# PHYSICS

**Class 10th (KPK)**

Chapter # 17

# INFORMATION AND COMMUNICATION TECHNOLOGY

## COMPREHENSIVE QUESTIONS:

**Give an extended response to following questions.**

**1. What is information and communication technology (ICT)? Explain briefly its components.**

**Ans: Information and Communication technology (ICT):**

Information and communication technology is the infrastructure and components that enable modern computing to create, access, analyze and communicate information.

The large amount of information is transmitted to distant places through electronic equipment in the form of data, image, voice, video, etc. ICT is blender of two terms

i) Information technology
ii) Telecommunication

**Information technology:**

Information technology is the scientific method to store information, to arrange it for proper use and to communicate it to others.

**Telecommunication:**

The methods and means that are used to communicate information to distant places is called telecommunication.

**Components of information and communication technology:**

The information and communication technology consist of five components that are;

A) Data and Information
B) Hardware
C) Software
D) Procedures
E) Human resource

**A) Data and Information:**

**Data:**

A collection of raw facts and figures are called data. The word raw means that it is in unprocessed form. Data may consist of numbers, symbol, characters, etc.

**Information**:

When data is processed, interpreted, organized, structured or presented so as to make them meaningful or useful is called information. The information is in the form of text, sound, graphic or figure.

**B) Hardware:**

**Definition:**

The physical part of computer, telecommunication and other devices is called hardware. The term hardware refers to machinery. Hardware is the physical part that can be able to touch and see.

**Example**:

CPU, mouse, monitor, keyboard, printer, etc.

**Chapter # 17**

**C) Software:**

**Definition**:

Software is a set of instructions that tells a computer what to do or how to operate. Software is also called program and cannot be touch. These programs are machine-readable instructions that direct the circuitry within the hardware part to store, process, read, transmit and retrieve information in specific manners.

**Example**:

Software enables you to use a computer for writing an essay, playing games, listening to music, etc.

**D) Procedures:**

These are set of instructions and rules to design and use information system. These are written in manuals and document for use. These rules may change from time to time. The information system must be flexible to cooperate these changes.

**E) Human Resource:**

Human resource are basically people who design and operate the software, they feed input data, build the hardware for smooth running of software. Users/people write the procedures, rules and is ultimately people who determine the success and failure of software.

**2) Explain the flow of information. Describe how information is transmitted as electric signals through wires, light signals through optical fiber and radio waves through air/vacuum?**

**Ans: Flow of information:**

Flow of information means the transfer of information from one place to another through electronic and optical equipment. Flow of transformation basically focused on the path that is followed by information entities.

Signals are electric or electromagnetic representation of data or information. Data/information can be transmitted by the propagation and processing of signals.

**Examples:**

In telephone, the information path is wire through which the information flows by mean of electrical signals.

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

**Transmission of Electric 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 wires (twisted cable, coaxial cable, etc.) and information is converted back to original form at receiver's end. Telephone network, cable TV and internet excess are the examples.

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

**Example:**

Consider person A is talking on phone with person B. when person A speaks some words, they are converted to electrical signal through mouth piece and transmitted through the wire. These electrical signals are converted back to sound through ear piece which person B can understand.

**Transmission of Electric signal through Optical fibers:**

An optical fiber transmits a signals encoded beam of light by means of internal reflection. The information is first converted into electrical voltage signals, that varying voltage is used to produce light. Two different types of light source are used in fiber optics are Light emitting diode (LED) and Injection laser diode (ILD). Both are semi-conductor devices that emit a beam of light when a voltage is applied.

**Principle of optical fiber transmission:**

The three principles for transmission of electric signal through optical fiber are;

**A) Step-index multimode:**

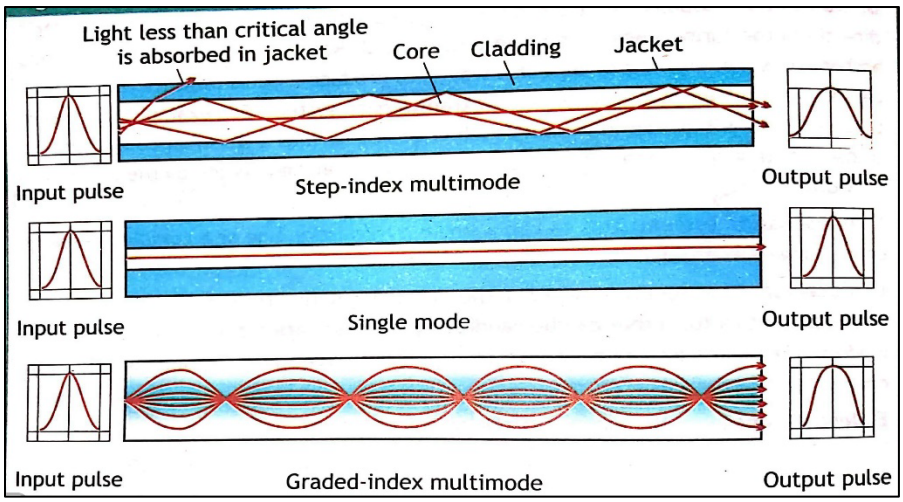
Light from the source enters the cylindrical glass or plastic core. Rays at low angles are reflected due to total internal reflection and travel along the fiber, other rays are absorbed by surrounding material. This form of propagation is called step index multimode. This type of fiber is used for very short distances.

**B) Single-mode:**

When the fiber core radius is reduced to the order of a wavelength, only a single order or mode can pass. Single mode is typically used for long distance applications like telephone and cable television.

**C) Graded-index multimode:**

When the index of refraction at the center of the core is made is higher and reduced gradually, light in the core curves helically due to variations in the index of refraction. The shortened path and higher speed allows light at the periphery to arrive at about the same time as the straight rays in the core axis. Graded-index fibers are used in local area networks (LAN).




**Transmission of radio waves through air or space:**

Electrical signal representing information from a microphone, a TV camera, or a computer (transmitter) can be sent from one place to another by using radio waves.

For **transmission** of a signal, radio-frequency electrical energy from a transmitter is converted into electromagnetic energy by the antenna and radiated into the surrounding environment (atmosphere, space and air).

"An **antenna** can be defined as an electrical conductor or system of conductors used either for radiating electromagnetic energy or for collecting electromagnetic energy."

For **reception** of a signal, electromagnetic energy falling on the antenna is converted into radio frequency electrical energy and fed into the receiver.

In two-way communication, the same antenna is used for both transmission and reception.

**3) Describe the function and use of fax machine, cell phone, photo phone and computer?**

**Ans: Fax machine:**

A fax machine is designed to send as well as received documents electronically over a telephone network.

The information is instantly converted to electrical signals and sent through a phone line to the other location. The transmission can be between two fax machines or between a fax machine and computer or online faxes that equipped to send and receive faxes.

**Function of fax machine:**

Fax machine are used to send and receive faxes, so it has two parts;

1 Sending faxes
2 Receiving faxes

**1. Sending faxes:**

For sending the document through fax machine, the paper is put in a scanner device and dials the relevant fax number. The fax machine reads the paper and divides the information into lines. The sending part is bit like a computer scanner that scans only one line of a document at a time, and only in black and white. A fax machine transmits only one kind of electric pulse down the phone line to represent black and other to represent white. The phone line transmits the document almost instantly to a fax machine at other end.

**2. Receiving faxes:**

The receiving fax machine receives the incoming signals and converted these signals into black and white markings to copy the document which was sent with the help of printer.

**Uses of fax machine:**

1. Fax machines are used by some companies for communication with their suppliers, customers and other companies.
2. Fax machine are easy to use and do not have viruses like email.
3. Fax machine are the safest form of communication.
4. Fax machines have the memory capacity to store the pages that come in or go out.
5. A user can transmit a same fax to multiple users at the same time which saves our time.

# Chapter # 17

**Cell phone:**

A wireless phones that can receive their signals from tower is called a cell phone. A cell is a geographical area around a tower in which a signal can be received. The area covered by a cellular phone transmitter can be from one mile to twenty miles in diameter.

**Function of cell phone:**

Cell phone provides incredible functions depending on their model, which are described below:

1. The main function of cell phone is communication by making calls, Sending and receiving text messages.
2. Some features of mobile phone include calculators, alarm clock and calendars.
3. Store contacts information.
4. Make tasks or to-do-list.
5. Keep tracks of appointments and set reminders.
6. It is possible to view documents on cell phone in MS office file format.
7. Give access to internet through mobile phone for getting information (news, GPS navigations, entertainment, etc.)
8. Cell phones are used as media player and can hear radio on it.
9. Cell phone can act as a camera by capturing picture or recording videos and to save them.
10. Many cell phones gave us a feature to block unwanted numbers.

**Uses of cell phone:**

Following are the main uses of cell phone are;

1. Communicate to one another by sending and receiving text messages.
2. Making calls.
3. Store contact information.
4. Send and receive email.
5. Use cell phone as a torch.
6. Use built in calculator to perform mathematical operations.
7. Used cell phone as a camera to take pictures or record video.

**Photo phone:**

The photo phone is the telecommunication device that allows transmission of sound on a beam of light.

The photo phone is the invention of Alexander BELL. This means that a light we use will not only provide light but also act as a means of communication.

**Function of photo phone:**

The photo phone works by projecting voice through an instrument towards a mirror. The vibration in voice caused similar vibrations into the mirror. Bell directed sunlight into the mirror, which captures and projected mirror's vibrations. The vibrations were transformed back into light signals at the receiving end of projection.

The photo phone functioned similarly to the telephone, except the photo phone used light as a means of projecting the information while the telephone relied on electricity. The modern optical fibers for transmitting light works on the principle of photo phone.

## Chapter # 17

**Uses of photo phone:**

We can communicate to our friends and relatives on photo phone with the physical appearance of each other.

**Computer:**

A computer is a device that can be instructed to carry out sequence of arithmetic or logical operations automatically via computer programming. The set of instructions are given to a computer that tells a computer what to do or how to operate.

**Functions of computer:**

Some functions of computer are as follows;

1. Computer can be used for different purposes to solve different problems quickly and easily.
2. Computer can store large amount of data.
3. Computer process data at a very fast speed and perform different tasks.
4. Computer can process huge amount of data and produce accurate result without any errors.
5. We can compose any type of document, letter or report through computer.
6. Computer does the same thing over and over again without getting tired.
7. We can communicate to other people in the world by using internet.

**Uses of computer:**

1. Computer can be used to perform multiple tasks (arithmetic or logical) quickly that saves our time.
2. Computer can be used for entertainment by watching movies, listening music playing games, etc.
3. Computers are used in hotels for advance booking of rooms, paying bills, etc.
4. Computers are used for data managing and graphic designing.
5. In railway stations, computers are used for rail reservation, preparation of reservation charts and printing of tickets.
6. NADRA department use computer network for designing and verifying NIC you can find any type of information with the help of internet
7. We can communicate to other people in the world by using internet.
8. Computer can be used in education to improve teaching and learning process.
9. Computers are used in companies to keep the records of their employees and their work.
10. Computers are used in hospitals to store medical history of the patients.

**4) What is email and internet? List few uses of internet in daily life.**

**Ans: Electronic mail (E-mail):**

Electronic mail (Email) is a method of exchanging messages between people using electronic devices.

Communication through email is more easy, fast and reliable.

**Features of Email:**

1. Some features of email are given below;
2. We can communicate with any person in any part of the world.
3. Email gives us facility to send pictures, voice, video, document and graphics, etc.

4. We can store data/information in email.
5. Email is fast way of communication and free of cost if you have an internet connection.

**Internet:**

The internet is a worldwide system of computer networks – a network of networks in which users at any one computer, if they have permission can get information from any other computer (and sometimes directly connect to users at other computers).

Internet is a global network that can be used for sharing information, providing worldwide services and communication. We can search any type of information on internet. A lot of services and products are sold and provided through internet today.

**Uses of internet:**

Some of the uses of internet are given below;

1) **Communication:**

Internet provided the facilities to communicate with one another which are;

- Email
- Social media like face book, twitter, Instagram, etc.
- Read and write blogs
- Forums and chartrooms
- Internet telephone (VOIP)

2) **Entertainment:**

We can use internet for entertainment by;

- Playing games
- Listening to music
- Watching movies
- Watching online video on YouTube.
- Looking for holidays and tickets (Concert, sports, etc.).

3) **Study and Research information:**

We can find detailed information on any topic in internet. Many websites provide lectures on different topic and can take online classes. We can find research papers and articles on internet.

**Example:**

Tehkals.com

4) **Shopping:**

Internet is widely used for shopping in the world. In online shopping a consumer can buy goods or services directly from a seller by visiting the website and place an order. Amazon and OLX are best examples of online shopping.

5) **Exploring the world:**

The internet has many services that help you to explore the world, such as;

- Satellite and mapping applications (Google earth)
- Live web cams that showing other parts of the world.
- Travel sites providing details of places with pictures and videos.

6) **Managing your life:**

With the help of internet our daily life activities can easily managed by

- Paying utility bills online.
- Investing a money
- Finding a new job
- Online banking like make deposits, withdrawal, etc.
- Keep up-to-date with news and sports events.
- Reading newspapers

**5) What are information storage devices? Describe the use of information storage devices such as video and audio cassettes, video cassettes, hard disk, floppy, compact disc and flash drive.**

**Ans: Information Storage devices:**

Information storage devices can be used to store data for later use. Electronic data storage requires electrical power to store data. Electronic documents can be stored much less space than paper documents. The information storage devices can store information both temporary and permanently and can be internal or external to a computer.

**Types of storage devices:**

Information storage devices are classified in to two main types;

i) Primary storage devices

ii) Secondary storage devices

**i) Primary storage devices:**

A primary storage device is generally small in size that are design to hold data temporarily (short period of time) while a computer is running. They are internal to a computer and have fastest access speed. It vanishes data when the computer is switched off. For example, RAM and cache.

**ii) Secondary storage devices:**

Secondary storage devices have large storage capacity and store data permanently. They can be external or internal to a computer. For example, Audio, video cassettes, hard disk, flash drive, etc.

**Audio and video cassettes:**

A magnetic tape, in computer technology is a storage medium that allows data archiving, collection and backup. At first the tapes were wound in wheel-like reels but then cassettes and cartridges came along which offered more protection for the tape inside.

One side of the tape is coated with a magnetic material. Data on the tape is written and read sequentially. Finding a specific record takes times because machine has to read every record in front of it.

An audio and video cassettes required special devices to played or recorded.

Audio cassettes are used to store music and sound while video cassettes are used for storing video and usually sound in addition.

**Hard disk:**

A hard disk is a secondary storage device that permanently stores and retrieves data on a computer. A hard disk drive is sometimes abbreviated as hard drive, HD or HDD. It is installed inside a system unit. Hard disk can store large amount of data as compared to other devices.
All computers have a hard disk in them which is used to store files for operating system, software programs and user personal files. A computer cannot perform any function without a hard disk.

**Floppy disk:**

A floppy disk drive is a storage device that enables a user to save data on removable diskettes. A floppy disk drive is simply refers as floppy, or FDD. A floppy disk is composed of thin flexible magnetic disk sealed in a square plastic jacket. In order to read data from floppy, a computer must have floppy disk drive.
Floppy disks were widely used to distribute software, transfer files and create backup copies of data. Floppy is used to store small amount of data. The standard size of floppy is 3.5 inch and capable of storing 1.44MB of data. Data access speed of floppy is slower than hard disk and it is less in cost.

**CD and DVD:**

A compact disc (CD) is a portable storage medium that can be used to record, store and play back audio video and other data in digital form. CD is a portable and inexpensive storage device that stores 700MB data. If you have CD-R you can create your own CD by adding any data, you want.

A digital video disk (DVD) is an optical disc capable of storing up to 4.7 GB of data. DVD is used to record, store data music or computer record. DVD is expensive and can store large amount of data as compared to CD.

**Flash drive:**

A USB flash drive is a small size, portable storage device that is used for transferring data from one computer to another. USB flash drive is removable, rewritable and has no moving part. It is used for storage, data back up, and transfer of computer files. Also flash drives are cheap with high quality and large capacity.

**6) What are the functions of word processing?**

**Ans: Word Processing:**

Word processing software is used to manipulate a text document, such as book, letter, article or a resume.
Word processing is a computer program through which we can develop any document by entering text. The software provides different tools for copying, deleting and various types of formatting.

**Functions of word processing:**

Some of the functions of word processing are given below;

## Chapter # 17

**1. Create and Edit:**

We can create any document by entering text and see it on the screen. You can edit the document by adding some new text, changing and deleting the text. If there is a mistake it can be corrected easily.

**2.Saving a document:**

Once a document can be created, it can be stored in memory on hard disk for further use.

**3.Printing:**

We can print out a document to get a hard copy.

**4. Copy, paste and moving a document:**

The text can be duplicated easily without typing it again. The text can be moved from one place to another within a document.

**5. Deleting:**

A text, paragraph and a whole document can be easily deleted.

**6.Formatting text:**

By means of modern word processing, we can write the document in different styles and in different colors like bold, italic or underlining.

**7.Insertion:**

It is easy to insert a word, sentence, photograph or other illustration within a document.

**8.Tables:**

Tables can be created by adding data in it. These tables can be edited by adding or deleting rows and columns.

**9. Spelling and Grammar check:**

If there is a typing mistake it can be easily corrected. Spelling errors are highlighted by red lines and grammar mistakes are by green lines.

**7) How information is handled? Describe data management and its monitoring and control?**

**Ans: Handling Information:**

Information handling is the ability to use ICT for gathering, organizing, storing, retrieving, modifying, interpreting and presenting information. It involves databases, spreadsheets and internet. All users of information system should manage the creation, storage, copying, backups and deletion of information in a manner which protects the confidentiality, integrity and availability of information.

**Data management:**

Data management is an administrative process that includes acquiring, validating, storing, protecting and processing required data to ensure the accessibility, reliability and timeliness of the data for its users.

Data management is to collect information for a special purpose and to store it into a computer in a file form which may help at times when needed. Each file has its own name, address and other identifications.

**Example:**

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

**Activities for efficient data management:**

Designing effective data management solutions consist of three primary activities, which are;

1) An assessment of supply chain information needs to be conducted, including who needs the information, how it will be used and the potential actions that may be taken in response to the data.
2) Standard Operating Procedures (SOPs) should be developed with staff trained on how to adhere to the SOPs. Staff need to trained on how to use the selected tools and equally importantly, on and how to analyze use the results.
3) The collected data should be made available in a format that enables decision making. The format will depend on the resource available and the audience but the data should be accessible and easy to use to answer key supply chain performance questions.

**Monitoring and Control:**

The monitoring and controlling process oversees the tasks necessary to ensure that the approved and authorized project is within scope, on time and on budget so that the project proceeds with minimal risk. Monitoring and controlling process is continuously performed throughout the life of a project.

**Example**:

In big stores and super market, the optical scanner is used with the help of laser beam, to read a bar code of a product which indicates the number. So the detailed and price about the product is obtained. It also helps for placing the order for products being sold in a large quantity and to decide about less selling products.

# CONCEPTUAL QUESTIONS:

**Give a brief response to the following questions.**

**1. Identify the most reliable means of storing information?**

**Ans:** A storage device is a physical piece of hardware that is used to store data. In most cases, any type of file can be added to a storage device. The following storage devices are in common use such as hard disk, CD and DVD and flash drives.

**Hard Disk**:

A hard disk is a secondary storage device that permanently stores and retrieves data on a computer. It can store large amount of data as compared to other devices.

**CD and DVD**:

A compact disc (CD) and Digital video disc (DVD) are circular disc on which data is stored on one or both sides. These are reliable sources of storing information and mostly used for storing movies, music, data and much more.

## Chapter # 17

**USB flash drive:**

A USB flash drive is a small, portable storage device that is used for transferring data from one computer to another. It is removable, rewritable and has no moving parts.

**2. How information is different from data?**

**Ans:** There is a great difference between data and information such as;

- A raw facts and figures that need to be processed is called data. But when data is processed, organized structured or presented in a given content so as to make it useful is called information.
- Data is in an unorganized form while the information is processed and organized form of data.
- Data is based on observations and records but when proper analysis is conducted to convert data into information by researcher to eliminate irrelevant data.

**EXAMPLE:**

For example, in a class test score is a one piece of data but the average score of the class is information that can be derived from the given test.

**3. Why frequency band for uplink and downlink is different in transmission of microwaves through space**?

**Ans:** The uplink frequency is greater than downlink frequency in transmission of microwaves through space. The uplink transmitter is on earth and need plenty of transmit power to overcome the slightly higher path loss inherent in higher frequency signal. On the other hand, the downlink transmitter is located on satellite and less power is needed to transmit data from satellite to earth station. Thus, the frequencies are different due to different values of power consumption.

**4. What does cell in 'cell phone' refer to?**

**Ans:** A wireless phones that can receive their signals from tower is called a cell phone. A cell is a geographical area around a tower in which a signal can be received. The area covered by a cellular phone transmitter can be from one mile to twenty miles in diameter. Several coordinated cell sites are called a cell system. When you sign up to a cellular telephone service provider, you generally are given access to their cell system which is essentially local. When travelling out of range to their cell system, the cell phone is not working properly.

5. **Can internet be used for shopping? Give an example.**

**Ans:** Yes, internet is widely used for shopping in the world. In online shopping a consumer can buy goods or services directly from a seller using a web browser. It has become very easy for the people to shop from home using internet. Different manufacturers present their products on internet. Consumer can buy a product by visiting the website, place an order and even make a payment using credit card.

## Chapter # 17

**Example:**
The few examples of online shopping sites are:

- Amazon
- OLX
- Dara, etc.

6. **How a flash drive is different from other storage devices?**
**Ans:** A USB flash drive is a small, portable storage device that is used for transferring data from one computer to another. A flash drive is different from other storage devices because it is smaller in size. USB flash drive is removable, rewritable and has no moving part. It is used for storage, data back up, and transfer of computer files. Also flash drives are cheap with high quality and large capacity. A USB flash drive can be used for a long time as long as you use it properly to avoid unexpected damage.