INPUT & OUTPUT DEVICES

COMP101 / COMP-111

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Chapter 4

Input & Output Devices

Q.1 What are Input devices? Explain its types.

Anything given to the computer is called input. Data and instructions are given to the computer as input. Input into the computer can be entered:

- Through a keyboard (by typing characters)
- By selecting commands (icons) on the screen and then clicking with a mouse
- By pressing a finger on a touch screen
- By speaking into a microphone
- By sending the image through a digital camera
- By scanning data printed on paper through scanner etc.

Input devices:

Any hardware component used to enter data and instructions into the computer or mobile device is called an input device. It takes input (data or instructions) from user and converts it into a form that a computer can understand and use. Different input devices are used for entering data and instructions into a computer. Examples of input devices are keyboard, mouse, scanner, touchpad, trackball, joystick, microphone, digital camera, etc.

Types of input devices:

There are multiple types of input devices. Some of those are given below.

1. Keyboard
2. Mouse
3. Trackball
4. Touch pad / track pad
5. Pointing stick
6. Touch screen
7. Digital camera
8. Light pen
9. Joystick
10. Scanners and readers
11. Microphone

1. Keyboard:

Keyboard is the most commonly used input device. It is mostly used to enter text and numeric type data into the computer. Buttons on the keyboard are called keys. Keyboard contains keys for all alphabetic characters, numeric digits, and special characters. It also contains some special keys known as function keys. A standard keyboard contains more than 100-keys like

QWERTY keyboard. This is because first six leftmost keys on top row of alphabets are Q, W, E, R, T, and Y. A keyboard is connected to serial or USB port on system unit.

2. Mouse:

It is used to control cursor or pointer on the screen and to give commands to the computer. As a user moves a mouse, pointer on the screen also moves. Mouse is connected with computer by a cable or wireless connection. Usually, a mouse with a cable is connected to USB port on system unit. Front of the mouse's casing contains one wheel and 2 or 3 buttons. These buttons can be clicked or double clicked to perform different tasks. For example, an object (icon) on the screen is selected by clicking left button of the mouse. Similarly, a program or folder is opened by double clicking left button of mouse. Bottom of a mouse is flat and contains a mechanism that detects movement of mouse. Commands can be given to computer very easily and quickly. Mouse also allows the user to create graphics such as lines, curves, and freehand shapes, on the screen

3. Trackball:

It performs functions like a mouse but it is a stationary device. It has a moveable ball on its top. The ball is rotated or rolled with fingers (or the palm of the hand) to control the movement of a pointer on the screen. Like a mouse, a trackball also has buttons used to send commands to computer. However, a trackball has additional buttons whose functions vary depending upon software. Trackball is usually available with a laptop computer. It is fixed on its keyboard. A trackball is also available as a separate input device. Some cordless trackballs are also available. These are not directly connected to computer with a wire.

4. Touch pad / track pad:

A touchpad is a pressure-sensitive pointing input device. It is also called trackpad. Like a trackball, a touchpad is also a stationary device but it has no moving parts. It is a small, flat surface (or sensitive pad) over which a user slides his/her fingertip to move the pointer on the screen. As a user slides his/her fingertip on flat surface of touchpad, pointer (or cursor) moves on the screen. Some touchpads have one or more buttons around the edge of the pad. These buttons work like mouse buttons. Some touchpads have no button. On most touchpads, users can tap the pad’s surface to initiate mouse operations such as clicking. Touchpads are now commonly used with portable computers such as laptops and are built-in on their keyboards. We can also connect a touchpad to a personal computer. Advanced keyboards also have a built-in touchpad

5. Pointing stick:

It is a pressure sensitive device. It is similar to pencil eraser and exists between keys on the keyboard. The pointer on the screen moves when the user pushes the pointing stick. It requires no additional space or cleaning like mouse. Pointing stick is normally used with notebook computers.

6. Touch screen:

A touch screen is a touch sensitive display device. The user can touch different parts of the screen. He touch screen either using fingers or stylus to input data and issue commands. Many touch screens today are multi-touch and can recognize input from more than one finger at a time. For example, the user can touch the screen with two fingers to enlarge or rotate an image

on the screen. Touch screens are commonly used in tablets, mobile devices, retail stores or ATMs etc.

7. Digital camera:

Digital camera is used to store digital images by taking pictures. It stores captured images on storage in the camera or some kind of memory card. Photos taken with digital camera are typically transferred to a computer using some wired or wireless connection. Many digital cameras allow the user to edit the images. The number of digital photos depends on the amount of memory in the camera.

8. Light pen:

A light pen is handheld pointing device. It looks like a pen. It is connected to the computer through a wire. When user touches the pen on specific areas of a specially designed screen, it sends information to the computer. Light pen is usually used by engineers and graphic designers etc.

9. Joystick:

A joy stick consist of a base and a stick. The stick can be moved in any direction to move an object around the computer screen. A joy stick can perform similar task to a mouse of trackball. It is mostly used for playing computer games.

10. Scanners and reading devices:

Scanner reads data or information from a source. This source could be a written document, a print tag, a graphic image or a photograph. A scanning device reads the data or information and then converts into a form that can be processed by the system unit. Two types of scanning devices are optical scanners and optical readers.

11. Microphone

A microphone is an input device. It is used to digitally record audio data such as human voice. It can be plugged into a computer or recorder. Many software applications can accept data with microphone. The software in the computer converts the sound waves into digital form.

Q.2 Write a Keyboard.

Keyboard is the most commonly used input device. It is mostly used to enter text and numeric type data into the computer. Buttons on the keyboard are called keys. Keyboard contains keys for all alphabetic characters, numeric digits, and special characters. It also contains some special keys known as function keys. A standard keyboard contains more than 100-keys like QWERTY keyboard. This is because first six leftmost keys on top row of alphabets are Q, W, E, R, T, and Y.

A keyboard is connected to serial or USB port on system unit. Some keyboards do not require cable to connect with computer. These keyboards enter data into computer through wireless technology such as radio waves (Bluetooth) or infrared light waves (IrDA). These types of keyboards are known as **Cordless** or **Wireless keyboards.** Every keyboard consist of Function keys, Main keyboard, Numeric keys and Additional keys.

Function keys:
There are 12 function keys on the top of the keyboard that are labeled from F1 to F12. These keys are used to perform some special functions. Function of each function key depends upon the software being used on computer. For example, in many software, function key F1 is used to get help about software currently running on the computer.

Main Keyboard:
Main keyboard area is like a typewriter keypad. It includes alphabetic character keys, numeric keys, and some special command keys. Functions of command keys depend upon software being used on the computer. Some of the most commonly used command keys are Esc, Tab, Caps Lock, Shift, Ctrl, Alt, Backspace, Enter etc.

Numeric keys
This part of keyboard consists of numeric keys and arithmetic operator keys. These keys are usually located on the right of the keyboard. These keys are similar to calculator keys. This part of keyboard also has an extra Enter key and Num Lock key. Num Lock key is used to activate or de-activate numeric keypad. It is a toggle key

Additional Cursor control Keys:
Keyboards also have some additional keys. Most of these keys are used to move cursor inside the document. Arrow keys, Insert, Delete, Home, End, PgUp, PgDn, Print Screen, Scroll Lock, Pause, Windows.

Q.3 Write a short note on Pointing Devices.
A pointing device is an input device that is used to control a pointer (cursor) on the screen and to give commands to the computer. A pointer represents a small symbol on the screen. It usually appears on the screen in the Graphical User Interface (GUI). For example, an arrow appears on the screen in the Windows environment. Location of the pointer on screen changes as a user moves pointing device. Pointing device can be used to select text, graphics, or other objects and to open a file/folder or run a program. Similarly, we can perform many other functions very easily and quickly using a pointing device. For example, engineers use pointing devices to draw graphs or maps. Examples are mouse, joystick, trackball, track pad, light pen, etc.

Q.4 Write a note on Mouse.
It is used to control cursor or pointer on the screen and to give commands to the computer. As a user moves a mouse, pointer on the screen also moves. Mouse is connected with computer by a cable or wireless connection. Usually, a mouse with a cable is connected to USB port on system unit. Front of the mouse's casing contains one wheel and 2 or 3 buttons. These buttons can be clicked or double clicked to perform different tasks. For example, an object (icon) on the screen is selected by clicking left button of the mouse. Similarly, a program or folder is opened by double clicking left button of mouse. Bottom of a mouse is flat and contains a mechanism that detects movement of mouse. Commands can be given to computer very easily and quickly. Mouse also allows the user to create graphics such as lines, curves, and freehand shapes, on the screen

Types of Mouse

Mechanical Mouse

A mechanical mouse has a rubber or metal ball inside it and an electronic circuit containing sensors. Ball rotates as mouse is rolled over a flat surface. Movement of pointer depends on rotation of ball. Nowadays, this type of mouse is rarely used

Optical Mouse

No ball inside it. It uses a device that emits and senses light to detect the movement of the mouse. Some optical mouse devices use optical sensors, and other use laser to detect the mouse movement. Nowadays, the optical mouse is commonly used in personal computers (PCs)

Wireless or Cordless Mouse

Not directly connected with computer. It uses wireless technology, such as radio waves (Bluetooth) or infrared light waves (IrDA). It enters input signals into computer in a similar way as a cordless keyboard

Air Mouse

Air mouse is similar to a remote control. It is a motion-sensing mouse. It is used in presentations for running slide shows, controlling media, and other objects. For example, raising mouse up might increase volume of media player. Air mouse works in air by detecting the direction of hand motion.

Q.5 Define Scanners. Write a note on its types.

A scanner is a light-sensing input device. It reads images and text printed on the paper and then translates into a form (i.e. digital form) the computer can process. Scanner uses laser technology to scan image on the printed paper and store it into the computer. Many scanners also include OCR software (Optical Character Recognition software). This software can convert a scanned image of the document into a text file that can be edited in a word processing application

Types of Optical Scanners

There are three types of scanners

- Flatbed Scanner
- Handheld Scanner
- Sheet-Fed Scanner

Flatbed Scanners

It is also known as an image scanner. It scans a full image of the document at a time. It works like a photocopy machine. The most common type of scanner, flatbed scanners have a large glass surface and a lid. These scanners work best with flat objects, such as photos and papers, but you can also place larger items such as open books onto the scanner

bed. The document to be scanned is placed on the glass surface and a flip-up cover is put over it. Scanner reads the whole image/document at a time and sends it to computer memory for storage. Flatbed scanners are mostly used at home and small offices. Some models of flatbed scanner come built in to all-in-one devices, which function as printers, scanners, copy machines and fax machines.

Handheld Scanners

Hand scanners or handheld scanners are small wand-shaped devices. It is also called a pen scanner. It is a small handheld scanning device. It is used in the same way as we use a marker highlighter. Handheld scanner is dragged over the image to be scanned. Usually, a handheld scanner is used for scanning small images, text, numbers, and bar codes. For example, it can be used for scanning articles from magazines, newspapers, and books. Handheld scanners are available in different shapes and types.

Sheet-fed Scanner

A sheet-fed scanner is a type of scanner that scans only one piece of paper at a time. Paper is moved automatically through the scanner across a stationary scan head. Sheet-fed scanners scan loose papers placed in a tray by pulling them across a static scanning lens. These devices make it easier to scan a large stack of papers than a flatbed scanner, where you would have to insert and remove each page. Sheet-fed scanners can scan photos, letters, forms, business cards, and even receipts. However, they won't work to scan books or large papers that don't fit in the tray. Some sheet-fed scanners feature additional trays designed for smaller items such as business cards. Sheet-fed scanners are available in different shapes and types.

Q. Write a note on output.

Data processed into a useful form is called output. The form of output varies, depending on the hardware and software being used and the requirements of the users. Users can view output on a screen, or print it on the paper through a printer, or store it on the disk in a file. In case of audio output, it can listen through speakers, headphones, or earbuds

Classification of Output

- Softcopy Output
- Hard Copy

Soft Copy:

Output viewed on the display screen & output in the form of audio or video. This kind of output is not tangible. It means that softcopy output cannot be touched. Output stored in a file on a disk is also a form of softcopy. Commonly used softcopy output devices display screen and speaker (for audio output)

Hardcopy Output:

Output printed on the paper. It may be in the form of text and graphics. Commonly used hardcopy output devices are printers and plotters.

Output Devices:

A hardware component that is used to receive the output from the computer is called an output device. It takes information from computer and converts it in a form that a user can understand. Commonly used output devices are

- Monitors
- Printers
- Plotters
- Speakers

Q. Monitors

Monitor is a commonly used output device on personal computers. Display device, also called a display device or simply display. It is used as a softcopy output device. It consists of a screen and different electronic components that display information on the screen. In a desktop computer, a monitor is a separate unit. In mobile computers and devices, monitor is built into the top of the case. Most of the monitors display text, graphics, and video in different colors. Today, most of the personal computers use color monitors. However, some monitors are monochrome. Monochrome means that information appears in one color. Today, monochrome monitors are rarely used.

Features of Monitors

Size

Size of a monitor (display screen) is measured diagonally in inches. From upper-right corner of the screen to the lower-left corner. Display screens are available in various sizes. Today, desktop computer screens are available from 17 to 30 inches, laptop screens from 14 to 17 inches, and tablet screens from 7 to 10 inches.

Color:

Display screens can be either color or monochrome. Color display screens show output in multiple colors. Color display screens are also called **RGB monitors.** RGB stands for Red, Green, and Blue. RGB display screen can create 256 different colors and thousands of variations of these colors. Today, most of the display screens show output in multiple colors.

Resolution

Display screen is divided into small dots called **pixels.** Pixels are arranged horizontally and vertically. Number of pixels on a screen is called its **resolution.** For example, a monitor screen with a resolution of 1440 × 900 has 1440 pixels horizontally and 900 pixels vertically. Monitor's screen that has a large number of pixels has a high resolution. Resolution refers to the sharpness and clearness of an image. High-resolution monitors are always preferred to see video films as well as for designing graphics

Dot Pitch:

Distance between pixels on the monitor screen is called **dot pitch or pixel pitch.** It is measured in millimeters. Dot Pitch is another factor that is used to measure the image clarity on a monitor. Smaller the distance between the pixels, higher will be the resolution of display screen.

Types of Monitors

There are two types of monitors:

- CRT Monitors
- Flat panel monitors

CRT Monitors

CRT stands for Cathode Ray Tube. This monitor contains a cathode ray tube (CRT). Cathode ray tube is a vacuum tube. Front of the tube is the screen on which output appears. Back of the screen is coated with phosphor (chemical material that lights up when an electron beam falls on it). Screen is organized into a grid of tiny dots of phosphor material. Smallest number of phosphor dots that the electron gun can focus on is called a **pixel.** CRT monitor contains one or more **electron guns**. A stream of bits defining the image of output is sent from the computer (from the CPU) to the CRT, where the bits are converted into a beam of electrons. Electron gun fires the beam of electrons. Beam of electrons passes through focusing and deflection systems. They direct beam towards specified points on the phosphor-coated screen. When a beam of

electrons hits the dots of phosphor, it lights up the selected dots (pixels) and an image of output is generated on the screen. In color CRT monitors, there are three electron guns; one for red color, second for green color, and third for blue color (RGB). Other colors for output are generated with the combination of these three colors. A typical CRT monitor can display output in 256 to 65,536 colors.

Flat-Panel Monitors

A flat panel monitor is a lightweight display device. It takes less desk space. It also consumes less power than a CRT monitor. However, it is expensive than the CRT monitor. A flat panel monitor is made up of two plates of glass. These plates contain a substance in between them. This substance is activated in different ways. The flat panel monitors are available in different sizes. They are mostly used with laptops and mobile devices. Examples of mobile devices that use flat panel monitors are digital cameras, tablet PCs, PDAs, and mobile phones. In these devices, they are built-in as small screens. Size of the screen is from 2.5 to 4 inches. Today, flat panel monitors are also commonly used with desktop computers.

Types of Flat-Panel Monitors

Types of Flat-panel Monitors are as follows:

- LCD Monitor
- LCD Screen
- LED Monitor
- OLED Monitor
- Gas Plasma Monitor

LCD Screen

LCD screen is used in mobile devices. These devices have built-in LCD screens. Most of the LCD screens are touch screens. Examples of mobile devices that use LCD screens are smartphones (mobile phones), PDAs, and digital cameras

LED Monitor

LED stands for Light Emitting Diode. LED monitor is a light weight flat panel display unit. It uses LEDs (light-emitting diodes) as pixels for displaying output. It produces bright images, emits less radiations, more reliable, and consumes less electric power than the LCD monitor. Lifetime of the LED monitor is also longer than other types of monitors. However, LED monitors are expensive than other types of monitors. Screens in laptops and mobile devices often use LED technology.

OLED Monitor

OLED stands for Organic Light Emitting Diode. OLED monitor is a type of flat-panel monitor. It uses organic molecules that are self-illuminating and, thus, do not require a backlight. It consumes less power and produces brighter images than LED or LCD monitors

Gas Plasma Monitor

A plasma monitor or display uses gas plasma technology. It uses a layer of gas between two glass plates. Gas emits ultraviolet light when an electric current is supplied. This light causes

the pixels on the screen to glow and form the image. Gas plasma monitors offer large screen sizes up to 150 inches. Display quality of these screens is also higher than the LCD monitor. However, these monitors are expensive than the LCD monitor. That is why gas plasma monitors are not commonly used

Q. Differentiate between CRT and Flat-Panel Monitors.

Flat-Panel Monitor	CRT Monitor
Lightweight than a CRT monitor	Heavier than a flat panel monitor
Commonly used in mobile computers and devices	Used in some desktop computers
Consumes less electric power than a CRT monitor	Consumes more electric power than a flat panel monitor
Uses liquid crystal or gas plasma technology to display output	Uses a cathode ray tube to display output
Can operate with a charged battery	Operates with electric power only
More expensive than a CRT monitor	Less expensive than a flat panel monitor
Takes less desk space than a CRT monitor	Takes more desk space than a flat panel monitor
Emits harmful radiation	Does not emit harmful radiation

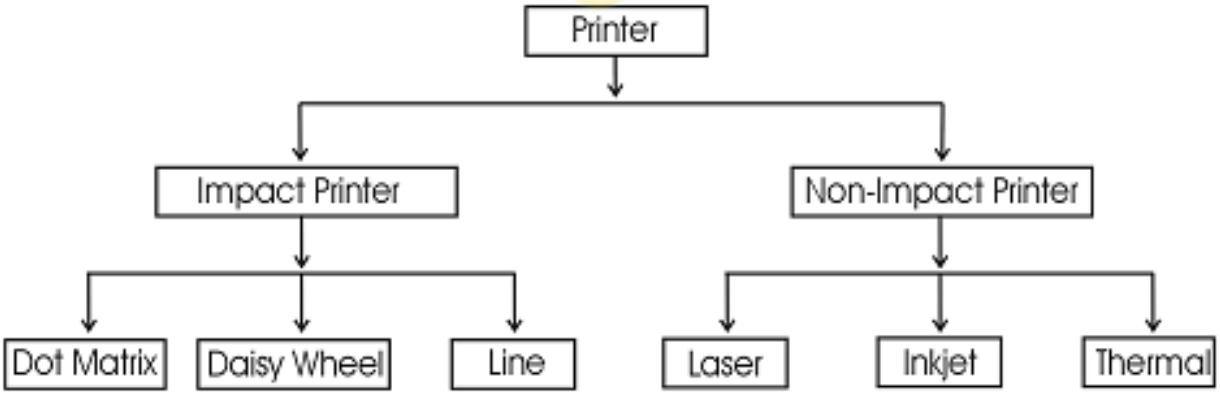
Q. What are printers?

Printers are the most commonly used output devices. They are used to print documents (output) on the papers. Output printed on the paper is called **hardcopy.** Hardcopy is also called as a printout. Output may be in the form of characters, symbols, and graphics. A printer is connected to a parallel port or a USB port of system unit by a cable.

Types of Printers:

There are two types of printers.

- Impact printers
- Non-impact printers



Impact Printers:

An impact printer works like a typewriter. It produces output on paper by striking a print hammer or set of pins against an inked ribbon. The ink is pressed from ribbon on the paper to produce the output. It uses an electro-mechanical technique to print output on the paper. It can print characters and graphics on the paper. Impact printers are slower in printing and produce low-quality output. Printing speed of these printers is measured in characters or lines per minute. They also produce more noise during printing. However, impact printers are less expensive. Today impact printers are not commonly used. Examples of impact printers are character printers (such as dot matrix printer & daisy wheel printer) and line printer (such as chain printer and drum printer)

Non-Impact Printers:

A printer that produces output on paper without striking the paper is called a non-impact printer. Some non-impact printers use spray ink while other use heat and pressure to create images. Non-impact printers use electrostatic, inkjet, laser, and thermal technologies for printing. Non-impact printers are faster and produce high-quality output than impact printers. They produce no noise during printing. These printers are costly than impact printers. Examples of non-impact printers are laser printer, ink-jet printer, thermal printer, and photo printer.

Q. Explain types of Impact Printers.

Types of Impact printers:

There are different types of impact printers. Some of them are as follows:

- Dot matrix printers
- Daisy wheel printers
- Line printers

Dot Matrix Printer

A Dot Matrix printer in an impact printer. It makes a hardcopy by printing one character at a time. Speed is measured by the number of characters it can print in one second. Printing speed of dot matrix printer is from 300 to 1100 characters per second (cps) or more. A dot matrix printer contains a print-head with a matrix of small pins arranged in rows and columns (in the form of a matrix). Print-heads are available with 9, 18, or 24 pins. This printer produces output on paper by striking pins (with a different combination of pins) against an ink ribbon. It forms the shape of output (characters or graphics) on paper by a number of dots. Usually, a dot matrix printer uses 100 to 300 dots per inch (DPI) to print output. Print-head that has more number of pins provides the best quality printout. The printing cost of these printers is very cheap. Dot matrix printers do not provide high quality output. They produce a lot of noise while printing.

Daisy Wheel Printer

Similar to a typewriter. It has a print wheel with a series of petals. This wheel is known as the daisy wheel. Daisy wheel have many petals and each petal of the daisy wheel contains a character at its end. A motor rotates the wheel. When the desired character reaches the print position on the paper, a hammer strikes a petal against the ribbon. This prints the character on the paper. Printing speed is in the range of 10 to 100 characters per second. Slower than the dot-matrix printer. However, its print quality is better than the dot matrix printer.

Line Printers:

Line printers are very fast printers. It prints a complete line of characters at a time. Printing speed is measured in lines per minute (lpm) which is up to 3000 lines per minute. Line printers are normally used with mainframe and minicomputers. Examples are Chain printer and Drum printer etc.

Q. Explain Types of Non-Impact Printers.

Different types of Non-Impact printers are follows:

- Laser printers
- Inkjet printers
- Thermal printers

Laser Printer (Light Amplification by Simulated Emission of Radiation):

A laser printer is the fastest and high-quality non-impact printer. A laser printer works like a photocopying machine. It uses laser technology to print image of output on the paper. It uses a **LASER beam** to burn the powder on the page to create a permanent image on the paper. This ink powder is contained in the **toner**.

Laser printers are available in both black-and-white and color models. Today, laser printers are commonly used for printing different types of documents. Laser printer prints one page at a time, therefore called page printer. The printer speed of laser printers is 12 to 45 **pages per minute (PPM)**. The printing speed for large business users is 150 **PPM** or more. The speed depends on the content being printed. Plain text is printed faster than graphics.

Laser printer prints text and graphics in high resolution. A typical laser printer provided a resolution of 1200 DPI or more. It also prints at higher speed than inkjet and dot matrix printers. Laser printer is mostly used in business field. The black and white printing cost of laser printer is less than inkjet printer. Laser printers are available in black and white as well as color models.

Ink-Jet Printer

It creates output on paper by spraying tiny drops of liquid ink. It can print text and graphics in both black-and-white and color. Printing speed is measured by number of pages per minute (ppm), it can print (it means that it is a page printer). Most ink-jet printers can print 12 to 36 pages per minute.

However, they print graphics and colors at a slower rate. Inkjet printer has a print-head that can spray very fine drops of ink. It consists of **cartridges** filled with liquid ink (some of them contain black ink and others contain color ink). Each cartridge has small nozzles in the form of a matrix. Like a dot matrix printer, combination of nozzles is activated to form the shape of characters or images on paper by spraying liquid ink through holes of nozzles. Most inkjet printers have resolution ranging from 1200 to 4800 dpi (dot per inch). In case of an inkjet printer, a dot is a drop of ink. These are less expensive, slower, prints in low quality than laser printers. However, faster and have high print quality than dot-matrix printers.

Thermal Printer

It prints information on heat-sensitive paper by pushing electrically heated pins. Basic thermal printers are not very expensive but their print quality is low. These printers are typically used to print receipts at ATMs and retail stores, electronic tickets at airports, tokens at banks, and other public places. Modern thermal printers have high print quality. They are also faster than ink-jet and laser printers

Q. Write a note on Plotters.

A plotter is a special output device. It is used for printing architectural drawings, building maps, and charts. A plotter is typically used to print large graphs or maps such as construction maps or engineering drawings. Plotter is normally a very slow output device. It works on the principle of holding a pen in hand and moving it on paper for drawing lines.

Types of Plotters

- Flatbed Plotter
- Drum Plotter

Flatbed Plotter

A flatbed plotter is also known as a table plotter. It plots on paper that is placed over a table-like surface. Typically, plot size is equal to the area of a bed. Bed size varies according to the need. Flatbed plotter uses two robotic drawing arms, each of which holds a set of pens. Most of the flatbed plotters have one to four pens of different colors. These pens move across the paper to draw charts or graphs on the paper. Movement of these pens is controlled by the computer system. Flatbed plotters are used in the design of cars, ships, aircraft, buildings, highways, etc. Flatbed plotters are very slow in drawing or printing graphs. Large and complicated drawing can take several hours to print

Drum Plotter

A drum plotter is also known as a roller plotter. It consists of a drum or roller on which a paper (a large paper sheet) rotates during printing. Paper or sheet is fed to this plotter. A drum plotter also consists of a mechanical device known as a robotic drawing arm that holds a set of pens or pencils. Drum rotates back and forth to draw (or print) the graph on the paper. Robotic drawing arm also moves side to side as the paper is rolled back and forth through the roller. This work is done under the control of the computer. These plotters are used to produce continuous output such as to record earthquake readings.

Q. Explain Audio Output.

Output in the form of voice, music, or any other sound is called audio output. Devices that are used to receive audio output (i.e. listen to music, speech, or other sounds) from a computer or mobile device are called audio output devices. Commonly used audio output devices are speakers, headphones, earphones or earbuds, and headset

Speakers

A speaker is used to receive audio output from the computer. It produces softcopy output in the form of voice. In some personal computers, speakers are built into the monitor. Similarly, mobile computers and devices have integrated speakers (or internal speakers). These speakers have a low-quality audio output. An external sound speaker (or stereo speaker) can be attached to the computer or mobile device for high-quality audio output. It is connected to the computer through the sound card on the motherboard. Speakers are available in different shapes and sizes. Wireless speakers are also available

Headphones, Earbuds & Headset

A speaker may create disturbance for others and also may create other privacy problems. For example, in a computer laboratory or office or any other crowded environment, speakers might not be practical. Headphones or earbuds are used for the solution of these problems. Only the individual wearing the headphones or earbuds hears the sound from the computer. Headphones and earbuds (earbuds are also called earphones) are audio output devices. Difference is that headphones are placed outside the ears, whereas earbuds or earphones are rest inside the ear canal. An audio output device that functions as both headphones and a microphone is called a **headset.** It is often used for making telephone calls or participating in video conferences or web conferences. Many headsets communicate wirelessly with a computer or mobile device. Wireless headsets are commonly used with smartphones