyse and communicate information is known as information and communication technology. OR

The scientific methods and means to store, process and transmit vast amounts of information in seconds with the help of electronic equipment's.

Abbreviation: - It is abbreviated by **" ICT ".**

Components of information and communication technology: -

The ICT system is made of five components which are given below.

(1) Data and Information.

(2) Hardware.

(3) Software.

(4) Procedures.

(5) Human Resource.

(1)DATA AND INFORMATION:-

Derivation and Meaning:- The term **"DATA"** comes from a singular **"Latin"** word **"DATUM"** which means **"Something Given".**

Definition:- The collection of facts and figures is known as data. OR

Anything in raw form is known as data.

Examples:- Ali, class 10th, student.

Every organization has its own specific data which is used to perform certain operation within organization.

INFORMATION:-

Definition:- The process data is as known as information.

Examples:- Ali is a student of class 10th.

DATA	INFORMATION
It is the collection of facts and figures	It is the process data.
It is input side.	It is output side.
It is before process.	It is after process.
It has no proper format.	It has proper format.
Examples: - Ali, class 10th, student.	Example: - Ali is a student of class 10th.

B. HARDWARE

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Definition:- The physical parts of a computer which cause processing of data is known as hardware.

Explanation:-

(i) Hardware can be seen and touched.

(ii) Hardware is repaired in case of problem.

(iii) Hardware is simple.

Examples:- Mouse , key board , printer etc.

C. SOFTWARE

Definition:- A set of instructions that tell a computer what to do and how to do is known as software.

Explanation:-

(iv) Software cannot be touched.

(v) Software is restored in case of problem.

**(vi)** Software is more complex than hardware.

Examples: - Operating system , application programs etc.

D. PROCEDURES

These are the set of instructions and rules to design and use information system. These are written in manuals and documents for use. These are rules or methods may change from time to time. The information system must be flexible to incorporate these changes.

HUMAN RESOURCE

It is people who design and operate the software , they feed input data, built and hardware.
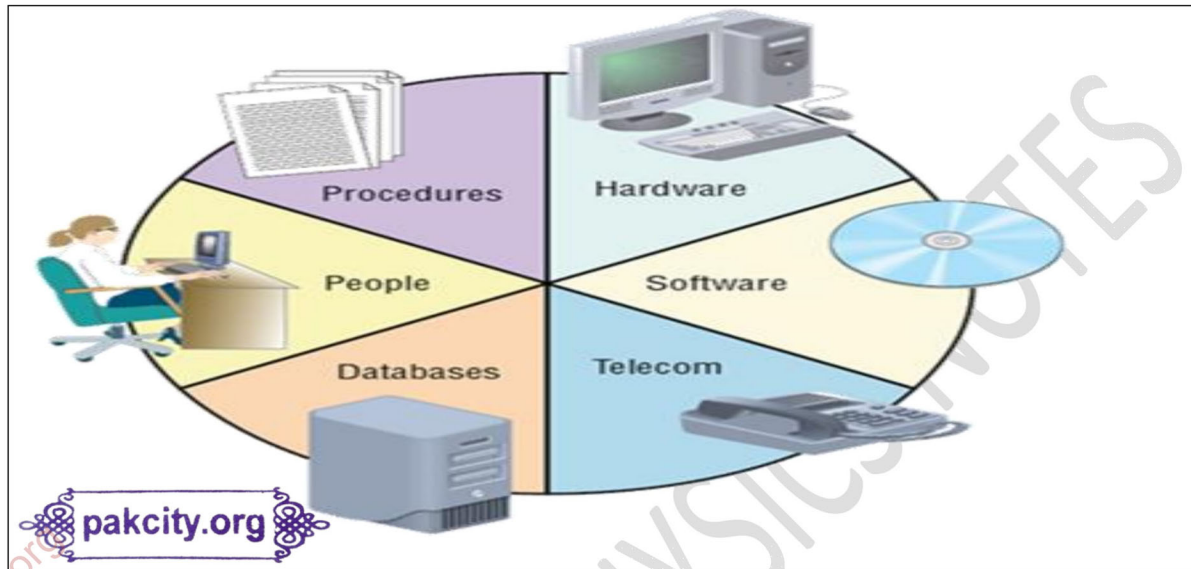
FLOW OF INFORMATION

Definition:- The transfer of information from one place to another through different electronic and optical equipment's.

Explanation:- Flow of information is a particular view that focuses on the path and means followed by information entities.

(i) In telephone, information path is wires in which the information flows by means of electrical signals.

(ii) In radio, television and cell phone, information path is emitter path is either air, vacuum and / or seawater in which the information travels in the form of electromagnetic waves or through which information travels in the form of light.

(i)Signals are electric or electromagnetic representation of data or information.
**(ii)Transmission is the communication of data / information by the propagation and processing of signals.**

TRANSMISSION OF ELECTRICAL SIGNAL THROUGH WIRE

Data or information can be transmitted and received over a wire-based communication technology. The information is converted to electrical signals at the transmitter, which is sent through wire (twisted pair, coaxial cable etc.), and information is converted back to original from at receiver's end. Examples include telephone networks, cable television and internet access.

For example in figure 17.2, a simple telephone model sound (voice) is converted into electrical signals through mouth piece and sent through electrical wires (twisted pair) and converted back to sound (voice) through ear piece at the receiver.

Electrical wire may be used to transmit both analog and digital transmission. For analog signals, amplifiers are required about every few kilometers and for digital transmission (using either analog or digital signals), repeaters are required every kilometer, depending upon the type of wire used.

Figure 17:2 - Telephone communication
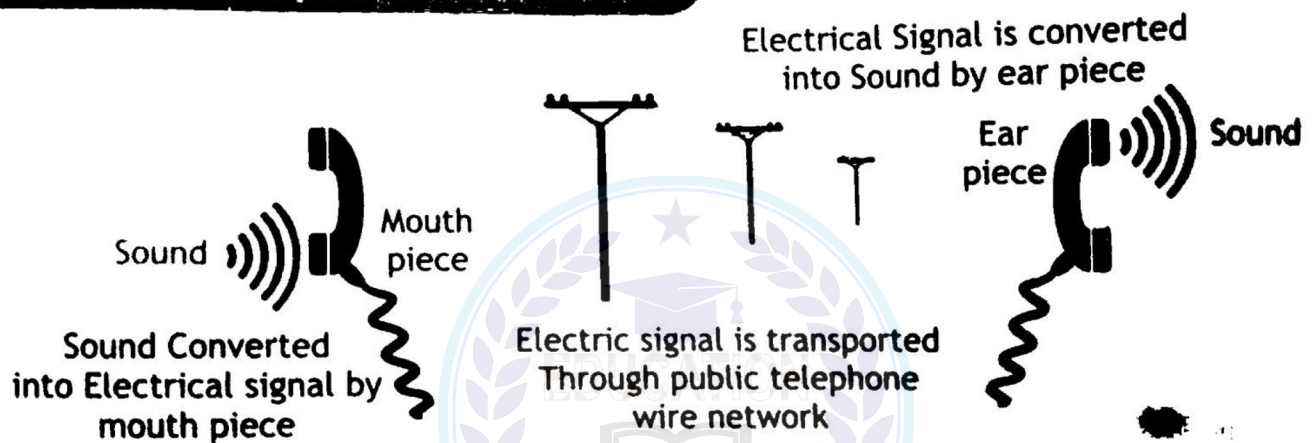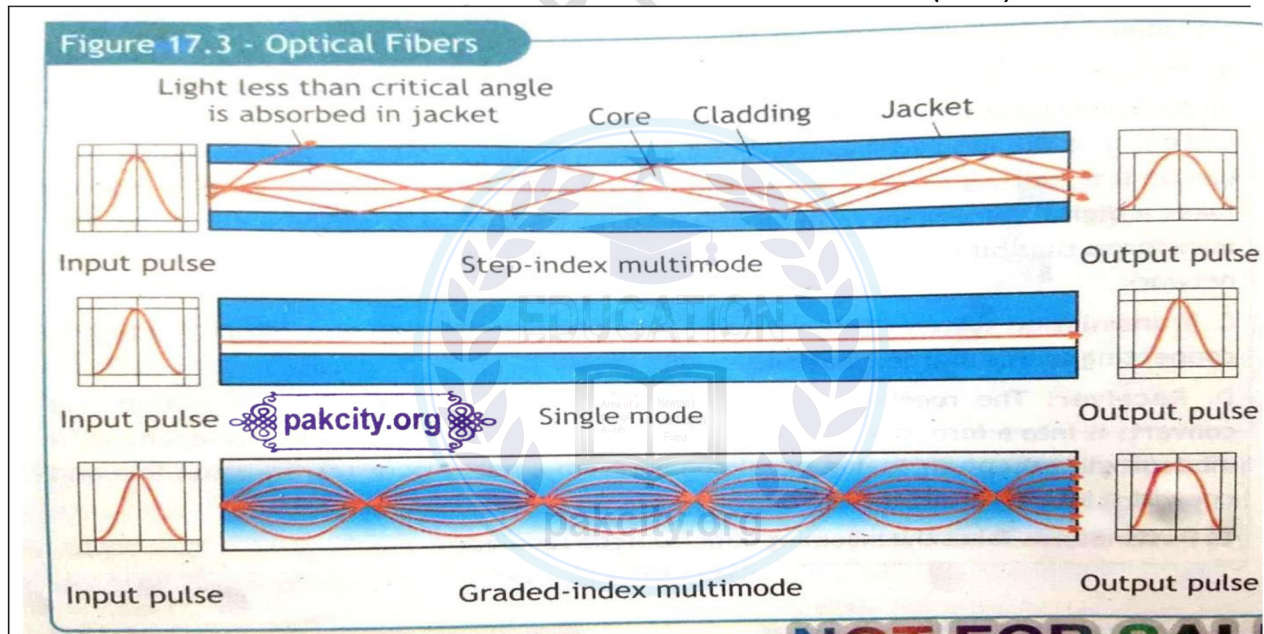
TRANSMISSION OF ELECTRICAL SIGNAL THROUGH OPTICAL FIBERS

An optical fibre transmits a signal encoded beam of light by means of internal reflection. Total internal reflection can occur in any transparent medium that has a higher index of refraction than the surrounding medium.

The information is converted into electrical voltage signals, this varying voltage is used to produce light. Two different types of light source are used in fibre optics system: the light emitting diode (LED) and the injection laser diode (ILD). Both are semi-conductor devices that emit a beam of light when light is applied. The LED is less costly, operates over a greater temperature range and has a longer operational life. The ILD which operates on a laser principle, is more efficient and can sustain greater data rates. Figure 17.3 shows the principle of optical transmission.

(A) **STEP-INDEX MULTIMODE:** - Light from a source enters the cylindrical glass or plastic core. Rays at low angles are reflected due to total internal reflection and travel along the fiber, other rays are absorbed by the surrounding material. This form of propagation is called step-index multimode. This type of fiber is best suited for transmission over very short distance.

(B) **SINGLE – MODE :-** when the fiber core radius is reduced to the order of a wavelength, only a single angle or mode can pass. Single – mode is typically used for long distance applications, including telephone and cable television.

(C) **GRADED-INDEX MULTIMODE:-** When the index of refraction at the centre of the core is made is higher and reduced gradually, light in the core curves helically due to variation in the index of refraction. The shortened path and higher speed allows light at the periphery to arrive at a receiver at about the same time as the straight rays in the core axis. Grade –index fibres are often used in Local Area Networks (LAN).

Figure 17.3 - Optical Fibers

TRANSMISSION OF RADIO-WAVES THROUGH AIR OR SPACE

Electrical signals representing information from a microphone, a TV camera, or a computer (transmitters) can be from one place to another place using radio waves. For transmission of a signal, radio-frequency electrical energy from the transmitter is converted into electromagnetic energy by the antenna and radiated into the surrounding environment (atmosphere, space, water). For reception of a signal, electromagnetic energy falling on the antenna is converted into radio-frequency electrical energy and fed into the receiver.
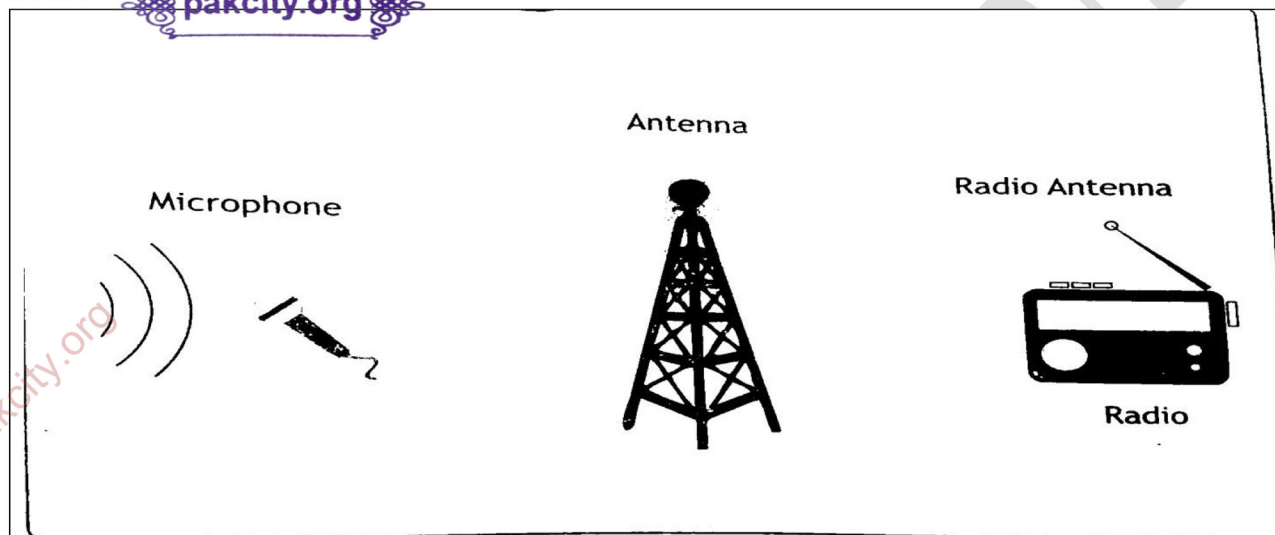
INFORMATION TECHNOLOGY

Definition:-The scientific method of storing, protecting, processing, transmitting, receiving and retrieving information is known as Information technology. OR
The technology by means of which information can handled , Processed, transmitted and recorded by applying modern science is known as Information technology. OR
The scientific method used to store information, to arrange it for proper use and to communicate it to others is known as information technology.

Abbreviation:- It is abbreviated by **I.T.**

Applications: -

(i) It plays an important role in the globalization.

(ii) It plays an important role in the designing processes.

(iii) It plays an important role in the storing of data.

(iv) It is used to transmit data and information from one place to another.

(v) It plays an important role in the management.

(vi) It plays an important role in the remote accessibility.

(vii) It plays an important role in the creation of new jobs.

(viii) It plays an important role in education.

(ix) It plays an important role in the health sector.

(x) It plays an important role in the advancement of economies.

(xi) It plays an important role in entertainment.

(xii) It plays an important role in the communicating news.

(xiii) It plays an important role in the accurate and speedy processing of information.

(xiv) It plays an important role in the software and hardware.

COMMUNICATING INFORMATION   OR   TELECOMMUNCATING:-

Definition: - Telecommunication or simply telecom is the exchange of information over significant distance by electronic means and refer to all type of voice, data video transmission. OR

It is the method that is used to communicate information to far off places instantly.

Telecommunicating Devices   OR Means of communication:-

Definition:- These are those devices which enables a person to communicate all over the world. OR

The machines or devices used to carry information to far off places are known as telecommunication devices.

Examples:-

(A) Fax machine.

(B) Cell phone.

(C) Photo phone.

(D) Computer.

(A) FAX MACHINE

Definition: - It is a machine which is used to send documents to other location without exchanging the physical versions of the documents. OR

A device for transmitting and receiving faxes.

Other Name: - It is also called Telefacsimile's.

Explanation:-The original documents is converted into electrical signals and then sent through a telephone cable line.

Sending Faxes:- For sending a document through a fax machine the user puts the paper in a scanner device and dialed fax number where he need to send the fax. The fax machine basically scans a page to convert its text and graphic into electronic signals and transmit it to another fax machine through telephone lines.

Receiving Faxes:- The specified fax machine receive the incoming signals. It converts the incoming back into its black, white and color parts and uses a printer to create the copy of the message that was sent.

(B) CELL PHONE

Definition:- It is an electronic device which way communication which sends and receives data through radio waves. OR

It is a really versatile radio because it sends and receive radio signals.

Other Name:- It is also called

(i) Mobile Phone.

(ii) Cellular Phone

Construction:- A cell phone consists of the following main parts.

(i) Compact speaker

(ii) Microphone

(iii) Keyboard

(iv) Display screen

(v)A power circuit board with microprocessors that each phone a miniature computer.

Principle:- Its basic principle is radio technology.

Working:- It carries a radio transmitter and a receiver inside it. It sends and receives the

massage in the form of radio waves. Our sound waves are converted into radio waves and then reach nearby station which linked with the telephone network. The area of each station works as a cell. When a call reaches from one cell to the other the radio signal emitted by telephone get connected with the next station by automatic system .Mobile receiver again changes the radio signals into sound.

(C) PHOTO PHONE

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History:- The first photo phone was invented by Alexander Bell in 1880.
Definition:- It is a device which transmit sound on a beam of light.
Working:- This phone work as the sound waves is projected towards mirror by an instrument the vibration of sound waves produces similar vibration sound in the mirror. At the same time light is flashed on the mirrors which pick up the vibration and redirected it to other photo phone which convert them back to sound waves.

Photo phone Network

Uses: - Modern means of telecommunication also uses the concept of photo cell as we can see in optical fiber.

(D) COMPUTER

Definition:- It is an electronic computing machine that is used for adding, subtracting and multiplying.   OR
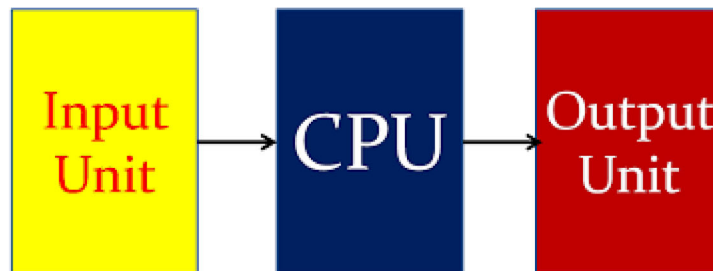It is an electronic machine which after analysing and arranging the given information, presents it in a very short time.
Parts:- The important parts of a computer are given below.
(1) Input Devices (Input Unit).

(2) Central Processing Unit (CPU).
(3) Output Devices (Output Unit).

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Input Unit → CPU → Output Unit
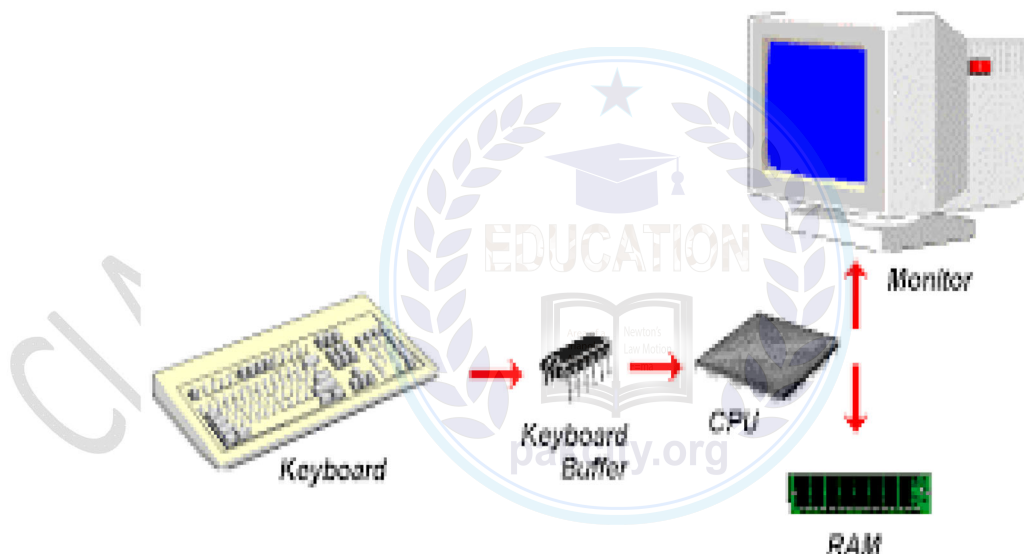
(1) Input Devices:-

Definition:- Those devices with the help of which data and instructions are entered into the computer are known as input devices . OR

The devices that enter the information into the computer are known as inputs devices.

Other Name:- This part is also called receiving section of the computer.

Explanation:- These devices send the received data to the central processing unit so that it arrangement and analysis may be done. OR

These devices feeds information into a CPU to arrange and analyze it.

Monitor

Keyboard → Keyboard Buffer → CPU

RAM

Examples of input devices:-

Input Devices
1. Keyboard
2. Mouse
3. Track Ball
4. Joystick
5. Touch Pad
6. Pointing Stick
7. Graphic Tablet
8. Touch Screen
9. Scanner
10. Digital Camera
11. Light Pen
12. Microphone

Central processing unit : -

Definition:- It is a part of computer which receives the data and instruction from input devices and then make them analyzed and organized.

Other Name:- It is also called brain of the computer because it perform the whole job.

Abbreviation:- It is abbreviated by CPU. This part comprises of a control unit and memory unit.

Parts OR Components of CPU:- It consists of

(i) Control Unit.

(ii) Memory Unit.

(3)Output devices:-

Definition:- Those device which provide ways to get back the information from a computer is known as output devices.

Function:-The internal working of computer is represented by the output unit.it is called Monitor. All the processes can be seen on its screen .while the print out of the result can be taken on a paper with the help of an attached printer. A monitor is a device which is uses to show the processing data of a CPU. All the process by a CPU can be observed on the screen or monitor.

Examples of Output Devices:-

Note:- Similarly CDs, floppy disk, memory card etc. are called output devices and any data can be saved in these devices.

The whole function of Computer:-
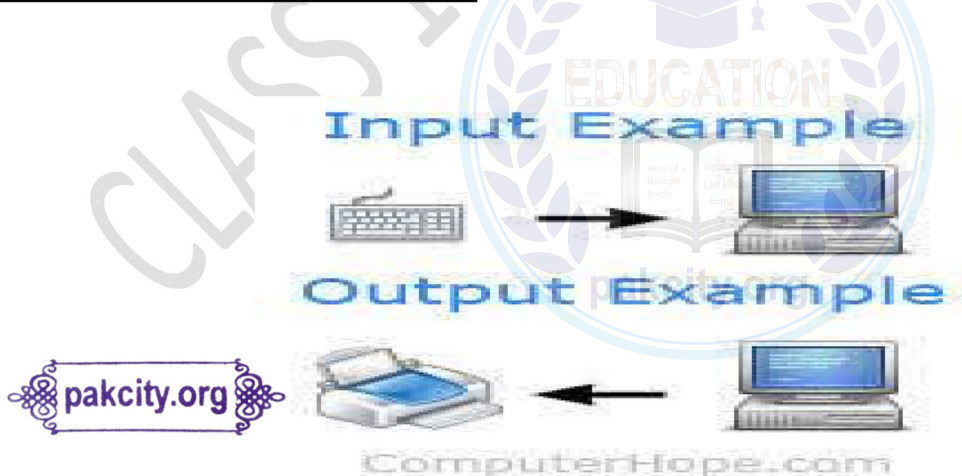
TYES OF COMPUTERS

(1) Mainframe Computer.
(2) Desktop OR   Personal Computer (PC).
(3) Laptop OR Notebook.
(4) Tablet.
(5) Smartphones.

1. MAINFRAME COMPUTER

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Description: -

These are extremely large computers used in organization (such as banks and government department) where very large amounts of data are processed.

Advantages:-

a. Capable of processing very big jobs, this makes use of their large memories and fast processor speeds.

b. Capable of complex problem-solving that would take smaller computers much longer to do.

Disadvantage :-

a. Mainframes are so large that they take up almost a whole room.

b. Complex to set up.

c. Expensive to operate and maintain and they require specialist staff to operate.

5. DESKTOP OR PERSONAL COMPUTER (PC)

Description: -

This is a general purpose computer made up of separate components:

a. Monitor

b. Keyboard

c. Mouse

d. Processor and storage

Advantages: -

a. Spare parts are often cheap because they are standardized.

b. They often have faster processors than laptop computers for the same price.

c. There are fewer problems with overheating than laptops because of their larger size. **pakcity.org**

Disadvantages: -

a. Lack of portability heavy and separate components are connected by wires.

b. Files have to be copied and stored on portable disk, especially if you need to take them with you.

3. LAPTOP OR NOTEBOOK

Description: -

This is a computer where all the components are together in a single unit. This means that they are portable; unlike desktop computers, they can be moved from one work area to another.

Advantages: -

a. Portability

b. User can work anywhere, especially if they can access WiFi and link to other media.

Disadvantage: -

a. Loss and theft

b. Limited Battery life

c. Keyboard and pointing devices are not as flexible as those on a desktop.

d. Laptops are more compact, so overheating can be a problem.

4. TABLET

Description: -

Like a laptop this is a small portable computer but the biggest difference is that its user interface is all through touch.

Advantages: -

a. Portable and easy to use.

b. Quick to switch on.

c.   Thousands of downloadable applications available.

Disadvantage: -

a.   Not all have 3G/4G access.

b.   Touch-screen typing can be difficult.

c.   Cannot make phone call.

5. SMARTPHONES

Description: -

This is an advanced mobile phone with, feature such as: web browsers, high-resolution touch screens, GPS navigation and Wi-Fi access.
 Smartphones are often used as media players and cameras.

Advantages: -

a.   Online access to data.

b.   Better web browsing capability than a simpler mobile phone.

c.   Just one device can accomplish many tasks at work or at home.

d.   Contact's details and phone numbers can be integrated.

Disadvantages: -

a.   A screen size makes it difficult to read long documents and makes it difficult to enter text and numbers quickly.

 b. Costs can be high as most providers want the user to commit to a long-term contract with internet access.

 c. Some webpages may not display or function entirely as the web designer expected.

INTERNET AND EMAIL

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Definition:- It is a method of exchanging digital messages from a author to one or more recipients.

Components of e-mail:- An e-mail message consists of three components which are given below.

(i) The message envelope
(ii) The massage header
(iii) The massage body .

Base of e-mail system: - To day e-mail systems are based on a store-and-forward model. Modern e-mail services accepts , forward, deliver and store massages. pakcity.org

Explanation: - One of the most widely used application of internet is e-mail, which provides very fast delivery of message to any enabled site on the internet. Communication through e-mail is more quick and reliable. Through our e-mail, we can communicate with our friends and institution with more ease and pace.

INFORMATION STORAGE DEVICES

Definition: - Those devices which are used to store the data and information are known as information storage devices.

Explanation: - Information can be stored by virtually any form of energy. Handwriting (paper documents) ,phonographic recording, magnetic tape, DNA and RNA and optical discs are all example of storage media. Electrical data storage require electrical power to restore and retrieve data. Computer data storage is one core functions of a general purpose computer. Electronic documents can be stored in much less space than paper documents.

Examples:- RAM, Hard disk, USB etc.

TYPES OF INFORMATION STORAGE DEVICES

(A) Primary Storage Devices.
(B) Secondary Storage Devices.

PRIMARY STORAGE DEVICES

Definition:-
Explanation:-
(i)   They are generally smaller in size.
(ii) They hold data temporarily and are internal to the computer.
(iii) They have fastest data access speed.
Example:- RAN and cache memory.

AUDIO AND VIDEO CASSETTES

Definition:-

Explanation:-

(i) They have large storage capacity.

(ii) They store data permanently.

(iii) They can be either internal or external to the computer.

Examples:- Hard disk, Optical disk drive , USB etc.
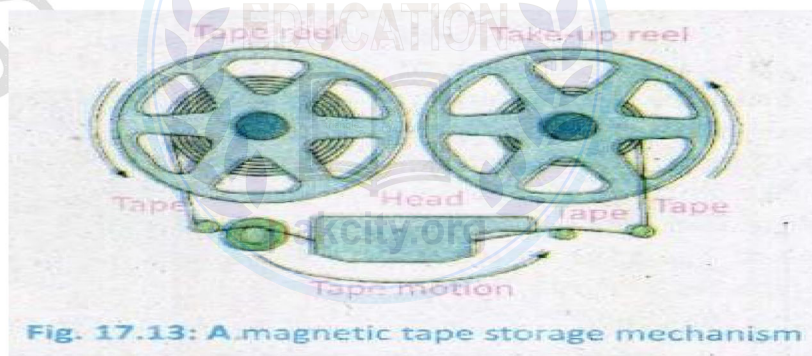
Audio Cassettes:-

Definition:- It is a data storage device which is used to store audio data or sound. OR

It is a storage device for collecting (storing) of sound.

Principle:- It is based on electromagnetisms.

Construction:-It consists of a tape of magnetic material on which sound is saved or record in particular form of a magnetic field.

Working:- A microphone convert sound waves into electrical signals these signals are amplified by an amplifier. When magnetic tape is passed through the head of audio cassettes recorder which act as electromagnet then magnetic tape is magnetized and sound is stored in a specific magnetic pattern in this tape the play back head again reproduces the recorded sound and directed it towards a loudspeaker.

Fig. 17.13: A magnetic tape storage mechanism

Production of the sound again and again:- To produce the sound again the tape is moved past the play back head. Changes in the magnetic field on the induce altering

current signals in the coil wrapped on the head. These signals are amplified and sent to the loudspeakers which reproduce the recorded sound. In video tape pictures are recorded along with sound.

Video Cassettes:-

Definition:- It is a data storage device which is used to store or recorded picture along with sound. OR
It is a data storage device which is used to store both audio video data. OR   It is a storage device which is used sound and picture.

Principle:- It is based on magnetism.

Explanation:-Recording of videos on a tape requires the same method as in audio cassettes but in video tape pictures are recorded along with the sound.

HARD DISK

Definition:- It is a storage device which is installed inside the system unit.

Other Name:- It is also called storage disc.

Construction:- It is made of aluminum and hence it is not flexible. It is coated with a layer of material (Fe, Co, Kr, Ni) that can be magnetized easily.

Explanation:-A hard disc is made by joining many plates. This disc revolves in enclosed box with great speed about its axis. It is kept in a closed jacket to avoid exterior pollution. Because of its large capacity and it has high density of data compared to other disc.

Uses:- By using hard disc and by control board a large number of information can be read and written.
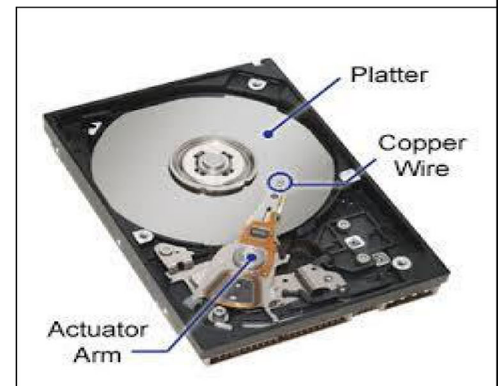
FLOPPY

Definition:- It is a data storage device which is made of flexible plastic material. OR
It is a storing device which is used for storing computer data. pakcity.org
Other Name:- It is also called magnetic discs.
Construction: - It is made of flexible plastic material which is coated with ferromagnetic compound. This disc is house in a protective jacket having several holes cut in it. This Disc consist of

i. Write protect notch
ii. Central hole .
iii. Index hole .
iv. Read/ write hole

CD AND DVD

Compact Disc:-

Definition:-It is a digital disc on which a pit pattern is formed . OR   It is
an optical disc that is used to store data.
Abbreviation: - It is abbreviated by " CD ".
Principle:- It is based on laser technology.
It is a data storage device on which It is digital disc comprises of billions of pits of varying length and space set on a shiny disc. Sound and movies can be stored on a CD with the help of a laser beam. These movies can be displayed on the computer's screen.
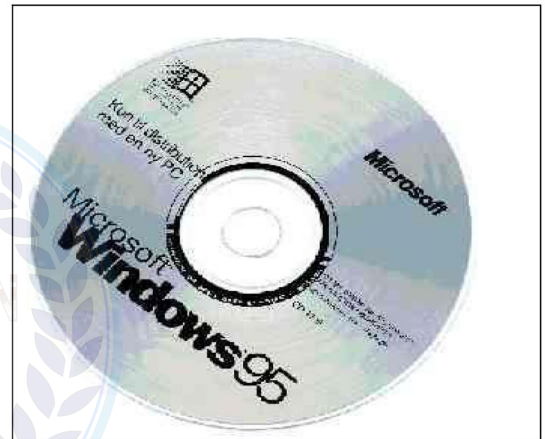
FLASH DRIVE

Definition: - It is a small storage device that can be used to transport files from one computer to another.

Other Name:- It is also called universal serial bus (USB).

Construction:- It consists of flash a memory data storage device integrated with a USB interface.

Explanation:-

(i).It is removable and rewritable.

(ii) It is physically much smaller than the other storage medium.

Uses:-

(i) It is used to transfer data from one place to another easily.

(ii) It is used to store music, movies and pictures

WORLD PROCESSING

Definition:- To type something by computer keyboard to correct to arrange to amend the documents , to add and delete the written required is known as word processing. OR

It is a computer application uses composition, editing, formatting and printing. Writing something correct something, arrange something, amend the document, add or delete something is called word processing.

Application of Word Processing :-

(i) We can develop any document

(ii)Spelling or grammatical mistakes can be checked.

(iii) We can write different styles and in different colours.

(iv) We can write letters , prepare and report and books.

HANDLING INFORMATION

(A)   DATA MANAGEMENT

Definition:- It is the process to draw a required line or pictures on the computer screen using mouse or keyboard.

Explanation:- It is the process and art of combining text and graphics communicating an effective message in the design of logos, graphics, brochures, news, letters, posters, signs and any other type of visual communication.

Uses Graphic design:-

(1)Computer aided designing.

(ii) 3-D coloured pictures.

(iii)Use in industrial field.

Note:- Graphic designs often use for desktop publishing software and techniques to achieve their goals.

Brochures

KEEP CALM AND CARRY ON

(B) MONITORING AND CONTROL

Definition:- To collect all information regarding a subjecting of any purpose and to store them in the computer in more than on interlinked files which may help when needed is called data managing.

Explanation:- These are uses by educational institution, libraries, hospitals and industries store the concern information of the management of the institution.

Monitoring and control:- Optical scanners are used in big departmental stores and super markets. To read bar codes of a product. A bar code indicates the number at which this product is recorded in the register. A bar code comprises of an item price, sold of goods, quality of product etc.

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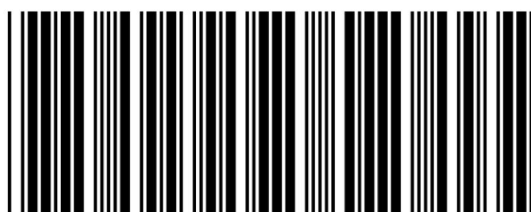
Barcode

39123439

Optical Scanner

CONCEPTUAL QUESTIONS

Q#01: Identify the most reliable means of storing information?

Ans:- **Means of information storages:-** Those devices which are used to store the data and information are known as means of information storage.

Examples:- The most reliable means of storing information are given below.

(i)   Hard drive.

(ii)   Magnetic strip

(iii) Super Disk

(iv) Tape cassette

(v)   DVD etc

Q#02:- How information is different from data?

ANS:-

DATA	INFORMATION
It is the collection of facts and figures	It is the process data.
It is input side.	It is output side.
It is before process.	It is after process.
It has no proper format.	It has proper format.
Example:- Ali , class 10th student.	Example:- Ali is a student of class 10th.

Q#03:- Why frequency band for uplink and downlink is different in transmission of microwaves through space? ❈ **pakcity.org** ❈

Ans:- Statement:- Frequency band for uplink and downlink is different in transmission of microwaves through space.

Reason: - This is because of the massive power **difference** between **transmit** and receive power.

Explanation:- The uplink frequency is the frequency which is used for transmission of signals from earth station transmitter to the satellite. The downlink frequency is the frequency which is used for transmission of signals from the satellite to the earth station receiver. On the Earth Station we have to penetrate the atmosphere to reach the satellite station. So we need a lot of power to be generated. This is only possible with the help of High power transmitter circuits, which cannot be installed on the satellite ,so uplink is at higher frequency with higher power.

Conclusion:- As Conclusion we find that frequency band for uplink and downlink is different in transmission of microwaves through space.

Q#04:- What does cell in cell phone refers to ?

Ans:- Statement:- Cell in cell phone refers to.

Explanation: - As we know that a cell is typically the area (several miles) around a tower in which a signal can be received. A cellular phone is also known as a cellphone or mobile phone. They are wireless phones which receive their signals from tower. A cellular phone is a telecommunication device that uses radio waves over a networked area (cells) and is served through a cell site or base station at a fixed location, enabling calls to transmit wirelessly over a wide range, to a fixed landline or via the Internet.

Conclusion:- As conclusion we find that Cell in cell phone refers to.

Q#05:- Can internet be used for shopping ? Give an example. pakcity.org

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Ans: Statement:- Yes internet be can used for shopping.

Explanation:- As we know that internet is a world-wide system of computer networks – a network of networks in which users at any one computer can, if they have permission, get information from any other computer. Now a days for various shopping purposes online shopping , booking hotels, tickets are the examples of online shopping.

Q#06:- How a flash drive is different from other storage devices?

Ans:- Statement:- A flash drive is different from other storage devices.

Reasons:- It is because of

(i) It has no movable parts.

(ii) It has long life due lack of movable parts.

(iii) It is removable, re-writeable and much smaller while other storage devices are heavy.

(iv) It is cheap with high quality and large capacity.

(v) It need less power for its operations while other devices need more power.

(vi) USB acts as "plug and play" device.

(vii) USB supports 3 types of speed:

- Low speed (1.5 Mbps)
- Full speed (12 Mbps)
- High speed (480 Mbps).

Conclusion:- From the above reasons we conclude that a flash drive is different from other storage devices